Report of the Health Technology Task Group (HTTG)

By Cari Borrás, D.Sc., FACR, FAAPM, FIOMP

HTTG Chair

to the IUPESM Administrative Council and General Assembly

at the World Congress 2015

Toronto, Canada

[http://www.iupesm.org/health-technology-tas-group-httg](http://www.iupesm.org/health-technology-tas-group-httg)

## Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Summary of Activities</strong></td>
<td></td>
</tr>
<tr>
<td>I. Reorganization of the Task Group</td>
<td>4</td>
</tr>
<tr>
<td>II. Administrative Meetings</td>
<td>4</td>
</tr>
<tr>
<td>III. Scientific/Educational Workshops, Symposia and Tutorials organized by the HUTT</td>
<td>5</td>
</tr>
<tr>
<td>• Workshop on “Radiological Equipment Maintenance Issues”, 8 September 2014, MBEC2014, Dubrovnik, Croatia</td>
<td>5</td>
</tr>
<tr>
<td>• Tutorial “Disaster Preparedness Program for Health Facility’s Technology Managers”, 10 September 2014, MBEC2014, Dubrovnik, Croatia</td>
<td>6</td>
</tr>
<tr>
<td>• “International Course on Technology Transfer for Epidemiologic Research and Public Health Heavy Metals” co-sponsored by the IUPESM, the Pontificia Universidad Católica del Perú (PUCP) and the (Peruvian) National Institute of Health (INS), 7 and 8 May 2015, Lima, Peru.</td>
<td>6</td>
</tr>
<tr>
<td>• Workshop on “Innovations in the Use of Mobile Devices in Healthcare”, 11 June 2015, WC 2015, Toronto, Canada</td>
<td>6</td>
</tr>
<tr>
<td>IV. Participation/ Presentations at Meetings</td>
<td>7</td>
</tr>
<tr>
<td>• IAEA/WHO International Conference on Radiation Protection in Medicine: Setting the Scene for the Next Decade, December 2012, Bonn, Germany</td>
<td>7</td>
</tr>
</tbody>
</table>
• Medicon 2013, September 2013, Seville, Spain
• ICSU ROLAC Workshop, January 2014, Varadero, Cuba
• Pan American Health Organization (PAHO) Workshop, January 2014, Havana, Cuba
• 12th Medical Physics Congress of Argentine Society of Medical Physics (SAFIM) / 1st Medical Physics Congress of the Americas, May 2014, Buenos Aires, Argentina
• 19th World Congress on Disaster and Emergency Medicine, April 2015, Cape Town, South Africa
• International Training Workshop on 'Design and fabrication of a PC-based ECG equipment', 2016, Dhaka, Bangladesh

V. Publications – Completed

• IUPESM-HTTG Workshop on Radiological Equipment Maintenance Issues. 8
• Disaster Preparedness Program for Health Facility’s Technology Managers 9
• On-line Program for CT Quality Control 9

VI. Publications in Preparation

• Defining the medical imaging requirements for a rural health center 9
• Innovations in the Use of Mobile Devices in Healthcare 9

VII. Website Update

VIII. Projects

• Low-Cost Digital Detector for Medical Imaging 10
• On-line Computed Tomography Quality Control Program 11
• Innovative point-of-care diagnostic platform (the LabDisk) 12
• Global Resource Center for Training of Health Technology Managers on Disaster Preparedness 13

IX. Other HTTG involvement 14

B. Budget 15

C. Recommendations 16

Appendices 1-8: Workshop Programs 17-25

A. Summary of Activities

[Information on the activities listed below, including the reports and documents cited, can be found in the IUPESM website: http://www.iupesm.org/health-technology-tas-group-httg]

I. Reorganization of the Task Group

• Cari Borrás was appointed new HTTG Chair and Yadin David HTTG Vice-Chair by Herb Voigt, IUPESM President.

• The Terms of Reference (TOR) presented by C. Borrás at the WC 2012 were modified with input from IUPESM officers, especially the president, and endorsed, together with a tentative Work Plan, by the HTTG members at their first meeting in July 2013.

• Members for the HTTG were sought, including a Vice-Chair. The goal was to have a globally distributed representation of medical physicists and biomedical engineers interested in implementing the HTTG goals under the IUPESM umbrella. The process took some time and the final membership was not consolidated and functioning until June 2013. The current list of HTTG members is as follows: Yadin David (Vice-Chair), USA; Barry Allen, Australia; Saide Calil, Brazil; Mario Castañeda, USA; J. Tobey Clark, USA; Kwan Hoong Ng, Malaysia; Colin Orton, USA, Marlen Perez, Cuba; Khondkar Siddique-e Rabbani, Bangladesh; Rossana Rivas, Peru; Herbert Voigt, USA, ex officio. I want to take this opportunity to thank every one of the HTTG members for their dedication and team work over the past years.

II. Administrative Meetings

Although the HTTG worked mainly by e-mail and telephone, the members have also met virtually and physically.

• E-meetings were held on 25 July 2013 and on 14 August 2014, using Kaiser Permanente GoToMeeting bridge services. Voice, video and screen sharing features were used throughout the meetings. The HTTG is very appreciative to Fred Hosea, who facilitated these services at no cost to the IUPESM.

• Physical meetings were held on 2 September 2013 (this was actually a ‘Strategic Planning Meeting’) during the ICMP 2013 in Brighton, UK, and on 25 November 2013 in Geneva, Switzerland, during the WHO 2nd Global Forum on Medical Devices.

• A final meeting is scheduled on 7 June 2015 during the WC 2015 in Toronto, Canada.
III. Scientific/Educational Workshops, Symposia and Tutorials organized by the HTTG. (The program and the slides of all these HTTG events are uploaded in the IUPESM-HTTG website)

- **Workshop on “Digital Imaging X-ray Detectors: Historical Perspectives, Current Capabilities, Future Promises”, September 1, 2013, ICMP 2013, Brighton, UK.** The purpose of the Workshop was to provide attendees with an overview and the latest information on large area digital x-ray detectors for medical imaging. The specific objectives were: to present physical characteristics of new digital x-ray detectors and selected clinical applications; to define image quality and radiation dose metrics and describe their measurements; and to discuss practical aspects of initiating a digital radiology department, including costs, especially in resource-limited settings. The program is attached as Appendix 1.

- **Workshop on “Disaster Preparedness for Health Technology Managers”, 22 November, 2013, 2nd WHO Global Forum on Medical Devices, Geneva, Switzerland.** The Workshop presented and discussed the variety of vulnerabilities faced by hospitals, such as earthquakes, flooding, high-winds risks, as well as the best ways to mitigate the risk of damage and disruption of hospital operations caused by these events, including potential damage caused to radiological equipment. The program is attached as Appendix 2.

- **Symposium on ”Health Technology Management and Utilization Challenges: The role of biomedical/clinical engineers, medical physicists and radiation safety professionals”, 2nd World Health Organization (WHO) Global Forum on Medical Devices: “Priority Medical Devices for Universal Health Coverage”, 24 November 2013, Geneva, Switzerland:** The HTTG made a presentation on the roles of different professionals (Biomedical/clinical engineer, Medical physicist, Radiation safety professional) in the development and sustainability of Healthcare Technology Management. The symposium clarified that the main function of the biomedical engineer is the research, design and manufacturing of medical devices; that of the clinical engineer, assuring optimal selection, installation, integration and safe performance of technology; and that of the medical physicist, the interaction with clinicians and other staff to optimize medical imaging and radiation oncology procedures that could include non-ionizing and ionizing radiation; in the latter case, the medical physicist can also be responsible for radiation safety. The program is attached as Appendix 3.

- **Workshop on "Radiological Equipment Maintenance Issues”, 8 September 2014, MBEC2014, Dubrovnik, Croatia.** The workshop explored and discussed the role of biomedical engineers at the design stage; the clinical engineers role in the training of local staff and coordinating with the manufacturer’s representatives for basic service issues; the advantages and disadvantages of contracting 3rd party vs manufacturers maintenance services; and the added complication, usually dealt with by medical physicists, of ensuring radiation safety and compliance with national/international radiation protection regulations. The critical matters in developing countries, where often facilities will ask a donor for new equipment rather than fixing the otherwise adequate one, were emphasized. The program is attached as Appendix 4.
• Tutorial “Disaster Preparedness Program for Health Facility’s Technology Managers”, 10 September 2014, MBEC2014, Dubrovnik, Croatia. The tutorial provided information on natural and made-man disasters by experts from the clinical engineering and medical physicist’s communities and offered solutions that can improve the safety of hospitals in disaster events, including nuclear/radiological accidents. The program is attached as Appendix 5.

• “International Course on Technology Transfer for Epidemiologic Research and Public Health Heavy Metals” co-sponsored by the IUPESM, the Pontificia Universidad Católica del Perú (PUCP) and the (Peruvian) National Institute of Health (INS), 7 and 8 May 2015, Lima, Peru. The course was an initiative of the IUPESM President, H. Voigt, concerned about the health effects of heavy metals in Peru, especially due to illegal mining. Some HTTG members such as C. Borrás and Y. David were involved in the initial stages: C. Borrás, seeking institutional support, visited WHO staff members in Geneva and PAHO staff members in Washington DC involved in the public health and toxicological aspects of heavy metals. No funding could be secured but a mercury toxicology expert at the PAHO/Peru office could be made available cost-free. Y. David and C. Borrás also reviewed the draft contract between the IUPESM and the PUCP, that H. Voigt had sent to the HTTG for its input, and asked questions and suggested modifications. By January 2014, when C. Borrás met H. Voigt in Cuba, it became clear that no formal contract was necessary, since Dr. Voigt was going to go to Peru as a Fulbright Scholar at the PUCP and could organize all the things there. Furthermore, R. Rivas –who lives and works in Lima– could, and did, help him. According to Dr. Voigt, she “played an extraordinary role in obtaining Peruvian NIH money to supplement the IUPESM grant to support the Workshop and then played a remarkable role in logistical support of the Workshop. She also gave a presentation at the Workshop, as did I.” The program is attached as Appendix 6.

• "Medical Physics and Biomedical Engineering Response to Cancer Control: A Global Health Challenge. A Symposium Sponsored by IUPESM-HTTG and UICC-GTFRCC", 10 June 2015, WC 2015, Toronto, Canada. Cancer is no longer the exclusive problem of industrialized countries. To explore the current situation worldwide, the World Health Organization will present the most updated statistics and medical physicists and biomedical engineers will suggest how the two professions can improve the situation by examining new research findings, what constitutes appropriate technology, how to achieve expertise mobilization and reviewing the role of several international organization in cancer management. The program is attached as Appendix 7.

• Workshop on “Innovations in the Use of Mobile Devices in Healthcare”, 11 June 2015, WC 2015, Toronto, Canada. This Workshop will address the use of mobile systems and devices such as smartphones, tablets, and laptops to address the unmet healthcare needs in rural/urban marginalized areas of the resource-limited regions of the world, where health conditions and vital signs data acquired from geriatric, pediatric and infirm patients have to be communicated in a timely manner to adequately trained and qualified caregivers. The Workshop will assess the clinical needs to be fulfilled, review some innovative solutions that are ready to be implemented, identify benefits from the implementation of such mobile systems by
overcoming barriers and matching patient needs with solutions, and discuss how to assure continuum of care and remote support to improve the utilization and maintenance of existing equipment. New devices (hardware and software), which provide improved healthcare at the point-of-care, will be demonstrated. The program is attached as Appendix 8.

IV. Participation/ Presentations at Meetings

• **IAEA/WHO International Conference on Radiation Protection in Medicine: Setting the Scene for the Next Decade, December 2012, Bonn, Germany:** C. Borrás presented, as HTTG Chair, a talk on “Challenges and opportunities with refurbished/second hand equipment”, at the session: “Meeting radiation protection needs in healthcare settings with limited infrastructure”, and wrote a full paper that has been published by the IAEA in the Congress Proceedings.

• **Medicon 2013, September 2013, Seville, Spain:** The HTTG, through Yadin David, participated in the Conference’s International Scientific Program Committee. It made contributions to the call for papers and to the papers review as well as to organizing a track on Safety and Human Factors Engineering for Medical Devices and Systems. The HTTG was represented in a Round Table on “The role of Biomedical Engineers in Healthcare Technology Assessment”, organized by Nicolas Pallikarakis. C. Borrás made a presentation on: “HTA in developing countries: An HTTG perspective on the role of the biomedical engineer”, sharing some of her experiences gathered during her work at the Pan American Health Organization (PAHO).

• **ICSU ROLAC Workshop, January 2014, Varadero, Cuba:** C. Borrás accompanied H. Voigt to participate in a Workshop on “Future Earth ICSU ROLAC & International Scientific Unions in Latin America and the Caribbean”, January 9th and 10th, 2014, Varadero, Cuba. The purpose of the event was to explore opportunities to enhance interdisciplinary collaboration between the International Scientific Unions, and between Unions and ICSU-ROLAC, ICSU’s regional office for Latin America and the Caribbean (LAC). (The reason C. Borrás was asked to go is because of her knowledge of the LAC region, having worked for PAHO during 15 years). The main topics discussed were Future Earth and Regional Research Collaborations. To benefit from the wide-range expertise of the Workshop participants, there were break out sessions. Perhaps the most challenging one was on how to incorporate regional interdisciplinary activities in different disciplines and scientific areas of the IU; it was suggested that the unions exchange newsletters and hold joint sessions at each other’s congresses. A list of Unions with their designated representatives can be found at: [http://www.icsu.org/latin-america-caribbean/about-icsu/icsu-union-member-contacts-in-lac](http://www.icsu.org/latin-america-caribbean/about-icsu/icsu-union-member-contacts-in-lac) and over 100 photos taken during the event can be seen at: [https://www.flickr.com/photos/icsu_lac/sets/72157639974459764](https://www.flickr.com/photos/icsu_lac/sets/72157639974459764). From the HTTG Chair’s point of view, the meeting was very useful to better understand ICSU’s goals and activities and establish professional links with participants from other unions, which can be most helpful for potential future joint projects.
• **Pan American Health Organization (PAHO) Workshop, January 2014, Havana, Cuba**: PAHO/Cuba invited H. Voigt and C. Borrás to deliver some lectures in a Workshop organized taking advantage of their presence in Cuba. The subject of the PAHO Workshop was “Health Effects of Heavy Metals and Ionizing Radiation”, and it was held on 13 and 14 January 2014 in Havana, Cuba. About 20 persons representing various government agencies involved in toxicology and radiation safety attended the Workshop and exchanged useful information with the speakers. H. Voigt spoke on the first day about the health effects of heavy metals and C. Borrás spoke on the second day about the new international radiation protection standards and the challenges regulatory authorities face because of new technologies.

• **12th Medical Physics Congress of Argentinean Society of Medical Physics (SAFIM) / 1st Medical Physics Congress of the Americas, May 2014, Buenos Aires, Argentina**. A plenary session of the SAFIM Congress, was devoted to medical physics education and training programs. There were speakers representing the IOMP, ALFIM and the AAPM. C. Borrás, speaking on behalf of the IUPESM, informed about the EFOMP efforts to harmonize education and training programs in Europe.

• **19th World Congress on Disaster and Emergency Medicine, April 2015, Cape Town, South Africa (Congress organized by the World Association for Disaster and Emergency Medicine)**: Yadin David made a presentation on “Promote Awareness of the Critical Role of Sustaining Technology and Utilities in Healthcare Institutions Facing Disaster by Exploring the Development and Establishment of an International Center for Information and Training of Health Technology Managers”, during the Preparedness and Assessment Communication Track of the Congress.

• **International Training Workshop on 'Design and fabrication of a PC-based ECG equipment', 2016, Dhaka, Bangladesh**. K Siddique-e Rabbani from the Department of Biomedical Physics & Technology of Dhaka University and President of the Bangladesh Medical Physics Association is organizing a Workshop aimed at scientists and engineers of the Third World. The idea is to train the participants in fabricating PC-based diagnostic ECG equipment so that they can fabricate quality ECG equipment for distribution within their own countries at low cost. Through this method, a large deprived population in the Third World will get the services of such medical devices. The HTTG agreed to endorsed the event and C. Borrás wrote a letter of support seeking for funding.

V. Publications – Completed *(Abstracts of HTTG events published in the corresponding Congress Programs are not included)*

**Articles**


Poster


VI. Publications in Preparation

• "Defining the medical imaging requirements for a rural health center"

It had been decided that the HTTG would prepare a publication based on the Workshop on the same subject held during the ICMP 2011 in Porto Alegre, Brazil, aimed at addressing the use of medical imaging to facilitate the diagnosis and treatment of the most common health conditions present in a rural health center. The publication is to expand on the consensus recommendations reached at the Workshop on the required imaging technologies, equipment, staff, telemedicine options, quality control and radiation protection programs and the need for coordination among the different health levels within the health system. C. Borrás agreed to be the editor, identified authors –most of them Workshop participants– and obtained contributions. Except for three chapters, which need to be lengthened to have a better balance among the various topics, the manuscript is ready for editing, and the authors, as well as the HTTG members, are considering publication options. In any case, it is intended that a link to the publication be placed in the IUPESM-HTTG website, and C. Borrás is offering to pursue the matter and continue as editor until the book is completed and published.

• Special Issue of Health and Technology, Colin Orton, editor

The HTTG decided to publish the content of the Workshop on “Innovations in the Use of Mobile Devices in Healthcare” to be presented at the WC 2015. C. Orton approached Luis Kun, current Editor in Chief of Health and Technology (H&T), the IUPESM Journal, to see if the topic would be adequate for a Special Issue of H&T. L. Kun thought the idea was excellent. Although the content of the presentations of the WC 2015 may not be long enough to fill an entire issue of the journal, the HTTG plans to have a two-day workshop on the same topic in 2016 with many more speakers. Pooling the papers from both workshops should provide enough material to fill the H&T 70 page requirement. C. Orton will be the Special Issue editor.

VII. Website Update

The HTTG part of the IUPESM website has been revamped under the leadership of Y. David with material furnished by B. Allen, Y. David and C. Borrás. Thanks to Ms. Fong Lee, who works for James Goh, the IUPESM Secretary, the website now has a short slide presentation on what the HTTG is, its current membership, its Terms of Reference and
Work Plan, as well as some historical material arranged by years and actual slides of the scientific/educational presentations made at previous HTTG workshops or links to the resulting publications, when available. The HTTG thanks most profusely Ms. Fong, the IUPESM webmistress in Singapore, for her efforts. Please, check: http://www.iupesm.org/health-technology-tas-group httg/ and suggest further improvements.

VIII. Projects

• Low-Cost Digital Detector for Medical Imaging

Karim S. Karim PhD PEng, Associate Director, Center for Bioengineering and Biotechnology and Associate Professor, University of Waterloo, Waterloo, Ontario, Canada and his colleagues at the University of Waterloo in Canada have developed a low cost digital X-ray solution (TBView 1000) based on off-the-shelf components that achieves low cost objectives by using a direct sales and an on-line support model. Pneumavision (the name of this social venture company) is planning to try out its first system prototype in Tanzania and compare its performance to a CR system. The device has been already approved by the Korean agency that is the equivalent of the US-FDA. While the detector is undergoing further testing, he is looking for partnerships (e.g. NGOs, government, industry and professional associations e.g. IOMP) that can help with publicizing this system, arrange for trials, training and support. He described his experiences in the Kyrgyz Republic during his sabbatical, which alerted him of the problems in resource-limited settings and prompted him to create the commercial venture, Pneumavision.

Dr. Karim was invited to make two presentations at the HTTG Workshop on Digital Radiology at the ICMP 2013 and discuss the technical challenges with medical physicists experts in medical imaging with digital detectors at the HTTG Strategic Planning Meeting in Brighton, UK. His presentation elicited many comments. Tony Seibert suggested that the detector-which is smaller than a 14”x17” standard chest one- could be ideal for neonatal and infant imaging. Shankar Krishnan asked whether the system is patented – which it is, and questioned the training needs, an issue discussed also by other meeting participants. C. Borrás mentioned the fiasco in Haiti of 11 WHIS-RAD (World Health Imaging Systems - Radiography) installed in the 1990’s which failed because the technicians did not have enough training to do simple things like changing a fuse or understanding that the machines had to be connected to the mains all the time to prevent the discharge of the batteries. Jin Wooi Tan explained problems he encountered in Malaysia, for example dust on ultrasound machines. Training programs for indigenous populations like the one from Bob Malcolm were recommended. Barry Allen suggested that, in the absence of properly trained maintenance engineers, the possibility of training junior medical physicists to do simple tasks is considered. (In China these persons are called "second tier medical physicists").

There were also suggestions regarding potential funding agencies for the development of such a project, for example: the Gates Foundation, the Aga Khan Foundation, Rotary International –their role in the polio eradication in the Americas and the distribution of
WHIS-RAD units in cooperation with Northwestern University were briefly reviewed– and Engineering World Health a Washington-DC based NGO which has projects in Honduras and Tanzania. The potential production of the system in countries like China and India was proposed. As an example, it was mentioned that the University of Singapore has produced an autochthonous CT system which costs only US$ 50,000. Karim Karim mentioned that the x-ray tube, which has a stationary anode, is manufactured already in both China and India with some input from Anders Tingberg from Sweden. Regarding questions whether any commercial company had been approached, Karim Karim explained that a start-up company Pneumavision had been formed. The goal is to market the digital X-ray system for less than US$ 15,000. Ideally the system should be portable and rugged.

The need of health technology assessment of new devices was emphasized, and the role of institutions such as the US National Science Foundation, described. C. Borrás who had been advising Dr. Karim on phantoms and dose measurements, and consulted with the Center of Devices and Radiological Health of the United States Food and Drug Administration (FDA) about the device, commented that the US FDA is willing to test the new detector using their specialized chest phantoms; they are already acquainted with the University of Waterloo, two of Karim Karim’s students already doing research at the FDA! Barry Allen mentioned that Siddique Rabbani from Bangladesh, who is developing a lot of new devices for resource-limited regions, would probably be happy to offer his site as a beta site. He formally proposed that the HTTG follow these two suggestions in parallel, and the meeting participants agreed to this action item.

Several of the participants, for example Arun Chougule and Paulo Costa expressed interest in getting the detector and asked Karim S. Karim for its availability. Tony Seibert suggested that the new detector is ideal for pediatric imaging, as there are no digital detectors commercially available of this size.

An update on the status of the project will be presented at the WC 2015 by Karim S. Karim.

- On-line Computed Tomography Quality Control Program

Realizing the lack of diagnostic medical physicists and biomedical/clinical engineers in certain parts of the world, such as in Latin America, an on-line quality control program (QC) for computed tomography (CT) scanners was tried out in Porto Alegre and in Sao Paulo, two main cities of Brazil, led by two university medical physicists, with technical input from C. Borrás on behalf of the HTTG. The initial idea consisted in documenting CT protocols in clinical use for adult head and abdomen scans, evaluating the scanner performance and image quality using a combination of commercial phantoms and in-house computer software and acquiring patient dose data in terms of CTDIvol through the DICOM metafiles, after validation following the methodologies developed by the AAPM and the ACR. The results of the phantom evaluations in various CT facilities would be automatically transmitted to the two universities, where the CT-QC team leaders would further analyze the data collected, integrate it with the other parameters obtained directly from the PACS system of the hospitals and provide recommendations to a local CT-QT person in each facility; such a person could be a CT technologist with special training in
QC, a medical physicist or a biomedical engineer. (It should be noted that in Latin America QC of medical equipment is often performed by biomedical engineers).

A pilot study involving two institutions in Porto Alegre and two in Sao Paulo is in progress, comprising a total of 15 scanners. The preliminary results of the pilot study were presented in a poster at the AAPM and the abstract was published in Medical Physics. Parallel to this preliminary work, the Brazilian researchers did an evaluation of a commercially available software which would automatically analyze the results of the phantom scans. The evaluation was subsidized by the software developer, IRISQA, LLC, in Frederick, MD, USA, a commercial corporation dedicated to develop software for testing medical imaging equipment.

After careful considerations, the Brazilian researchers decided that to provide remote support to facilities without on-site dedicated CT QA staff using a commercially available software that each CT installation would have to purchase, would be too expensive for most Latin American facilities. Furthermore, the software tested did not incorporate some of the parameters that the Brazilian Regulatory Authority requires to measure on a periodic basis. Consequently, they decided to start the program by developing their own software. One of the researchers, Paulo Costa, from the University of Sao Paulo, has developed a software for image quality assessment using MatLab® language, that calculates noise-power-spectra (NPS), slice thickness, slice increment, noise, CT number linearity and modulation transfer functions (MTF) across scans, measurements that are usually not done manually as they are labor-intensive; his software greatly reduces the time needed. Also it makes the analysis less subjective, more quantitative, and improves reproducibility. Results of this work are presented at the WC 2015 in Toronto. The other researcher, from PUCRS, is also working on software development in collaboration with a local software company, called ANIMATI. They are implementing a modular system that will be attached to a web-based PACS, allowing inter-institutional communication. The modular system will extract patient dose data (CTDIvol and DLP) from DICOM metafiles, and will integrate the image quality assessment tools developed at USP. It is expected that when the software is completely validated, it can be shared among other institutions in Brazil interested in developing on-line CT-QC programs. The project is being funded by a governmental agency (FAPERGS).

- **Innovative point-of-care diagnostic platform (the LabDisk)**

In the framework of the 2nd WHO Global Forum of Medical Devices, at the invitation of C. Borrás, Dr. Konstantinos Mitsakakis from Hahn-Schickard (a Research, non-for-profit organization) and IMTEK, University of Freiburg presented the project “DiscoGnosis” ([www.discognosis.eu](http://www.discognosis.eu)) to the HTTG meeting in Geneva in November 2013. The project, coordinated by K. Mitsakakis and funded by the European Commission (EC), aims at the diagnosis of febrile infectious diseases such as malaria, dengue, typhoid fever, and pneumonia, the panel being easily adaptable to endemic needs/epidemic outbreaks. The partnership has been recently expanded to a collaboration with the South African partner LifeAssay Diagnostics (Pty) Ltd for the detection of viral vs bacterial pneumonia in African children (2015-2018).
The LabDisk is a disk-shaped plastic disposable chip (similar to a CD) that uses centrifugal forces to handle the whole blood sample (50µl) and performs fully automated analysis by microfluidically integrating (bio)chemical reagents and assay steps that would otherwise need a whole laboratory to be performed. It can detect multiple diseases in a precise, rapid, sensitive and multiplexed way with minimum external intervention and within 1 h, at the point-of-care. The goal is to use the LabDisk as a diagnostic tool for management of patients with febrile syndrome (providing the suitable treatment considering co-infections and similar clinical symptoms) and, in the future, also as an epidemic surveillance tool in regions with low medical infrastructure.

Following the November meeting in Geneva, where the HTTG members endorsed the disk platform to be a new HTTG project, C. Borrás has tried to help K. Mitsakakis’ obtaining additional funding. In April 2014, she wrote a Letter of Support to a proposal sent to the European Commission by him for a project on water quality analysis using the LabDisk. The proposal ended with a score of 12.5/15.0, but did not get funded. In December 2014, she worked as a consultant with George Washington University (GWU) in a Letter of Intent (LOI), initiated by K. Mitsakakis, towards the USAID as response to an urgent call for Ebola diagnostics. The USAID never notified us of the outcome; the assumption is that there would be no support. And in January 2015, after consulting with H. Voigt and with the full support of the HTTG, C. Borrás acted as the PI of the participation of HTTG/IUPESM in the Bill Gates Foundation Letter of Intent (LOI) initiated by K. Mitsakakis for Antenatal Care, bringing together a highly international and multidisciplinary consortium, again led by GWU, where C. Borrás has a faculty appointment. Gates chose 50 of 1200 LOIs received (4%) and we weren’t among them. However, a very competent consortium has been established and K. Mitsakakis hopes that we will have the chance to re-submit it in some similar call.

In the meantime, C. Borrás is contributing to the dissemination of the LabDisk and the EC-funded project DiscoGnosis of K. Mitsakakis. In particular, she distributes the links of a blog and video that were recently produced by the EC, acknowledging the high potential and impact of the project. This dissemination is expected to have significant results in public awareness, for example already UNITAID has contacted the technology developers of the LabDisk. For the records, the links are:

Video: https://www.youtube.com/watch?v=UvcZwOXTRuk&feature=youtu.be

Future collaboration activities will focus in the field of dissemination of the LabDisk platform with the help of HTTG and its network to international organizations, as well as cooperation on forthcoming international calls for proposals in the field of infectious disease diagnosis.

- **Global Resource Center for Training of Health Technology Managers on Disaster Preparedness**

Nature and man-made disasters have been impacting life, communities and businesses throughout our globe. This impact is especially critical when it involves health services
facilities who are expected to help its community in such crisis. It is recognized that health services facilities are becoming ever more technology dependent, creating a need for global resource center for training on how health facilities can be better prepared to face and function during disaster. There are, unfortunately, many such events such as Haiti earthquake devastation, Japan tsunami disaster, U.K. flooding, Nepal’s earthquake and other

These events emphasize the need for immediate development of such collaborative global center where variety of agencies and stake holders will develop pertinent training material and exchange form for sharing strategies, best practices and lessons learned to optimally operate before, during and after disaster hit. Thus, Yadin David with the collaboration of Fred Hosea and some HTTG members plan to develop a Center that will:

- Collect and organize resources content
- Assemble project advisory council to guide it
- Develop training curriculum
- Recruit training faculty
- Publish list of resources and how to deploy them.
- Offer face-to-face and virtual global training
- Create information exchange portal focusing on disaster preparedness issues faced by health technology managers
- Promote development of policies and guidance to improve operational conditions in response to disaster in healthcare services.

IX. Other HTTG involvement

• During 2013 and 2014, C. Borrás assisted John LeHeron from the IAEA to coordinate the groups of experts who met in Vienna, Austria, to draft a Safety Guide on “Radiation Safety in Medical Uses of Ionizing Radiation”, based on the International Basic Safety Standards and to be co-sponsored by the IAEA, ILO, WHO and PAHO. In this role, she made sure biomedical and clinical engineers are included among the key people in diagnostic and therapeutic radiology departments. The Safety Guide has been placed on the IAEA web for comments by the Member States and a final meeting to review the comments received and elaborate the final draft will take place in Vienna in July 2015. C. Borrás plans to be there.
B. Budget (in Euros)

**HTTG Finances 2012-2015**

**2012.** Expenditure as per Annual Accounts (Jan. 2012) €283

**2013.** Expenditure as per Annual Accounts:

- Brighton €3,113
- IPEM -€900
- Seville €1,501
- Geneva €787
- **Total** €4,501

**2014.** Expenditure as per Annual Accounts:

- Cuba €1,267
- Dubrovnik €2,819
- **Total** €4,086

**2015.** Budget €6,000

**IUPESM-PUCP-Peruvian NIH International Course on Heavy Metal Detection and Toxicity, 7-8 May 2015**

Grant €7,000
C. Recommendations

The HTTG respectfully requests the IUPESM Administrative Council the approval of this report as an endorsement of past and current activities and the expectation of future accomplishments. In July 2014, At the Annual AAPM meeting, C. Borrás met with KinYin Cheung, current IOMP President and next IUPESM President. He expressed great interest in the continuation of the HTTG. Since then, Dr. Cheung has been apprised of HTTG undertakings, which will facility their continuation under his leadership. Although an influx of new members is necessary to infuse new vigor and vision to the HTTG, to ensure that pending actions can be carried out in the next period, it is recommended that some of the current HTTG members be kept.

Respectfully submitted

Cari Borrás, D.Sc., FACR, FAAPM, FIOMP
HTTG Chair
7 June 2015
Appendix 1


Workshop Program

Session Moderator: C. Borrás, Chair IUPESM-HTTG

Session overview
To provide attendees with an overview and the latest information on large area digital x-ray detectors for medical imaging

Session objectives
To: present physical characteristics of new digital x-ray detectors and selected clinical applications
To: define image quality and radiation dose metrics and describe their measurements
To: discuss practical aspects of initiating a digital radiology department, including costs, especially in resource-limited settings.
To: discuss practical aspects of initiating a digital radiology department, including costs, especially in resource-limited settings.

Program

<table>
<thead>
<tr>
<th></th>
<th>The Health Technology Task Group of the International Union for Physical and Engineering Sciences in Medicine</th>
<th>C. Borrás</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Historical development of CR/DR and new detector technologies</td>
<td>J Anthony Seibert</td>
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<tr>
<td>3</td>
<td>Image quality parameters and their measurement</td>
<td>John M. Boone</td>
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<td>4</td>
<td>Low cost digital detector technology for emerging economies</td>
<td>Karim S. Karim</td>
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<tr>
<td>5</td>
<td>Dose metrics: New “Exposure Index”</td>
<td>J. Anthony Seibert</td>
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<td>6</td>
<td>Clinical applications</td>
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<td>7</td>
<td>Flat panel detectors for CT</td>
<td>John M. Boone</td>
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<td>8</td>
<td>CMOS detectors for breast CT</td>
<td>John M. Boone</td>
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<tr>
<td>9</td>
<td>Digital detectors for mammography</td>
<td>Ng Kwan Hoong</td>
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<td>10</td>
<td>Region of interest tuberculosis screening</td>
<td>Karim S. Karim</td>
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<tr>
<td>10</td>
<td>Transition from screen-film to digital radiography: Practical advice</td>
<td>Ng Kwan Hoong</td>
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<td>11</td>
<td>Radiation protection of patients and the use of Diagnostic Reference Levels in digital radiology</td>
<td>Eliseo Vañó</td>
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</table>
Appendix 2


Workshop Program


2. Disaster Management Challenges for Clinical/Biomedical Engineering Professions – Program Elements and Innovation Resources | F. Hosea

Appendix 3


Symposium Program

Session Chair: Dr. Caridad Borrás
Session Co-Chair: Ms. Laura Alejandra Velez

1. Improving patient outcome through technology life cycle management: The role of biomedical engineers - Prof. Nicolas Pallikarakis, Institute of Biomedical Technology (INBIT), Greece

2. Improving patient outcome through technology life cycle management: The role of clinical engineers - Dr. Yadin David, IUPESM/Health Technology Task Group (HTTG), United States of America

3. Improving patient outcome through technology life cycle management: The role of medical physicists - Dr. Caridad Borrás, IUPESM/Health Technology Task Group (HTTG), United States of America
Appendix 4

“Radiological Equipment Maintenance Issues”
MBEC2014, Dubrovnik, Croatia, 2014”

Workshop Program

1. Introduction – Cari Borrás, Health Technology Task Group (HTTG), International Union of Physical and Engineering Sciences in Medicine (IUPESM), Barcelona, Spain

2. Can maintenance problems be resolved at the design stage? – Nicolas Pallikarakis, Medical Physics / Medical School, University of Patras, Patras, Greece

3. Manufacturer, local and 3rd party maintenance services – Yadin David, Biomedical Engineering Consultants LLC, Houston, Texas, USA

4. Radiation safety issues – Cari Borrás, Health Technology Task Group (HTTG), International Union of Physical and Engineering Sciences in Medicine (IUPESM), Barcelona, Spain

5. Problems specific to developing countries – Mario Forjaz Secca, Physics Department, Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa, Lisboa, Portugal

6. Discussion – All
Appendix 5

“Disaster Preparedness Program for Health Facility’s Technology Managers”, MBEC2014, Dubrovnik, Croatia, 2014

Tutorial Program

1. How can we prepare health facilities operations for disasters? – Yadin David, IFMBE/ Biomedical Engineering Consultants, LLC - (25 minutes)

2. The role of medical physicists in natural or man-made disasters – Caridad Borrás, IUPESM-HTTG, Barcelona, Spain (30 minutes)

3. Software tools and resources that can be used to capture and track critical information during disaster – Fred Hosea - Kaiser Permanente, California, USA (25 minutes).

4. Q&A period (10 minutes)
## Appendix 6

**INS-PUCP-IUPESM**  
**International Course on Technology Transfer for Epidemiologic Research and Public Health Heavy Metals**

**First day: 7 May 2015**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>8:00-8:30</td>
<td>Registration of Participants</td>
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</table>
| 8:30-8:45 | **Opening Remarks:**  
Dr. Ernesto Gozzer Infante – Institutional Head of INS  
Dra. Pepi Patron – Vice-Chancellor for Research PUCP  
Dr. Herbert F. Voigt – President, IUPESM; Boston University Partners |
| 8:45-9:30 | **Keynote Presentation:**  
Advances in Research on Heavy Metals and its Impact on Public Health  
Med. Jonh Astete Cornejo – CENSOPAS - INS |
| 9:30-11:00| **Roundtable: State of Exposure to Heavy Metals in Peru**  
Moderator: Phys. Gastañaga Maria del Carmen Ruiz – CENSOPAS  
1. Review of the Status of the Impact of Exposure to Heavy Metals in Peru  
   Dr. Rosa Burgos Aliaga – DGSP - MINSA.  
2. Epidemiological Monitoring of Heavy Metals  
   Ms. Laura Nayhua Gamarra – DGE MINSA. |
| 11:00-11:45| **Keynote Presentation:**  
Neurodevelopment and Heavy Metal Exposure in Pediatric Population: Trends in Research and Mitigation Strategies  
Dra. Patricia Fabian – Boston University School of Public Health |
| 11:45-12:45| **Keynote Presentation:**  
Exposure and Lead Poisoning  
Med. Gastañaga Maria del Carmen Ruiz – CENSOPAS - INS |
| 13:00-14:30| Lunch |
| 14:30-15:30| **Keynote Presentation:**  
Research Recommendations Toxicity (acute effects) and Possible Interventions.  
Dra. Laura Borgel Aguilera – Universidad de Chile |
| 15:30-17:00| **Roundtable: Research on Heavy Metals in Peru**  
Moderator: Representative OGITT  
1. Research Priorities for Peru Heavy metals: Problems to Solve.  
   Med Hector Collantes Lazo – CENSOPAS - INS  
2. Social Determinants of exposure to heavy metals.  
   Psych. Iselle Sabastizagal Vela – CENSOPAS |
<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Details</th>
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<tbody>
<tr>
<td>8:30-10:00</td>
<td><strong>Roundtable: Technology for Research on Heavy Metals</strong></td>
<td>Moderator: QF. Arturo Ramírez Erazo, CENSOPAS</td>
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<tr>
<td></td>
<td></td>
<td>1. <em>Commercial Devices for Detection of Heavy Metals: Need and Use in Remote Areas.</em></td>
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<td>Dr. Herbert F. Voigt – President IUPESM; Biomedical Engineering, Boston University</td>
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<td>2. <em>Portable Detection Device.</em></td>
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<td>Dr. Christopher J. Frederickson – CEO &amp; CSO, NeuroBioTex, Inc.</td>
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<td>3. <em>Technologies Used in CENSOPAS.</em></td>
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<td>Chem. Manuel Chavez – CENSOPAS</td>
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<td>10:00-11:00</td>
<td><strong>Keynote Presentation:</strong></td>
<td><em>Measuring, Mapping and Identification of Heavy Metals in Various Sources of Pollution.</em></td>
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<td>A. James Attar, Ph.D. – President, Appealing Products, Inc.</td>
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<td>11:00-12:00</td>
<td><strong>Keynote Presentation:</strong></td>
<td><em>Technology Management and Technology Assessment Research Institutions</em></td>
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<td>Rossana Rivas, MSc PhD (c) – Executive Director, Technopole Health CENGETS PUCP</td>
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<td>12:00-14:00</td>
<td><strong>Lunch</strong></td>
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<td>14:00-15:30</td>
<td><strong>Round table: Ethical, Intercultural and Political Dissemination of Results and Evidence Generated by Research Aspects of Heavy Metals.</strong></td>
<td>Moderator: Representative OGITT</td>
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<td>Exhibition of perspectives:</td>
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<td>• Representative Ethics Committee of the INS</td>
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<td>• Dr. Diana Cordano – Representative of the Ombudsman</td>
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<td>• Representative of Directorate General of Education, Culture and Environmental Citizenship – Ministry of Environment</td>
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<td>• Mag Tesania Velasquez – Director of Social Responsibility - PUCP</td>
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<tr>
<td>15:30-17:30</td>
<td><strong>Round table: Strategies to Reduce &amp; Eliminate Exposure to Heavy Metals in Peru</strong></td>
<td>Moderator: Phys. Jonh Astete Cornejo, CENSOPAS</td>
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<td>Exhibition Review</td>
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<td>• <em>Strategies to Mitigate and Reduce the Incorporation of Heavy Metals</em></td>
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<td>A. James Attar, Ph.D. – President, Appealing Products, Inc.</td>
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<td>• <em>Strategies to Reduce Exposure at Community Level and Child Population</em></td>
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<td>Mary Patricia Fabian, Sc.D. – Boston University School of Public Health</td>
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<td>• <em>Strategies and Criteria Chile, Germany and ILO among others</em></td>
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<td></td>
<td>Dr. Laura Borgel Aguilera – Universidad de Chile</td>
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<td>• Mr. Juan Narciso Chavez – Representative of the Ministry of Environment</td>
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<td>– Representative CENSOPAS</td>
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<td>17:30-18:00</td>
<td><strong>Closing Remarks:</strong></td>
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<td>Dr. Ernesto Gozzer Infante – Institutional Head of INS</td>
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<td>Dr. Herbert F. Voigt – President, IUPESM; Boston University Partners</td>
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Appendix 7

10 June 2105, WC 2015, Toronto, Canada

Co-chairs: Cari Borrás and Jacob Van Dyk

13:30-13:35 Introduction – Cari Borrás, Chair, IUPESM-Health Technology Task Group (HTTG), Washington DC, United States

13:35-14:00 The Global Cancer Burden and WHO’s Response – Adriana Velazquez, World Health Organization (WHO), Geneva, Switzerland

14:00-14:25 Biomedical Engineering Research for Cancer Diagnostics and Therapeutics – Ratko Magjarević, University of Zagreb, Zagreb, Croatia

14:25-14:50 Appropriate Technologies for Cancer Diagnostics and Therapeutics – Cari Borrás, HTTG, Washington DC, United States


15:15-15:40 Initiatives of Expertise Mobilization – Jacob Van Dyk, Western University, London, Ontario, Canada

15:40-16:05 Equal Access to Radiation Therapy by 2035 – David Jaffray, Global Task Force on Radiotherapy for Cancer Control (GTFRCC), Ontario Cancer Institute, Toronto, Canada

16:05-16:30 Discussion and Summary - Jacob Van Dyk, Western University London, Ontario, Canada
**Appendix 8**

"Innovations in the Use of Mobile Devices in Healthcare", 11 June 2015, WC 2015, Toronto, Canada

Co-chairs: Cari Borrás and Colin Orton

<table>
<thead>
<tr>
<th>Time</th>
<th>Session Description</th>
<th>Presenter(s)</th>
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<tbody>
<tr>
<td>15.00-15.15</td>
<td>Welcome Remarks; Objectives of the Workshop</td>
<td>Cari Borrás, IUPESM-HTTG Chair, Washington DC, USA</td>
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<tr>
<td>15.15-16.00</td>
<td>General Overview (The state of TeleHealth, TeleMedicine, and mHealth)</td>
<td>Kwan-Hoong Ng, Department of Biomedical Imaging, University of Malaya, Kuala Lumpur, Malaysia</td>
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<tr>
<td>16.00-16.25</td>
<td>Implementation, Barriers and Policy Issues: <em>Industrialized Areas</em></td>
<td>Yadin David, Biomedical Engineering Consultants, LLC., Houston, USA</td>
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<tr>
<td>16.25-16.50</td>
<td>Resource-limited Regions</td>
<td>K. Siddique-e Rabbani, Department of Biomedical Physics &amp; Technology, University of Dhaka, Bangladesh</td>
</tr>
<tr>
<td>16.50-17.05</td>
<td>Development of Healthcare Applications using Facilities and Functions available in Modern Mobile Devices</td>
<td>Marlen Perez-Diaz, Center for Studies on Electronic and Information Technologies. Central University of Las Villas, Santa Clara, Villa Clara, Cuba</td>
</tr>
<tr>
<td>17.05-17.30</td>
<td>Quality of Service Assessment, Maintenance and Sustainability Issues</td>
<td>Tobey J. Clark, Instrumentation and Technical Services, University of Vermont, Burlington, Vermont, USA</td>
</tr>
<tr>
<td>17.30-18.00</td>
<td>Point of Care Solutions <em>Demonstration</em></td>
<td>K. Siddique-e Rabbani, Department of Biomedical Physics &amp; Technology, University of Dhaka, Bangladesh. Kwan Hoong Ng, Department of Biomedical Imaging, University of Malaya, Kuala Lumpur, Malaysia</td>
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<tr>
<td>18.00-18.30</td>
<td><em>Demonstration</em></td>
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<td>18.30-18.50</td>
<td>Discussion</td>
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<td>18.50-19.00</td>
<td>Summary and Recommendations</td>
<td>Colin Orton, Wayne University, Detroit, Michigan, USA</td>
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