

Report of the Ad Hoc Committee to Establish an International Council within the AAPM

Membership: F. Fahey (Co-chair), J. Bayouth (Co-chair), C. Borrás, J. Van Dyk, C. Orton, M. Mahesh, R. Jeraj, I. Sechopoulos, M. Bazalova-Carter, C. McCollough, S. Huq, D. Brown

Table of Contents

1. Introduction.....	1
2. Executive Summary.....	1
3. Background.....	4
3.1. Motivation.....	4
3.1.1. Research.....	4
3.1.2. Education	4
3.1.3. Patient care.....	4
3.1.4. Industry	5
3.1.5. Outreach.....	5
3.1.6. International Partnerships	5
3.1.7. Journals	6
3.1.8. Membership	6
3.2. History and Current State of AAPM international activities	6
3.3. Anticipated AAPM Resources Required	7
3.3.1. Estimated Staff Requirements.....	7
3.3.2. Overall expenses for the newly formed International Council	8
4. Changes Required to AAPM By-Laws and Rules to Establish an International Council	9
5. Justification to Membership	9
5.1. Weaknesses of current paradigm	9
5.2. Improving International Activity Oversight	10
5.3. Strengths of an IC paradigm	10

Reference List

Appendix

1. Introduction

The Ad Hoc Committee for Defining the Structure, Charges and Budget for 2020 of the International Committee had extensive discussions regarding a modified structure for international activities within the AAPM, especially whether these activities should be organized via an International Committee or an International Council. The Ad Hoc Committee met with the members of the AAPM EXCOM as well as chairs and vice chairs of all councils. It was the consensus of the entire leadership that a new council, an International Council, should be formed. The Ad Hoc Committee recommended that the AAPM consider a By-Laws change to incorporate an International Council into its governance structure. The current Ad Hoc Committee to Establish an International Council within the AAPM was charged with developing a proposal to establish an International Council and formulating the required revisions of the By-Laws and Rules.

2. Executive Summary

The Ad Hoc Committee recommends that the AAPM By-Laws be amended for the establishment of an International Council, making the focus of the new council equal in priority and membership support to the focus of the existing councils, and obviating the need for extensive changes to the Rules.

The report compiles information regarding the rationale (motivation, history, and required resources), logistical considerations, and justification for the formation of the International Council. AAPM has been actively engaged in international affairs for much of its his history, and while much of the recent activity has involved efforts of the International Affairs Committee (IAC) and the International Educational Activities Committee (IEAC), AAPM working directly with a large number of other international organizations including the International Organization for Medical Physics (IOMP) and the International Atomic Energy Agency (IAEA). These international endeavors have had considerable impact on the research, education, patient care, industry relations, outreach and organizational partnerships of AAPM. Additionally, nearly 20% of AAPM membership consists of medical physicists living outside the US. These international members actively participate in all aspects of AAPM, including its two largest sources of non-dues revenue: Annual Meetings and our journals (*Medical Physics* and *Journal of Applied Clinical Medical Physics (JACMP)*).

In view of the increasing importance of global activities for medical physicists, this Ad Hoc Committee considers the following guiding principles to be essential for the future of AAPM an its members:

1. International partnerships strengthen the AAPM and, thereby, its membership.
2. International collaborations strengthen the science, education, and professional practice of medical physics in the US.
3. International collaborations have the potential for contributing to improved quality and safety in healthcare, not only in the US but also abroad.

Formation of an International Council will provide AAPM coordination, consistency, rigorous oversight, and strategic development of its global activities. Currently, those attributes are lacking, in part, due to their distributed existence within the organization. For example, international growth strategies for AAPM journals should be harmonized by a single council with consideration of priorities within each of the existing councils. Figures 1A & 1B below show an overview of the current and proposed AAPM structure focusing on international activities, respectively. This report demonstrates that proposed improvements are possible without necessarily incurring substantial increases in organizational complexity or expense.

While a By-Laws amendment may not be necessary in order to form the International Council, the Ad Hoc Committee highly recommends doing so for consistency with the other four councils that are all currently defined in the By-Laws. The Ad Hoc Committee acknowledges that under Article III. Section 2. G of the By-laws of the AAPM, the International Council could be established as an “Other Standing Committee as specified in the Rules”.

The Ad Hoc committee refers this report to Chairman of the Board, Cynthia McCollough, who formed the committee. The co-chairs of this Ad Hoc Committee are available to work with the Rules Committee on proposed rules changes.

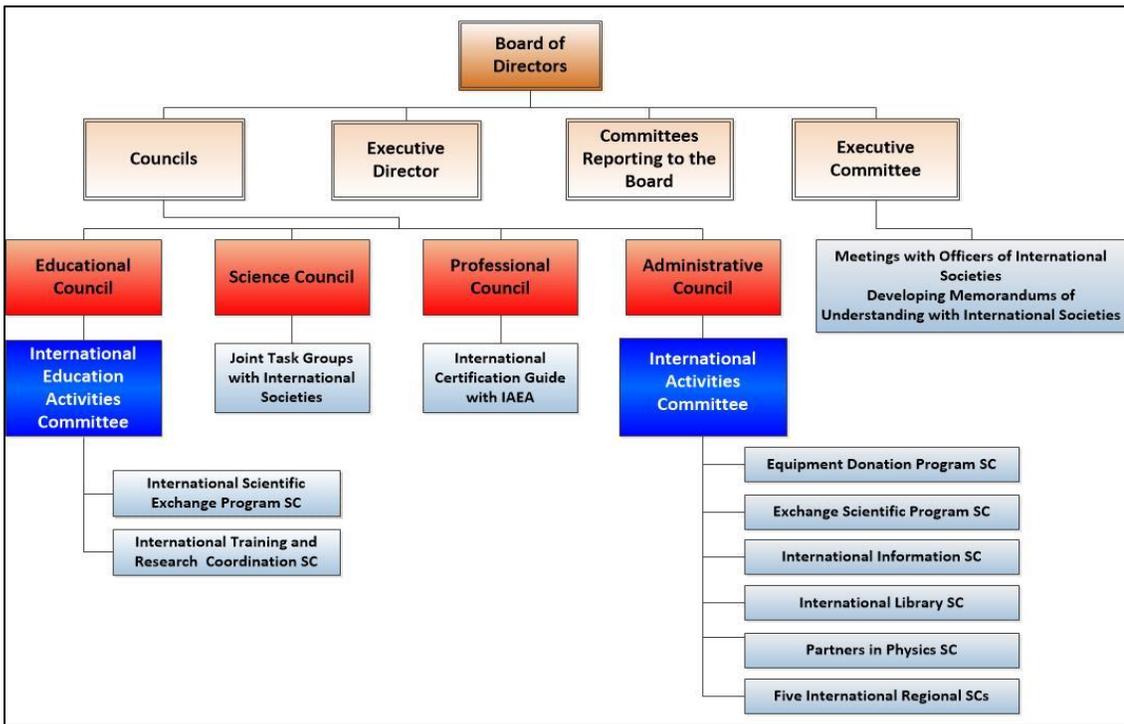


Figure 1A. Existing organizational structure specifically showing international-related activities (in dark and light blue).

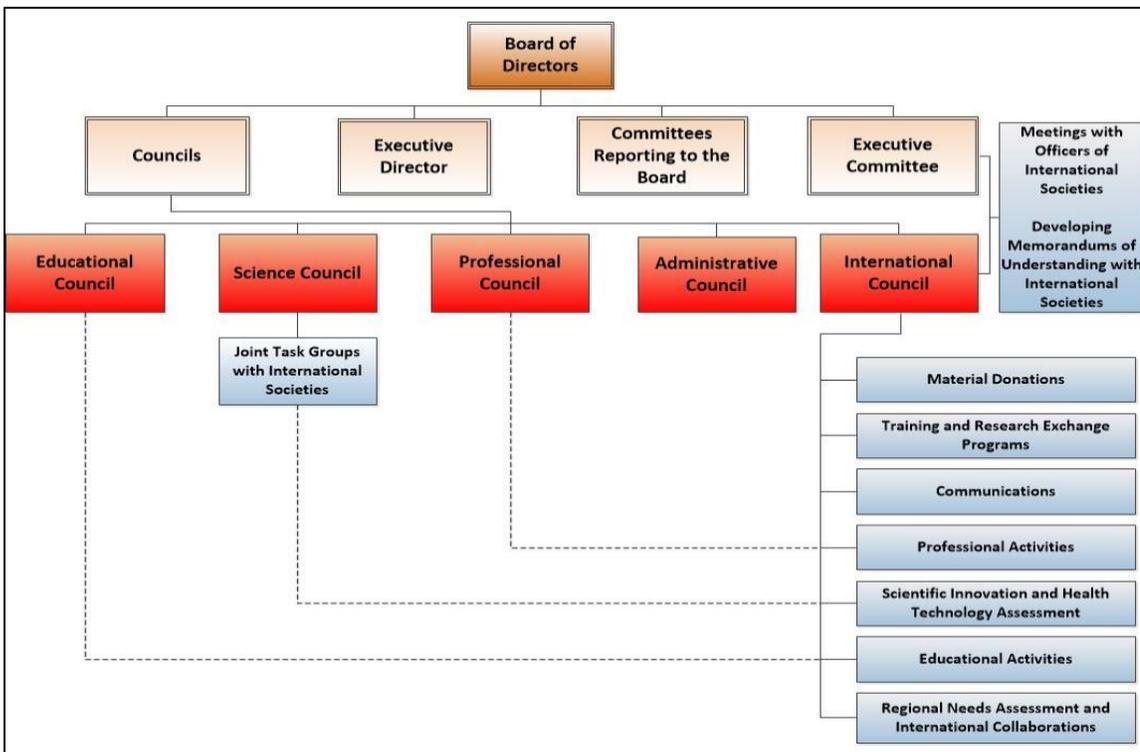


Figure 1B. Organizational structure with new International Council. Dashed lines represent communications between the boxes shown.

3. Background

3.1. Motivation

Medical physics is a global enterprise. Some of the greatest breakthroughs and developments in imaging and radiotherapy have been realized through international collaborations. AAPM's membership reflects the international nature of medical physics, with nearly 20% of its membership residing outside of the US. International AAPM members regularly attend AAPM's Annual Meetings and are integral members of many AAPM committees and task groups. AAPM task group reports are essential guidance documents internationally. Currently, the AAPM is partnering with international organizations to solve global medical physics issues. All these global interactions and partnerships have a major impact on improving the quality of patient care and safety. Moreover, international issues cut across essentially all interests of AAPM, and their importance is increasing.

3.1.1. Research

The global nature of medical physics is manifested by the expanding scope of research and development activities in the field as well as the global growth in the existing number of medical physicists. In the scientific domain, major research into areas such as "big data", artificial intelligence, machine learning, and automation is increasingly dependent on global interactions and collaborations. Similarly, the development and evaluation of hybrid technologies (e.g., Linac with CT, Linac with MRI, MRI/PET, ...) are projects of such scope that they require international partnerships, both with medical physics colleagues and industry. Multiple recent reports indicate that the only way to move forward in healthcare, especially including low-to-middle income countries (LMICs), is to use multipronged approaches with the global community working together with multiple capable partners including local and international organizations, industry, non-government and altruistic organizations, and independent professionals. Furthermore, the increasing needs of LMICs demand a refreshed review of the available treatment and imaging technologies, encouraging a further perspective on scientific and technological developments to make these technologies more robust and cost-efficient, factors that are not only relevant for LMICs but also for high-income countries (HICs).

3.1.2. Education

The US competes to attract and retain first-rate students and scientists, yet international applications to US medical physics PhD programs are declining. Institutions from the subset of US colleges and universities responsible for training and graduating the most physics PhDs have suffered an average 2-year decline in international applications of 22%. While no formal survey has been conducted for medical physics PhDs, it is estimated that these trends follow general trends in physics.

Furthermore, a recent report on the evaluation of medical physics training in radiology residency programs in 67 countries concluded that "the lack of adequate involvement of medical physicists in training and in the formal examination of radiology residents in both developed and developing countries is a matter of concern with likely implications on patient and staff safety." ¹

The AAPM has an International Portal with a guide to resources and opportunities, especially helpful for LMIC contexts. Discussions are underway within some AAPM committees to provide further on-line education and training materials that are beneficial to both LMIC and HIC contexts.

3.1.3. Patient Care

International AAPM members regularly attend AAPM's Annual Meetings where they contribute to the science and discussions. They are also integral members of many AAPM committees and task groups. AAPM task group reports are highly regarded and used internationally. See, for example, the recent report jointly produced by the IAEA and the AAPM

on small field dosimetry². In addition, there are some areas of medical physics such as the dosimetry of radionuclide therapy where physicists in other parts of the world may have considerably more experience than those in the US.

3.1.4. Industry

Companies are increasingly multinational with some of the main medical physics companies having headquarters outside the US (e.g., Siemens, Philips, Elekta, Raysearch). In addition, US companies such as GE may have considerable international presence. Partnerships with industry in support of education, training, research and development are on the increase in view of the growing complexity of the technology and the evolution to “smart” technologies which increasingly demand relevant clinical data. Industrial partners may have considerable interest in AAPM’s international endeavors as they may view regions outside the US as emerging markets.

3.1.5. Outreach

In 2015, the International Organization for Medical Physics (IOMP) performed a survey that indicated that there were about 30,000 medical physicists globally and estimated that this number would double by 2035³. Also, in 2015, the Global Task Force on Radiotherapy for Cancer Control produced a Lancet Oncology Commission report that indicated that an additional 22,000 medical physicists would be needed by 2035 if equal access to radiotherapy is to be provided globally⁴. According to the World Health Organization (WHO), of the 57 million global deaths in 2016, 71%, were due to noncommunicable diseases (NCDs) of which 66% were due to cardiovascular diseases and cancers⁵, each of which involves significant support from medical physics both in diagnostic imaging and radiation therapy. The burden of these diseases is rising disproportionately among LMICs and populations at almost double that of HICs. Several of the 2015 United Nations Sustainable Development Goals⁶ include proposals of a reduction by one third by 2030 of premature mortality from non-communicable diseases such as cancer and cardiovascular disease, and promote education and partnerships in support of sustainable development, all of which are relevant to medical physics and AAPM.

Like AAPM, many scientific and professional organizations, including those related to medical physics (e.g., ASTRO, ESTRO, RSNA, ...), provide various levels of support to international outreach activities for individuals from LMICs via reduced membership fees, special travel grants and other specific awards, as well as providing education and training. Indeed, many of these organizations are increasing their outreach efforts. For example, the American Physical Society (APS) recently developed a strategic plan that takes their international efforts to the next level with an indication that international activities cut across essentially all interests of the APS and that their importance is increasing⁷.

Future increases in the demand for medical physics research and clinical support around the world requires multipronged approaches with the global community working together, and AAPM can and needs to be a key global leader in providing guidance and training. There may be potential opportunities for recent graduates to partner with institutions outside the US to experience different contexts, different technologies and different disease states, in addition to sharing their up-to-date knowledge with partner institutions. Furthermore, there is a growing interest by medical physics residents to gain global health experience during their residency programs.

3.1.6. International Partnerships

AAPM members participate on advisory committees for various international organizations including the IAEA, the IOMP, the International Medical Physics Certification Board (IMPCB), the European Federation of Organizations for Medical Physics (EFOMP), et al, thereby partnering with international organizations to solve global medical physics issues. All these global interactions and partnerships have a significant impact on improving the quality of treatment procedures, patient care and safety, both in the US and abroad.

3.1.7. Journals

Already in 2006, Bill Hendee, in an editorial in *Medical Physics*, described the international scope of *Medical Physics* by indicating that in 2005 more than 50% of submitted manuscripts originated in 44 countries outside the United States. In 2011, Hendee further described the global outreach of *Medical Physics* by showing that in the previous year there had been a 50% increase in submitted manuscripts from all over the globe. This trend is continuing and in 2019, 66% and 63% of submitted manuscripts to *Medical Physics* and the *Journal of Applied Clinical Medical Physics* were from outside of the US from 55 and 54 different countries, respectively. Strategic and coordinated efforts are essential to maintain these non-dues sources of revenue.

3.1.8. Membership

Presently, 1,614 (18%) of the 9,028 AAPM members live outside of the US in 95 different countries.

On a global scale, the AAPM is a well-resourced professional society, especially in terms of intellectual contributions to scientific, educational and professional activities. Members of AAPM are also involved with various international organizations including the IOMP, the IAEA, and EFOMP, in addition to various non-government altruistic organizations such Radiating Hope, Medical Physics for World Benefit (MPWB), International Cancer Experts Corps (ICEC), and others.

In summary, international activities provide many potential benefits to AAPM and its membership including the engagement of its members in international activities, the enhancement of visibility for AAPM, and medical physics in general, and the expansion of our clinical expertise in areas well developed by other international leaders in medical physics. Considering these mutual benefits and addressing the existing structural deficiencies, the Ad Hoc Committee emphasizes that development of an International Council will aid the organization and efficiency of international activities within AAPM.

3.2. History and Current State of AAPM international activities

The desire of medical physicists in the US to interact at the international level has been in the forefront of the activities of AAPM since its inception. It was the decision of the soon-to-be-formed International Organization for Medical Physics (IOMP) to restrict membership to national medical physics societies that led to the formation of the AAPM in 1958, and AAPM became one of the four charter national members of the IOMP when it was formed in 1963. International activities have remained an important activity of AAPM and an International Affairs Committee (IAC) was formed in 1970, initially as an Administrative Committee reporting directly to the Board of Directors until the formation, in 2011, of the Administrative Council (AC) to which it now reports. In 2006, all educational activities of the IAC were transferred to an International Education Activities Committee (IEAC) reporting to the Education Council. The following is a brief review of activities of the IAC and IEAC.

IAC activities

- Interacts with other national medical physics societies via its five regional activities subcommittees
- Facilitates donations of equipment to LMICs in collaboration with the IOMP via its Equipment Donation Program subcommittee
- Facilitates donations of books and publications to LMICs in collaboration with the IOMP via its International Library subcommittee
- Organizes the AAPM International Webpage to include information about sister societies in other countries, international conferences and symposia, teaching courses, licensing and regulation, education, job openings, etc. via the International Information subcommittee
- Organizes programs whereby qualified AAPM members may serve as Exchange Scientists in LMICs via its Exchange Scientist Program subcommittee

- Facilitates opportunities for physicists in LMICs to have their application fee and dues waived via its Partners in Physics subcommittee

IEAC activities

- Co-sponsors/endorse educational events worldwide (about 10 per year)
- Organizes special sessions at the World Congresses on Medical Physics and Biomedical Engineering
- Co-organizes (with the IAC) an International Symposium at the AAPM Annual Meeting
- Conducts educational courses in LMICs via its International Scientific Exchange Program subcommittee (2 per year, one in diagnostic and the other in radiotherapy physics)
- Facilitates training and research opportunities for medical physicists from foreign countries at AAPM member facilities via its International Training and Research Coordination subcommittee

However, not all international activities of the AAPM are overseen by either the IAC or the IEAC, especially those involving collaboration with other organizations such as:

Recent international collaboration on publications

- Collaborated with EFOMP to produce AAPM Report 246 (2019)
- Collaborated with the IAEA to produce TRS-483 (2018)
- Collaborated with the “Groupe Européen de Curiothérapie and the European Society for Radiotherapy & Oncology” (GEC-ESTRO) to produce Supplement 2 of AAPM Report 84 (2017) and Reports 138 (2011), 167 (2016), and 192 (2014)
- Collaborated with ESTRO to produce AAPM Report 229 (2012)
- Collaborated with ASTRO to produce Clinical Impact Statements on Radiation Oncology for Integrating Healthcare Enterprise International (about 1/year)
- Contracted with the International Commission on Radiation Units and Measurements (ICRU) to provide members with free access to ICRU Publications
- Contracted with the International Commission on Radiological Protection (ICRP) to provide members with free access to Annals of the ICRP
- Provided free access to AAPM Task Group Reports and its Virtual Library for non-AAPM members

AAPM representatives to international organizations

- IOMP
- Council on Ionizing Radiation Measurements and Standards.
- EFOMP
- ESTRO
- IAEA
- International Electrotechnical Commission.
- International Organization for Medical Physics.
- International Society for Magnetic Resonance in Medicine.
- International Union of Pure and Applied Physics.
- World Molecular Imaging Society.

3.3. Anticipated AAPM Resources Required

3.3.1. Estimated Staff Requirements

Each of AAPM’s four existing councils are assigned a “staff liaison” to provide program management assistance to the council leadership and committee chairs. While the support varies by council, there are some basic, essential tasks required for any council. The general responsibilities of the staff liaison to a council include:

- Provides day-to-day project management of council activities. Serves as a process expert, making recommendations based on AAPM policies, research, and past experience.

- Keeps AAPM Executive Director apprised of council initiatives. Coordinates with and informs other council liaisons on council initiatives.
- Is responsible for the development and oversight of the council budget, as well as the budgets of its subgroups.
- Ensures that the council and committee chairs execute their administrative duties.
- Supports the council volunteer leadership in communicating regularly with members to ensure that Council obligations are fulfilled.
- Works with council chairs to develop agendas and conduct effective meetings. Compiles and distributes all material prior to the meetings.
- Attends council and committee meetings (in person, conference call, and virtual) and drafts minutes.
- Monitors action items to keep the council and its committees moving forward to meet established goals.
- Guides council Reports through the drafting, approval and publication process.

Based on this understanding, it is estimated that the staff effort is approximately 30% of an FTE, or approximately \$25,000.

3.3.2. Overall expenses for the newly formed International Council

The previous section focused on staff expenses for the new International Council. Given below are projected expenses with ranges listed in the parenthesis as currently budgeted for other councils. Other estimated expenses for the newly formed council (in addition to the budget currently allotted for the international activities) are as follows:

1. International Council yearly retreat –\$ 25 K (based on AC budget of ~\$27K, SC budget of ~ \$31K for year 2020)
2. Equipment Rental: \$5K (0 to \$10K – budgeted for other councils)
3. Catering \$3K (\$4K to \$5K – budgeted for other councils)
4. Travel to annual meetings by chair and vice-chair: \$6 K (based on PC budget)
5. Travel to budget meetings by chair and vice-chair: \$2K (\$1K or 3K)
6. Travel expenses for chair and vice-chair to RSNA and Spring Clinical Meeting: ~3K
7. Meeting registration fee waiver for council chair and also to council vice-chair: \$1K

These expenses for the new council total about \$45K in addition to staff expenses.

Adding both staff and other expenses, the anticipated AAPM resources needed for the new council is approximately \$70K per year.

To put this in perspective, this additional cost to AAPM is approximately 0.6% of the AAPM budget (based on 2020 expenses). Also, the formation of the new international council may provide opportunities to increase international membership in AAPM, increase additional coordination of activities with other international organizations and explore new pathways for international activities.

4. Changes Required to AAPM By-Laws and Rules to Establish an International Council

By-Laws:

The International Council must be added to the list of standing committees in Section 2 and the membership and purpose must be defined in Section 5.

Rules:

In Section 3.0 (Committees), text must be added to define the membership and liaisons for the International Council. The categorical International Committees, their purposes and general activities must also be defined.

All other text (e.g., Terms of Office, Conduct of Business, Reporting Requirements) used in the proposed additions to the AAPM By-Laws and Rules is the same as what is currently used for the other councils and categorical council committees. The proposed additions to the AAPM By-Laws and Rules are included in the Appendix 1.

The Chair of the AAPM Rules Committee, Dr. John Antolak, reviewed the proposed additions, answered questions, and provided suggestions to the Ad Hoc Committee as it prepared this proposal. Official consideration of these recommendations by the AAPM Rules Committee is scheduled to occur following Board approval of the report from this Ad Hoc Committee. This provides an opportunity to address any comments or concerns from the AAPM Board of Directors received during their April 2020 meeting. If after their consideration there are no substantive changes, the Rules Committee would submit the required information to the AAPM Secretary for presentation to AAPM membership, discussion during the July 2020 Annual Business Meeting and a membership vote following the Annual Meeting.

5. Justification to Membership

5.1. Weaknesses of current paradigm

The *primary weakness of the current paradigm* is a lack of coordination of international endeavors, which stems in large part from the fragmented approach to such. The AAPM currently engages with numerous, varied international partners on a vast array of educational, research, and development activities, as listed above. These activities occur both formally, through committees such as the IAC and IEAC, which are housed under two separate councils, and in an ad hoc fashion through various opportunities that arise across several of our other subcommittees, committees, and councils..

The upside of all of these activities is that they provide substantial evidence that many of our members are genuinely invested in participating actively in the international arena. The downside is that many of these efforts are not coordinated, or there is a lack of a single association entity positioned to act as the global coordinator of these endeavors. The results of this fragmented approach to our international activities are:

- Duplication of effort
- Lack of standardization
- Lack of metrics to assess impact
- Ineffective or contradictory sharing of information with partner clinics and organizations
- Missed opportunities to grow the international membership base
- Inability to effectively respond to changing landscapes
- Suboptimal presentation of AAPM as global leaders in the development of treatment and quality standards
- Inability to effectively communicate opportunities for international engagement to the AAPM membership

- Inability for leadership to maintain clear, current knowledge of the organization’s international efforts and partnerships

Therefore, the current paradigm of prioritization, organization, execution, and oversight of the international efforts of the Association is often fragmented, leading to a lack of clear responsibilities and division of effort, potential for duplication of effort, and lack of a single body with a comprehensive vision, crucial to allow for optimal prioritization of undertakings. At the same time, the current structure, By-Laws, and rules of the Association do not seem to be appropriate for a simple re-alignment of committees, sub-committees, and workgroups/task groups, under a single existing body.

5.2. Improving International Activity Oversight

Improving oversight and increasing accountability is essential to ameliorate the potential effects of bias, cronyism, and manage any perceived conflicts of interest. Like many AAPM activities, international activities would benefit from coordinated oversight, and some AAPM members have expressed concern for these perceived issues. While these issues may only be the perception of a minority of members, it is important to establish international activities in a way that clearly provides rigorous oversight. A newly created International Council should be required to establish a structured process that codifies the procedure and evaluation metrics used to:

1. Evaluate and rank international activity proposals
2. Identify and select the ideal participants
3. Assess the relevance, impact, likely success, and harmony with the mission and vision the AAPM
4. Demonstrate how the proposal builds on prior work and establishes a platform for future engagement
5. Summarize for AAPM members how the proposed activity will benefit them directly
6. Complete budgetary accounting for volunteer time, financial support, and staffing effort needed for completion

5.3. Strengths of an IC paradigm

The strength of establishing an International Council strongly depends on the specific tasks such a council would be expected to accomplish. As discussed elsewhere in this report, the tasks are considerable indeed. AAPM is a leading international organization promoting the application of physics in medical care that is currently in a wide range of engagement.

The direct benefits to our membership are to provide an opportunity, particularly for our early career and younger members to participate in a variety of new international educational and scientific opportunities. For example, there may be opportunities for members that have very recently finished their graduate education to volunteer within international fellowship programs prior to starting their residencies. Improved engagement with our international partners will allow us to learn certain aspects of medical physics from other regions of the world that are just coming to the clinic in the US such as targeted radionuclide therapy. Furthermore, it can provide a forum for addressing challenging issues in the practice of medical physics that face us all globally.

AAPM is in a unique position to influence the practice of medical physics across the world from the perspective of training, education, scientific development, and professional growth and this is an enormous undertaking. In order to

accomplish these tasks, an International Council should be formed whose focus will be to develop needs-assessed strategies for effectively advancing the practice of medical physics globally in research, teaching and clinical service. However, the allotted budget for these activities is limited. A holistic approach to international activities is thereby crucial in ensuring that AAPM efforts are coordinated and efficient, and that lessons learned and resources created from activities working in one region of the world are shared with groups working in other regions or with other non-profit organizations involved in international activities involving medical physics. Thus, a thoughtful evaluation of the international programs is warranted in order to provide the most efficient approach to accomplishing these tasks with the greatest opportunity for success.

Centralizing the coordination of AAPM's international activities as well as communication regarding these efforts under a new International Council that has prominence and resources to realize these efforts will greatly enhance efficiency while minimizing duplication of effort yielding a greater potential for success. The International Council would provide a single point of contact for all things international both within and beyond the AAPM as well as acting as a conduit for our international partners whether these regard education, science, safety and quality of care, commercial efforts or standardization of medical physics quality on a global scale. Strategies should be developed by the new council for the effective implementation of new programs and activities. The maintenance of existing programs as well as the establishment of new ones must be associated with measurable metrics to assess their impact, ensuring sustainable, measurable, and meaningful impact on global health as it relates to the practice of medical physics both in the US and abroad. These activities cross the boundaries of science, education, and professional aspects involving many stakeholders with which AAPM currently engages. Although AAPM currently has the structure (councils with their associated committees, sub-committees, and WGs) to address these challenges across the globe, a better approach to coordinating these efforts is essential. It is vitally important to communicate with the leadership of the existing councils the enormous need described above so that the proper resources can be applied to successfully undertake the full spectrum international activities discussed in this report. Clearly, it is a daunting task to manage such international activities in a manner that best benefits AAPM and its membership. At first glance, it may appear that adding a new council may only muddle an already complicated structure where, in fact, quite the opposite is true. The major strength of the establishment of an International Council is the ability to address these challenges in an organized and coordinated fashion through centralized management and communication both within AAPM as well as with other partners and stakeholders outside AAPM. The ability to clearly demonstrate measurable value in the international arena presents the potential for increased international membership as well as investment in these efforts by our commercial partners that are active internationally.

For AAPM to stay relevant in today's world and to maintain its international leadership, we must make a more concerted effort to participate in global health activities in a comprehensive and organized manner. If we are to be leaders on the world stage and realize our full potential as scientists, educators and practitioners—as medical physicists—then we must lead. Today, local health and global health are undeniably linked. Discoveries and newly developed technologies in other countries as well as here in the US advances clinical care everywhere. We need to be a driving force working with international leaders in medical physics together to push our field forward to even greater scientific heights while being an active participant promoting high quality and safe practice of medical physics worldwide. In this manner, AAPM will realize its mission of 'advancing medicine through excellence in the science, education and professional practice of medical physics' on a global scale.

Reference List

1. Rehani MM, Pauwels R, Rehani B. Evaluation of medical physics training in radiology residency in 67 countries. *Phys Med* 2018;54:30-33.
2. International Atomic Energy Agency (IAEA). *Dosimetry of Small Static Fields Used in External Beam Radiotherapy*. Vienna, Austria: International Atomic Energy Agency (IAEA); 2017.
3. Tsapaki V, Tabakov S, Rehani MM. Medical physics workforce: A global perspective. *Phys Med* 2018;55:33-39.
4. Atun R, Jaffray DA, Barton MB, Bray F, Baumann M, Vikram B, Hanna TP, Knaul FM, Lievens Y, Lui TY, Milosevic M, O'Sullivan B, Rodin DL, Rosenblatt E, Van Dyk J, Yap ML, Zubizarreta E, Gospodarowicz M. Expanding global access to radiotherapy. *Lancet Oncol* 2015;16:1153-1186.
5. World Health Organization (WHO). NCD mortality and morbidity. https://www.who.int/gho/ncd/mortality_morbidity/en/. World Health Organization (WHO); 2020.
6. United Nations. United Nations Sustainable Development Goals. <https://www.un.org/sustainabledevelopment/>. 2018.
7. American Physical Society (APS). Task Force on Expanding International Engagement: Report, Recommendations, and Implementation. https://www.aps.org/programs/international/upload/APS_TaskForceReport_AC.pdf. American Physical Society (APS); 2018.
8. Hendee WR. The International Scope of Medical Physics: An Editorial. *Medical Physics* 2006;33:4770-4771.
9. Hendee W. The Global Outreach of Medical Physics. *Medical Physics* 2011;38:2313-2314.

Appendix 1

BY-LAWS

ARTICLE III. COMMITTEES

Section 2. Standing Committees (amended September 9, 2010 and *effective date*)

The Standing Committees shall be:

1. Administrative Council
2. Education Council
3. International Council
4. Professional Council
5. Science Council
6. Audit Committee
7. Executive Committee
8. Finance Committee
9. Nominating Committee
10. Rules Committee
11. Calibration Laboratory Accreditation Executive Committee
12. Other Standing Committees as specified in the Rules

Section 5 International Council (added *effective date*)

The International Council shall be composed of the Chair, the chairpersons of the categorical International Committees, additional members as specified in the Rules, and other ex officio members pursuant to the Rules.

The categorical International Committees shall be established pursuant to the Rules.

The International Council shall develop, prioritize, and coordinate international activities of the Corporation, including external collaborations related to international activities of the Corporation. The International Council shall consider and make recommendations for international policy and programs to the Board.

RULES

3.7 International Council (added *effective date*)

Purpose

As specified in the By-Laws.

Membership

The Chair of the Council will be appointed.

The Chair-designate, after appointment and for the remainder of time before succeeding as Chair.

The Chairs of the categorical International Committees.

One representative member from each of the other councils.

Liaison members will be non-voting.

Liaisons and Relationships with Other AAPM Committees and External Entities

The Chair of the International Council shall serve as an ex officio member of the Board of Directors, without vote.

With all Councils through the Council Chairs, or their designate.

AAPM's Liaisons to International Organizations

Others as necessary.

Terms of Office

In accordance with the standard Rules.

In order to assure continuity, terms of service should be staggered in such a way that approximately one third of the International Council receives new appointments each year. The President may, after consultation with the Chair of the International Council, dismiss a Council member who is absent from two consecutive meetings of the International Council.

Conduct of Business

The International Council shall meet at least twice annually. When the Chair is unable to preside over meetings of the Council, the Vice Chair will preside.

Reporting requirements

Board of Directors

When the Chair is unable to attend meetings of the Board, the Vice Chair will act as a substitute.

Activities

1. Provide overall direction to the committees of the International Council.
2. Receive reports from the International Committees.
3. Review the appointments and charge of Subcommittees, Task Groups and Working Groups appointed by the International Committees.
4. Ensure liaison between the committees of the International Council and among their respective Subcommittees, Working groups or Task groups.
5. Ensure liaison with other Councils.
6. Monitor the activities of categorical International Committees.
7. Recommend appointments to the categorical International Committees.
8. Submit an annual report to the Secretary. The report shall include the following material:
 - a. Any changes to international committees formulated by the International Council since the last report;
 - b. The accomplishments of each International Committee since the last report and a summary of work in progress (including the work and membership of any task group);
 - c. A summary of any international inquiries addressed to the AAPM since the last report and replies thereto;
 - d. Accomplishments, work in progress and recommendations of the International Council, as a whole, which are not included in the above.
 - e. Recommendations on international policy for the Board of Directors.

Committees

The categorical International Committees shall consist of the following:

Committee on Educational Activities

Committee on Training and Research Exchange Programs

Committee on Communications

Committee on Professional Activities

Committee on Scientific Innovation and Health Technology Assessment

Committee on Material Donations

Committee on Regional Needs Assessment and Collaborations

Subcommittees

Subcommittees may be appointed by a Committee to accomplish specific tasks within its purview. Their establishment and charge must be approved by the Council. The Chair of each Subcommittee will be a voting member of the parent Committee.

Working Groups

Working Groups may be appointed by a Standing Committee or Subcommittee to accomplish specific tasks within its purview. Their establishment and charge must be approved by the Council. Their lifetime will be limited to the needs of the task. The Chair of each Working Group shall be a member of the parent Council, Committee or Subcommittee.

Task Groups

Task Groups may be appointed by a Standing Committee, Subcommittee or Working Group to accomplish specific tasks within their purview. Their establishment and charge must be approved by the Council. Their lifetime will be limited to the needs of the task. Each Task Group must be endorsed by the Council at least annually or be considered disbanded. The Chair of each Task Group will be a voting member of the parent Council, Committee, Subcommittee or Working Group.

3.7.1 Committee on Educational Activities (added effective date)

Purpose

The Committee on Educational Activities shall advise the International Council and, through it, the Board of Directors, on matters related to the education of medical physicists working outside of the US and Canada.

Membership

In accordance with the standard Rules.

Liaisons and Relationships with Other AAPM Committees and External Entities

Others as necessary.

Terms of Office

In accordance with the standard Rules.

Conduct of Business

In accordance with the standard Rules.

Reporting requirements

International Council

In accordance with the standard Rules.

Activities

1. Endorse, co-sponsor, develop and/or sponsor international medical physics educational activities.
2. Develop, individually or in collaboration with others, curricula and educational resources for medical physicists working outside of the US and Canada, including standardized materials that can be adapted for different audiences and reused in a range of educational settings.

Subcommittees

In accordance with the standard Rules.

3.7.2 Committee on Training and Research Exchange Programs (added *effective date*)

Purpose

The Committee on Training and Research Exchange Programs shall advise the International Council and, through it, the Board of Directors, on matters related to exchange programs, between AAPM and national or international medical physics organizations and/or governmental and intergovernmental agencies, for the purposes of facilitating training and research opportunities in medical physics.

Membership

In accordance with the standard Rules.

Liaisons and Relationships with Other AAPM Committees and External Entities

Others as necessary.

Terms of Office

In accordance with the standard Rules.

Conduct of Business

In accordance with the standard Rules.

Reporting requirements

International Council

In accordance with the standard Rules.

Activities

1. Facilitate medical physics training and research opportunities at an AAPM member's institution for medical physicists working outside of the US and Canada.
2. Develop and maintain a database of AAPM institutions willing to host medical physicists working outside of the US and Canada for training and research opportunities.
3. Develop and maintain a database of AAPM members willing to travel to support clinical and research training programs for medical physicists working outside of the US and Canada.

Subcommittees

In accordance with the standard Rules.

3.7.3 Committee on Communications (added effective date)

Purpose

The Committee on Communications shall advise the International Council and, through it, the Board of Directors, on matters related to the development and maintenance of effective communications related to international medical physics activities.

Membership

In accordance with the standard Rules.

Liaisons and Relationships with Other AAPM Committees and External Entities

Others as necessary.

Terms of Office

In accordance with the standard Rules.

Conduct of Business

In accordance with the standard Rules.

Reporting requirements

International Council

In accordance with the standard Rules.

Activities

1. Develop and maintain content for the AAPM International Council website and on-line presence.
2. Promote the value of AAPM membership to a global audience.
3. In collaboration with national and international medical physics organizations and governmental and intergovernmental agencies, raise international awareness of the profession of medical physics.

Subcommittees

In accordance with the standard Rules.

3.7.4 Committee on Professional Activities (added effective date)

Purpose

The Committee on Professional Activities shall advise the International Council and, through it, the Board of Directors, on matters related to the professional development and advancement of individuals and medical physics organizations working outside of the US and Canada.

Membership

In accordance with the standard Rules.

Liaisons and Relationships with Other AAPM Committees and External Entities

Others as necessary.

Terms of Office

In accordance with the standard Rules.

Conduct of Business

In accordance with the standard Rules.

Reporting requirements

International Council

In accordance with the standard Rules.

Activities

1. In collaboration with national and international medical physics organizations and governmental and intergovernmental agencies, develop the profession of medical physics internationally through accreditation, certification, and licensure initiatives.
2. In collaboration with AAPM's Education and Professional Councils and national and international medical physics organizations, provide continuing education and professional development opportunities for medical physicists working outside of the US and Canada.

Subcommittees

In accordance with the standard Rules.

3.7.5 Committee on Scientific Innovation and Health Technology Assessment (added effective date)

Purpose

The Committee on Scientific Innovation and Health Technology Assessment shall advise the International Council and, through it, the Board of Directors, on matters related to the development, assessment and deployment of science and technology that enhances the quality, safety, and standardization of the practice of medical physics throughout the world.

Membership

In accordance with the standard Rules.

Liaisons and Relationships with Other AAPM Committees and External Entities

Others as necessary.

Terms of Office

In accordance with the standard Rules.

Conduct of Business

In accordance with the standard Rules.

Reporting requirements

International Council

In accordance with the standard Rules.

Activities

1. In collaboration with AAPM's Science Council, national and international medical physics, biomedical engineering or physics organizations, and/or governmental and intergovernmental agencies, develop and/or assess technologies and technical resources for medical physicists working outside of the US and Canada, including technology that can be adapted for use in diverse practice settings.
2. In collaboration with AAPM's Science Council, national and international medical physics organizations, and/or governmental and intergovernmental agencies, develop simple, vendor-neutral guidance to assist medical physicists working outside of the US and Canada with the installation, trouble-shooting, and quality assurance of medical imaging and radiation therapy equipment.

Subcommittees

In accordance with the standard Rules.

3.7.6 Committee on Material Donations (added effective date)

Purpose

The Committee on Material Donations shall advise the International Council and, through it, the Board of Directors, on matters related to collaborative programs between the AAPM and national and international medical physics organizations for the purpose of providing resources, such as equipment and library materials, to medical physicists outside of the US and Canada with limited access to such resources.

Membership

In accordance with the standard Rules.

Liaisons and Relationships with Other AAPM Committees and External Entities

Others as necessary.

Terms of Office

In accordance with the standard Rules.

Conduct of Business

In accordance with the standard Rules.

Reporting requirements

International Council

In accordance with the standard Rules.

Activities

1. Coordinate with national and international medical physics organizations on matters associated with the donation of equipment related to the practice of medical physics to countries with limited access to such resources.
2. Coordinate with national and international medical physics organizations on matters associated with the donation of books, journals, or other educational materials related to the practice of medical physics to medical physicists in countries with limited access to such resources.

Subcommittees

In accordance with the standard Rules.

3.7.7 Committee on Regional Needs Assessment and Collaborations (added *effective date*)

Purpose

The Committee on Regional Needs Assessment and Collaborations shall advise the International Council and, through it, the Board of Directors, on matters related to the region-specific assessment of needs to facilitate the safe and effective practice of medical physics and the development of collaborations, designed to meet the identified needs, between AAPM and other national and international medical physics organizations and/or governmental or intergovernmental agencies.

Membership

In accordance with the standard Rules.

Liaisons and Relationships with Other AAPM Committees and External Entities

Others as necessary.

Terms of Office

In accordance with the standard Rules.

Conduct of Business

In accordance with the standard Rules.

Reporting requirements

International Council

In accordance with the standard Rules.

Activities

1. Develop, maintain, and use processes designed to quantitatively assess the medical physics resources and needs in at least six regions of the world, including Africa, Asia-Oceania, Europe, Latin America, Middle East and North America.
2. Develop and maintain a database of contact information for leaders and other representatives of key stakeholder organizations at the regional, national, and international levels.
3. Coordinate AAPM collaborations with individual practices, regions or organizations and ensure involvement of all relevant Committees of the International Council.

Subcommittees

In accordance with the standard Rules.