2015 Stakeholder Meeting Summary

BMETs in Low Resource Countries

Prepared for the
The GE Foundation and the AAMI Foundation
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EXECUTIVE SUMMARY

Without technology that supports diagnosis and treatment, patients are vulnerable to needless pain and suffering, poor health outcomes, and even death. Timely access to emergency care and the use of diagnostic and therapeutic tools reduces patient mortality. Yet much of the available equipment in low resource countries is not functional. The World Health Organization (WHO) estimates that in Sub-Saharan Africa alone, as much as 70 percent of all laboratory and medical equipment is partially or completely out of service at any given time. A 2011 study by Perry and Malkin estimates the number is closer to 40 percent. However, the GE Foundation’s Chief Medical Officer David Barash, MD, points out that even one piece of equipment out of service is too many for any patient. A primary cause of this significant problem is the lack of skilled biomedical equipment technicians1 (BMETs) able to analyze, maintain, repair, and upgrade the equipment used to diagnose and treat patients. This problem is particularly acute in low resource countries.

In response to this issue, the GE Foundation and the AAMI Foundation are collaborating to develop recommendations for training models in low resource countries that are scalable, replicable, and sustainable within the next 3-5 years. The key goals of the joint project are 1) training more BMETs overall; 2) training BMETs more quickly; and, 3) creating a system of ongoing professional support and development for trained BMETs.

As a part of the data gathering phase for this project, the GE Foundation and the AAMI Foundation convened a group of 55 international stakeholders interested in training and supporting BMETs in low resource countries. This report summarizes the findings from the June 11-12, 2015, meeting held in Toronto, Canada and creates a call to action for medical, engineering, academic, philanthropic, and development communities to collaborate to address the critical need for trained BMETs in low resource countries.

Participants stated that an ideal training model that is scalable, replicable, and sustainable would include a requirement that training programs build partnerships and engage a network of interested people and organizations across academia, hospitals, governments, funders, NGOs, associations, communities, and other targeted groups to garner funding and other necessary resources.

Further, training programs should focus on vetting, developing, and continuously evaluating trainers to ensure that students are receiving appropriate training by competent trainers. Program faculty must possess both theoretical and practical knowledge and experience; be able to bridge the gap between theory and practice; and have an understanding of pedagogical approaches and learning strategies. Further, faculty must understand and know how to address complex infrastructure challenges that require fitting trained BMETs into a low resource system that has its own challenges that, when not addressed, impact the success of trained BMETs; and be committed to developing and empowering students.

1 A Biomedical Equipment Technician, also referred to as a Biomedical Engineering Technician/Technologist (BMET) or Biomedical Equipment/Engineering Specialist (BES or BMES), is typically an electro-mechanical technician who ensures that medical equipment is well maintained, properly configured, and safely functional. In hospital or clinical environments, BMETs often work with Clinical Engineers. http://www.aami.org/productspublications/ProductDetail.aspx?ItemNumber=924
committed to their own growth and development. Ideally, the trainers will be local, able to converse in the
local language, understand local customs, and have a local network on which to rely.

The programs also must focus on the student life cycle from pre-admission to professional BMET. They
must recruit and admit students with the greatest likelihood of success in the training program and
profession, both in terms of aptitude and attitude. Pre-assessment and routine evaluations are critical
factors to success.

The healthcare technology management (HTM) field\(^2\) should advocate for and raise awareness of the
global HTM profession by collecting success stories and then communicating those stories broadly.
Further, they need to take responsibility for developing a core curricula based on valid research and
international standards on which local training programs can rely. Additional research on health outcomes
is necessary to demonstrate the impact of the work BMETs do and support the technician’s credibility
among their peers.

Meeting participants recognize the significant work required in order to build a scalable, replicable, and
sustainable BMET training model. This meeting revealed a core group of committed individuals who are
willing to contribute to doing that work and address the pressing need for trained BMETs in low resource
countries.

The participants identified six strategies as critical next steps, including:

1. Create an international advisory body to assure quality of BMET training based on core
competencies.
2. Create a global alliance that focuses on the promotion of the HTM profession in low resource
countries.
3. Ensure the strict selection of BMET trainees and trainers.
4. Engage multiple stakeholders and funders to promote BMETs.
5. Create sustainable, scalable funding strategies for BMET training to improve public health
outcomes.
6. Define metrics for BMET health impact and outcomes.

The six strategies identified by the participants provide the impetus for further discussions. While the
community can address some tasks quickly, others will require considerable time and effort. To date,
securing funding for training has not been easy, and funding for community building will likely be more
difficult to garner. Nonetheless, the work done in the field thus far must continue, and it must be better
organized and supported. Creating a training model that is scalable, replicable, and sustainable in low
resource countries requires the entire stakeholder community to work together for this common purpose.

\(^2\) Healthcare technology management (HTM) is the official name of the professional field responsible for managing the selection, maintenance,
and safe and effective use of medical equipment and systems. The field includes biomedical equipment technicians, clinical engineers, clinical
equipment specialists, biomedical equipment specialists, imaging equipment specialists, laboratory equipment specialists, and others who protect
BACKGROUND

Without technology that supports diagnosis and treatment, patients are vulnerable to needless pain and suffering, poor health outcomes, and even death. Timely access to emergency care and the use of diagnostic and therapeutic tools reduces patient mortality. Yet much of the available equipment in low resource countries is not functional. The World Health Organization (WHO) estimates that in Sub-Saharan Africa alone, as much as 70 percent of all laboratory and medical equipment is partially or completely out of service at any given time. A 2011 study by Perry and Malkin estimates the number is closer to 40 percent. However, GE Foundation’s Chief Medical Officer David Barash, MD, points out that even one piece of equipment out of service is too many for any patient. A primary cause of this significant problem is the lack of skilled biomedical equipment technicians (BMETs) able to analyze, maintain, repair, and upgrade the equipment used to diagnose and treat patients. This problem is particularly acute in low resource countries.

In response to this issue, the GE Foundation and the AAMI Foundation are collaborating to develop recommendations for the creation and deployment of an efficient and scalable training model in low resource countries within the next 3-5 years. The key goals of the joint project are 1) training more BMETs overall; 2) training BMETs more quickly; and, 3) creating a system of ongoing professional support and development for trained BMETs.

As a part of the data gathering phase of this project, the GE Foundation and the AAMI Foundation in June 2015 convened a group of 55 international stakeholders interested in training and supporting BMETs in low resource countries. This report summarizes the findings from the June 11-12, 2015 meeting held in Toronto, Canada, and creates a call to action for medical, engineering, academic, philanthropic, and development communities to collaborate to address the critical need for trained BMETs in low resource countries.

GE Foundation Initiatives

The GE Foundation (GEF) (http://www.gefoundation.com/), the philanthropic organization of GE, is committed to building a world that works better. GEF empowers people by helping them build the skills they need to succeed in a global economy; equipping communities with the technology and capacity to improve access to better health and education; and elevating ideas that tackle the world’s toughest challenges to advancing economic development and improving lives. The generosity and talent of GE’s employees supports the work of the GE Foundation.

The Developing Health Globally™ (DHG) program is GEF’s signature philanthropic program that aims to improve access to quality healthcare for some of the world’s most vulnerable populations. Established in 2004, the DHG program strengthens healthcare systems in the developing world by upgrading equipment and infrastructure, and providing ongoing training and support to ensure success and sustainability. GEF creates sustainable impact through smart investing and leveraging of GE expertise and engaging committed partners. DHG works to enable the delivery of quality healthcare to more people around the world by strengthening the health systems that serve them.

4 The World Bank Atlas methodology defines low resource countries for fiscal year 2016 as low-income economies with a gross national income (GNI) per capita of $1,045 or less in 2014; middle-income economies are those with a GNI per capita of more than $1,045 but less than $12,736; high-income economies are those with a GNI per capita of $12,736 or more. Lower-middle-income and upper-middle-income economies are separated at a GNI per capita of $4,125.
In partnership with Engineering World Health and Developing World Healthcare Technology Laboratory at Duke University, DHG is developing local biomedical technology training programs for BMETs to identify trainers and local infrastructure to create in-country (local) training to cultivate a professional community of biomedical technicians. In resource-poor settings, DHG is developing local biomedical technology training programs; partnering with Ministries of Health to identify trainers and local infrastructure to create in-country training; and providing ongoing coaching and mentoring resources to cultivate a professional community of biomedical technicians. To date, these efforts have trained 200 BMETs in four countries: Cambodia, Ghana, Honduras, and Rwanda.

DHG is actively working to further the impact of the BMET program and develop a more expeditious, scalable, and cost-effective model for global implementation.

**AAMI Foundation Initiatives**

The Association for the Advancement of Medical Instrumentation (AAMI) and the AAMI Foundation (http://www.aami.org) are leaders in supporting the healthcare technology management (HTM) field by providing training and professional certifications (e.g., CBET), and nationally respected and recognized credentials. AAMI has assessed the needs and gaps in education and brought respected leaders together to determine ways of improving medical device safety and support and to improve and standardize the training and skillset for individuals working with medical devices. AAMI also has made it a priority to bring recognition to the field through a number of initiatives.

In 2011, AAMI convened a group of experts at a “Future Forum I” meeting to develop a shared vision of the field and activities that would help move the field forward. Efforts continued in 2012 at “Future Forum II” as AAMI worked to advance the field and establish a vision. Combined, the Future Forum meetings resulted in

- establishing a unifying name for the field, “Healthcare Technology Management” (HTM), which includes clinical engineers, biomedical equipment technicians, clinical equipment specialists, biomedical equipment specialists, laboratory technicians, imaging technicians, and others who manage healthcare technology;
- identifying both opportunities and challenges for the field and the professionals working in it; and
- developing and implementing a business plan to support the continuing evolution and growth of the HTM field as a profession.

In 2013, AAMI launched the “I am HTM” campaign (http://www.aami.org/iamhtm/), a major initiative to promote the value of the HTM field to hospital executives, clinicians, information technology personnel, and prospective students. The campaign includes marketing materials to promote the field. All of these materials are available free of charge on AAMI website.

Other outcomes of the Future Forum meetings include

- Developing career ladders.
- Developing core competencies for BMET training to guide BMET education programs in developing core curriculum and helping BMETs and their employers with career planning, hiring, and development opportunities.
- Developing promotional materials for outreach to external audiences.
- Developing standardized job descriptions.
- Establishing a robust website (www.aami.org/htmconnect).
In 2014, AAMI convened Future Forum III, a two-day expert meeting to identify the education and training gaps of US-based clinical engineers and BMETs. The outcome was the identification of steps to bridge those gaps. Jackie Eder-Van Hook, PhD, of Transition Management Consulting, Inc., the lead consultant on this joint GE Foundation-AAMI Foundation project, facilitated Future Forum III.

The AAMI Foundation offers annual scholarships to BMET and clinical engineering students as one more way to support the ongoing growth and professionalism of the HTM field overall.

AAMI has continued to focus its efforts with strategic plan goals to strengthen the skillsets, credentials, academic experiences, stature, and recognition of HTM professionals in healthcare delivery and to increase its training programs worldwide to keep up with the current trend of globalization. AAMI also has several programs and initiatives aimed at attracting a diverse membership.

AAMI is pursuing opportunities to hold training courses abroad and provide easier access to healthcare professionals seeking more in-depth training from an industry leader. Foundational elements of all of these efforts and other strategic priorities are advancing the safety of healthcare technology, improving patient outcomes, and saving lives.

Convening the 2015 Stakeholder Meeting

As part of its role in the joint GE Foundation-AAMI Foundation initiative to enhance BMET training and support in low resource countries, the AAMI Foundation is seeking to understand the current state of BMET training in low resource countries and to build a broader global HTM community by identifying and interviewing key stakeholders. Toward that end, in April 2015 the AAMI Foundation identified and invited approximately 75 individuals to attend a stakeholder meeting to coincide with the 2015 IUPESM conference, an international professional meeting held in Toronto, Canada in June 2015. The purpose of the meeting was to solicit data from key stakeholders to answer the question, “In three to five years, how can we create a scalable, replicable, and sustainable BMET model that trains and employs quality biomedical technicians in low resource nations around the world?”

This report summarizes the discussions and findings from that meeting. It also creates a call to action from the collective voice of the attendees for medical, engineering, philanthropic, academic, governmental, and development communities to collaborate to address the lack of trained BMETs in low resource countries.

Despite the short lead-time, distance, cost, and visa requirements, 55 stakeholders attended the meeting. Participants expressed that, although they had a shared passion for the subject and many of them knew one another, they had not ever come together for this common purpose.

Overall, participants expressed a strong sense of gratitude and support for the convening of the meeting and its outcomes. There was an audible “buzz” at the pre-meeting dinner and throughout the meeting itself with strong positive feedback. The broadly-held genuine interest in, commitment to, and concern for in the topic was evidenced in part, by the fact that participants who had to leave for other conference
obligations during the meeting returned once those obligations were completed. Most participants, many of whom had spent the week attending the 2015 IUPESM conference, and some of whom attended the 2015 AAMI annual conference the prior week, stayed until the stakeholder gathering ended on a Friday afternoon. A participant roster is included in Appendix A.

The participants provided critical information to create a fuller understanding of the system in which HTM professionals now operate in low resource countries. Perhaps even more significant outcomes of this stakeholder meeting were convening the international stakeholder community, garnering project buy-in, and setting the stage for future activities to occur.

Overall, participants wanted to understand both the obstacles that prevent people, governments, and organizations from training more BMETs and the requirements for the achievement of measurable and sustainable improvements in outcomes. They specifically wanted to develop a vision, identify educational needs and opportunities, develop core curricula, and create action plans.

Participants were clear in their desire for the development of a vision to create a realistic, adaptable, and sustainable training model that builds BMET capacity; creates shared responsibilities on the clinical care team; and improves patient outcomes in low resource countries.

Over the course of the meeting, the need to articulate and document the current global environment for BMETs also became clear. Each participant seemed to have a unique understanding of one aspect of the system. For example, one person may understand the student cycle (identification, recruitment, training, support, development, and graduation), while another person understands the intricacies of public policy and regulations. Prior to this meeting, the various communities have not interacted in any formal way to share their perspectives. Identifying additional stakeholders and articulating their needs and requirements is a critical aspect of the joint initiative.

**STAGE SETTING**

**Networking Dinner**

Meeting participants gathered for a networking reception and dinner on June 11. Mary Logan and Asha Varghese welcomed the participants, delivered opening comments, and described the project goals: 1) training more BMETs overall; 2) training BMETs more quickly; and, 3) creating a system of ongoing professional support and development for trained BMETs. Ms. Logan introduced the project lead, Jackie Eder-Van Hook, PhD who introduced her co-facilitator Chris Love. Consultant bios are included in Appendix B.
Initial Vision

At dinner, Eder-Van Hook began her remarks by stating that conducting BMET training in low resource countries sounds so simple, but, in reality, it is quite complex. She then presented an initial project vision statement, to which there was widespread agreement by participants.

In three to five years, we have a scalable BMET model that trains and employs quality biomedical technicians in low resource nations around the world. The BMETs are respected members of the clinical care team and hospital staff and have access to a system of ongoing professional support and development. Equipment is available and appropriately utilized for positive patient outcomes.

Interview Summary

Eder-Van Hook then shared the highlights of more than 30 hours of interviews she conducted to learn about the issues surrounding BMET training in low resource countries, inform the agenda setting, and, ultimately, the development of the model. Interviewees included BMETs, trainers, and individuals from academia, government, NGOs, associations, and the private sector. Eder-Van Hook briefly summarized what she had heard from interviewees focusing on the students, faculty, graduates, and facilities.

Students come from diverse backgrounds. A few have technical backgrounds, although most do not. Some have attended school, but in Cambodia, for example, the students may only have 5-9 years of education. Some speak English, but most are not fluent and some are unable to comprehend technical instructions in English. Some are not fluent in the local language, and may not be literate in their own language. Few have technical skills, although some arrive with mechanical skills such as those who served as the hospital “handyman” or those who had been electronics technicians outside of healthcare. Students arrive at the trainings with limited skills in math, computers, and rarely have budget, management, or soft skills (communications). Students face challenges and significant pressures in attending the trainings, and yet they find a way to participate overcoming resource needs, language, literacy, family and community support, transportation, and lodging.

Skilled Trainers and Faculty. Skilled trainers are lacking in most of the countries mentioned. In some instances, even after completing a Train-The-Trainer course, they may lack hands-on skills needed to demonstrate how to repair a piece of equipment. One interviewee described a trainer taking two class sessions to demonstrate a repair and still being unsuccessful. Undoubtedly, it was frustrating for the trainer and students. Some of the trainers strive to become university professors once they have gained more experience, a fact that reduces the number of in-country trainers and effects the ability of training programs to expand the number of graduates and achieve programmatic sustainability.

Graduates. Program graduates may find it difficult to find wage paying jobs. They may not be paid any more than when they served as the hospital handyman, a demoralizing situation for one graduate in Honduras. There is limited upward mobility for the graduates. They may not receive the respect or support of health care providers in their facilities. Culturally, they may find it difficult to educate doctors and nurses on issues such as operator or use errors.
Clinical Facilities. Facilities may be operating under centralized health systems giving staff inadequate control. They may not know that BMETs exist, have a budget to hire BMETs, or pay for parts, if, in fact, they are able to order parts. BMETs are often left to figure out their roles, how to make things work with makeshift resources and tools/parts, and with an expectation that they do many other tasks beyond managing healthcare technology simply because of their technical skills.

Interviewees described the students, trainers, and graduates as talented, bright, and motivated people. They spoke of them with admiration, affection, and even amazement at what they are able to accomplish under difficult and low resource conditions.

Advice from the Chief Medical Director

GE Foundation’s Chief Medical Officer, Dr. David Barash spoke briefly to participants about the global need for BMETs. He encouraged them to tackle the issue of inoperable equipment. He challenged them to work to get as close as possible to zero pieces of inoperable equipment. He suggested that the group take a four-step approach to creating a BMET training model. First, do simple stuff. Second, fail fast – implement simple pilot projects and if they do not work, try something else. Third, demonstrate leadership. Lastly, find and work with partners.

Participant Work Groups

The stakeholder meeting was designed in part around three key issues. First, each participant has an important piece of information about current BMET training and/or knowledge of what is missing from that training. The meeting was an opportunity to pull out that information. Second, networking among this group is of critical importance. While some participants are acquainted, conversations of this type and scale have not occurred previously. Lastly, given the length of the meeting and the number of participants, it was important to keep the participants engaged and moving from group to group.

To aid in addressing these issues, the facilitators modified a structured conversation methodology, known as World Café for the meeting. World Café is a creative process for leading collaborative dialogue, sharing knowledge, and creating possibilities for action in groups. The agenda was divided in six major parts, agenda setting, SWOT analysis, identifying critical factors, strategy development, action planning, and next steps. The agenda is included in Appendix C.

MEETING FINDINGS

Setting the Agenda: Defining Success

To begin the full day of work together, participants offered their ideas of what success might look like at the end of the meeting. Interestingly, the visions of success put forward could be seen as a sequence of progressive steps that move beyond the scope of the day well into the future.

- Understand the current situation, gaps, challenges, and scope of the need by critically looking at the environment in which BMETs operate, including public policy, infrastructure challenges, stakeholders, and resources.
- Create a vision, training model, and action plan with SMART goals applicable in low resource settings that are realistic, adaptable, and sustainable with a regional or country approach.

5 SMART goals are specific, measurable, attainable (or assignable), relevant (or results-oriented), and time-bounded.
• Engage and collaborate with stakeholders.
• Utilize consensus building at the local level and beyond.
• Share and learn from each other’s experiences.
• Identify chief challenges, such as what works in the same way in different environments and countries, and what is unique.

The exercise highlighted both the participants’ short- and long-term hopes and set the tone for the day.

**Identifying the Current State: SWOT Analysis**

In an effort to define the current state, participants working in small groups created a SWOT analysis to identify the strengths, weaknesses, opportunities, and threats inherent in current BMET training efforts. They focused on key areas of training, BMET profession, stakeholders and community expertise, funding and other resources, government, communications, and research.

<table>
<thead>
<tr>
<th>Training</th>
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<tbody>
<tr>
<td><strong>Strengths:</strong></td>
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<tr>
<td>Students’ desire to learn</td>
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<tr>
<td>Quality of expatriate trainers</td>
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<tr>
<td>Clinical mentoring and training</td>
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<tr>
<td>Curriculum (availability; graphics, design, and organization, quality of materials)</td>
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<tr>
<td>Local accreditation</td>
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<tr>
<td>Training reflective of local realities, recognition of need to adapt to local conditions</td>
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<tr>
<td><strong>Weaknesses:</strong></td>
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<tr>
<td>Accessibility, cost and availability of training (post basic, continuing, practical)</td>
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<tr>
<td>Lack of training infrastructure and support</td>
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<td>Existing structure and systematic approach; top down approach</td>
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<td>Isolated programs and successes, lack of common approach</td>
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<td>Lack of quality of teachers in-country</td>
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<td>Low number of trainees (qualified applicants, low female enrollment)</td>
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<td>Linguistics</td>
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<td>Long distance communications</td>
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<td><strong>Opportunities:</strong></td>
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<tr>
<td>New trainee sources (pre-enrollment education, willingness to learn, demand)</td>
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<tr>
<td>Training innovations (mobile technology; virtual; standardized curricula)</td>
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<tr>
<td>Availability of academic and training facilities</td>
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<td>Bridge departments (engineering, health science, medical, dental)</td>
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<td>Develop accreditation standards</td>
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<tr>
<td><strong>Threats:</strong></td>
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<tr>
<td>Lack of structured system to support training</td>
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<td>Lack of linkages to in-country decision-makers</td>
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<td>Lack of program accreditation</td>
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<td>Turf wars over standards and who sets the standards</td>
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<td>Lack of core competencies, complacency resulting in failing competencies</td>
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<td>Lack of training facilities; no local schools</td>
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<td>Lack of trainers, externally developed and delivered content</td>
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<td>Sub-standard practical training component</td>
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<td>Lack of leadership, management, and finance skills to make business case to c-suite</td>
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<td>Loss of funding for students</td>
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6 SWOT analysis is a tool enabling organizations to identify its Strengths and Weaknesses considered internal and controllable factors as well as Opportunities and Threats considered external and uncontrollable factors.
### BMET Profession

| Strengths: | • Local BMETs feel responsible to improve conditions |
| Weaknesses: | • Weak standards and guidelines  
• Undefined scope of practice  
• Low number of BMETs  
• Poor compensation/incentives (wage scale, compensation, incentives entry/retention)  
• Lack of awareness of need for BMETs (value proposition, health impact, HTM)  
• Few jobs (lack of standardized jobs, job poaching)  
• No career ladder  
• Lack of BMET identity, credibility, and recognition of BMET work  
• Lack of international certification  
• Limited body of knowledge  
• Technology transfer |
| Opportunities: | • Demonstrate leadership  
• Abundant volunteers; invite retirees to teach abroad  
• Recruit more female BMETs  
• Links to governments, NGOs, and associations |
| Threats: | • Cost of tuition vs. likelihood of employment  
• Incentives leads to migration and “brain drain” from public sector hospitals  
• No defined career path, limited job satisfaction  
• Few graduate success stories  
• Professional conflict (BMEV-BMT, pharmacy-BME)  
• Male dominated culture; lack of support/development for female BMETs  
• Weak relationships, change in leadership and personnel in clinical facilities |

### Stakeholders and Community Expertise

| Strengths: | • Interest by WHO, GEF-AAMIF 2015 Stakeholder Meeting, and others  
• Goodwill of organizations and NGOs that are willing to support efforts  
• Increased public concern; strong NGO community  
• Creative, innovative use of resources, passion, resourcefulness, community pride  
• Stakeholder buy-in and support (GEF-AAMIF 2015 Stakeholder Meeting; IFMBE CED; WHO, PAHO; ACCE, biomed societies; HTM leaders/ambassadors)  
• Government infrastructure  
• Financial support  
• Access to faculty, trainers, and volunteers  
• Political capital  
• Capacity building focus  
• Talent, motivation  
• Knowledge  
• Expertise in developed countries  
• Existing technical training institutions (Teninty’s 2-year training program)  
• Women in BMET |
| Weaknesses: | • Curriculum issues (quality, languages barriers, lack of standardization)  
• Inter-professional training needed for medical and dental profession and BMETS  
• No links between biomedical engineering schools and hospitals |
| Opportunities: | • Capacity building  
• Create global community of HTM professionals; find and develop champions  
• Foster cooperation; foster networks for networking, learning, and sharing  
• Increase awareness among major international players; engage corporations  
• Create a level playing field (“World is Flat”) |
| Threats: | • Lack of stakeholder buy-in; lack of appreciation by USA medicine  
• Weak linkages (between education and clinical institution, corporations)  
• Lack goodwill of organizations and NGOs that are willing to support efforts  
• Diversity of cultures |
### Funding and Other Resources

**Strengths:**
- None Specified

**Weaknesses:**
- Limited awareness of funding opportunities
- Dependence on donor cycles
- Reliance on unpredictable government budgeting
- Lack of NGO sustainability
- Limited financing
- National training programs
- Limited training resources (materials, tools, resources post training, training facilities)
- Shortage of equipment, parts, tools, and consumables
  - Weak logistics
  - Documentation, access to service and owner's manuals
  - Lack of availability of leasing or renting equipment
  - Difficult acquisition of equipment, parts, tools, and consumables
  - Lack of financial planning for equipment, parts, tools, and consumables

**Opportunities:**
- Public-private-academic partnerships
- Emerging markets
- Foundation-funded training
- Global web training

**Threats:**
- Lack of training program funding
- Lack of tuition funding
- Lack of availability of short-term funding
- Lack of funded posts
- Shrinking budgets
- Resource availability (service and user manuals, equipment, parts)
- Lack of cultural and language resources
- Lack of associations
- Shortage of equipment, parts, tools, and consumables
  - Difficulty procuring parts and consumables
  - Proprietary equipment complexity (code sharing, software availability)
  - Lack of available technology
  - Vendor restrictions on BMET repairs

### Government

**Strengths:**
- None Specified

**Weaknesses:**
- Various government policy and regulations

**Opportunities:**
- None Specified

**Threats:**
- Social instability, conflict, wars, political instability
- Low political support, buy-in, collaboration
- Insufficient coordination between education and health sectors
- Poor communications
- Abrupt changes in funding and policies
- Corruption, greed, apathy
- Procurement challenges
- Inadequate policy direction

### Communications

**Strengths:**
- None Specified

**Weaknesses:**
- Lack of coordination, centralization of information, shared information

**Opportunities:**
- Share experience and knowledge
- Publish successful cases
- Communicate need for BMETs generally and specifically in low resource countries
- Create jobs
- Improve quality of life

**Threats:**
- None Specified
Research

<table>
<thead>
<tr>
<th>Strengths:</th>
<th>None Specified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weaknesses:</td>
<td>Lack of needs assessment at country and regional levels</td>
</tr>
<tr>
<td></td>
<td>Difficulty of measuring success, impact</td>
</tr>
<tr>
<td></td>
<td>Lack of data and evidence</td>
</tr>
<tr>
<td>Opportunities:</td>
<td>None Specified</td>
</tr>
<tr>
<td>Threats:</td>
<td>None Specified</td>
</tr>
</tbody>
</table>

Identifying Critical Factors of Scalability, Replicability, and Sustainability

Working in small groups, participants reflected on the factors that make BMET training programs scalable, replicable, and sustainable.

Scalable

Participants answered the question, “What key factors make a BMET training program scalable?” In answering the question, they considered those programs that have successfully increased the number of students trained and the factors that inhibited the scalability of BMET training programs. They identified essential factors that create a scalable training model, including a strong, adaptable hands-on curriculum taught by skilled trainers, and effective collaborations with essential stakeholders.

Strong, Adaptable, Hands-On Curriculum Taught by Skilled Trainers

- Building a strong foundation (body of knowledge, core curricula, and standards of practice).
- Training conducted by skilled trainers who possess both theoretical and practical knowledge and experience; are able to bridge the gap between theory and practice; have an understanding of pedagogical approaches and learning strategies; are committed to developing and empowering students; and are committed to their own growth and development.
- Providing students with a hands-on internship for BMET skills development.
- Integrating evaluation into the systems to drive ongoing improvements.
- Recognizing and appreciating the different needs of countries, regions, populations, and facilities.
- Emphasizing collaboration between engineering and health sciences departments.

Effective Partnerships with Essential Stakeholders

- Creating, developing, and fostering partnerships and engagement strategies with and for key stakeholders at the highest levels in each country, while supporting ownership at the local level.
- Creating, developing, and fostering strategic alliances and public-private-academic institutions for greater transparency (less prone to corruption) and legitimacy.
- Fostering institutional buy-in (governments, hospitals, universities, NGOs, associations).

Participants also said that the resources necessary for scalability include access to international standards and best practices, material resources, and support for professional development.

Access to International Standards and Best Practices

- Accessing local and international associations, especially in the US, UK, and Canada that are relevant to BMETs for information sharing, training, and networking.
- Creating a global BMET/HTM community for sharing best practices.
- Supporting the creation of “health technology” oversight committees that include BMETs, physicians, and other health leaders.
Access to Material Resources

- Accessing clearly defined set of resources (financial, expertise, information; predictable flow of resources for budgeting purposes).
- Accessing an ongoing continuum of resources to support growth and improvement.
- Accessing local and regional infrastructure necessary to support local efforts.
- Accessing equipment, tools, parts, and consumables.

Access to Support for Professional Development

- Creating a road map for learning (skills development) and career progression.
- Recognizing and receiving support from human resource departments for the role of BMET, the field of HTM, and the leadership it provides.
- Accessing human resources support (continuing education, mentoring, program development, networking, and technological support (computerized maintenance management system (CMMS)).

Participants also identified specific barriers to scalability.

<table>
<thead>
<tr>
<th>Barriers to Scalability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students and Faculty/Trainers: Moving people around Lack of knowledge about career and skills development, HTM approach</td>
</tr>
<tr>
<td>Stakeholders: Lack of institutional buy-in from governments, facilities, and NGOs Lack of networking, not as simple as joining professional associations</td>
</tr>
<tr>
<td>Policies: Lack of a uniform body of knowledge, curriculum, and standards of practice Lack of individualized approach; different settings, different needs Lack of a coordinated approach that uses local and distance learning tools</td>
</tr>
</tbody>
</table>

Replicable

Participants answered the question, “What key factors make a BMET training program replicable in another location (site, region, or country)?” In answering the question, participants considered BMET training programs that have replicated their training programs successfully and the factors inhibiting the replicability of training programs (cultural, social, geographic, students, faculty, literacy, jobs, etc.).

Participant descriptions of factors that support replicability clustered around enhancing training content and trainers, assessing local and country ways and needs, and resolving financial and resource challenges.

Enhancing Training Content and Trainers

- Creating two separate categories of BMET training. One program for technicians already working in hospitals and another to provide initial BMET training. Identifying common/basic elements.
- Establishing regional training hubs equipped with clinical equipment.
- Considering life cycle concepts.
- Identifying HTM core competencies and incorporating into curriculum (technical, communications, physiology, medical terminology, etc.).
- Providing continuing professional development.
- Creating common standards.
- Creating process/roadmap of the steps to develop a BMET program.
- Developing train-the-trainers as champions for BMETs.
- Identifying an international body to recognize BMET programs and gain recognition.
Assessing Local/Country Ways and Needs
- Understanding institutions, especially Ministries of Health by country (differences, regulatory bodies, advocacy groups, educational institutions, clinical).
- Pre-assessing local/country needs (survey training needs, gain lists of non-functional equipment, and other indicators, as appropriate).

Resolving Financial and Resource Challenges
- Addressing compensation issues and identifying retention strategies.
- Acquiring resources to procure tools and test equipment; list of standardized tools.
- Overcoming procurement obstacles.

Participants also identified specific barriers to replicability.

<table>
<thead>
<tr>
<th>Barriers to Replicability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training:</td>
</tr>
<tr>
<td>- Lack of vertical replicability within a country</td>
</tr>
<tr>
<td>- Lack of knowledge of key elements of a replicable model</td>
</tr>
<tr>
<td>- Curriculum that does not cover the whole life cycle of equipment</td>
</tr>
<tr>
<td>- Lack of standardized terms</td>
</tr>
<tr>
<td>- Lack of core set of competencies to be achieved at end of training</td>
</tr>
<tr>
<td>- No open menus of standardized courses from which to choose from and adapt</td>
</tr>
<tr>
<td>- Lack of community help to achieve core set of competencies</td>
</tr>
<tr>
<td>Stakeholders:</td>
</tr>
<tr>
<td>- Lack of understanding by the Ministry of Health, key players by country and program</td>
</tr>
<tr>
<td>- No system to maintain community of BMETs</td>
</tr>
<tr>
<td>Policies:</td>
</tr>
<tr>
<td>- Unmet need for work with international bodies to recognize and certify training programs regardless of country</td>
</tr>
<tr>
<td>- No core set of competencies</td>
</tr>
<tr>
<td>- Lack of national policies on BMET training</td>
</tr>
<tr>
<td>Resources:</td>
</tr>
<tr>
<td>- Lack of resources (HR, teaching resources and structure, political structure)</td>
</tr>
<tr>
<td>- No common script/training tool kit</td>
</tr>
<tr>
<td>Other:</td>
</tr>
<tr>
<td>- Low levels of literacy (English, French, and/or local languages)</td>
</tr>
<tr>
<td>- Resistance to one size fits all: flexibility</td>
</tr>
</tbody>
</table>

Sustainable

Participants answered the question, “What factors make a BMET training program sustainable?” In answering the questions, participants considered funding, stakeholders, infrastructure, literacy rates, technological orientation, political-social stability, public-private partnership successes, political systems, champions, knowledge of the role of BMETs, entry level and advanced jobs, faculty/trainers, access to parts, behavior change, culture change, etc.

Responses to this question described many essential qualities of sustainable BMET training. Response themes included engaging the right participants to create responsive, accountable local training. Nurturing the development of the BMET profession and its members is also critical. Other themes that emerged were securing and developing quality trainers, utilizing broad stakeholder support and getting Ministries of Health directly involved in assuring sustainability. Participants consciously considered topics beyond the obvious need for securing financial resources. They discussed funding separately.

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7 Sustainable means the ability to maintain the training at a certain rate or level.
Engaging the Right Participants to Create Responsive, Accountable Local Training

- Providing mechanisms to identify aptitude and test for competency.
- Selecting the “right” local training institute or center of excellence capable of generating funds.
- Utilizing assessments, including a mechanism for feedback between education and health sectors to match the needs on the ground with the training provided.
- Establishing a strategic alliance between academic institutions and healthcare facilities, including a link between schools of engineering and hospital/teaching institutions.
- Fostering training programs that grow along a continuum of training.
- Developing local champions, leadership, and a planning process.
- Articulating the needs of the local environment, involving local champions in the entire process.
- Ensuring ownership of training and outcomes by the Ministry of Health and local training facility.
- Assuring a growing, living, and continuous process improvement environment.

Nurturing the Development of the BMET Profession and its Members

- Delineating public vs. private.
- Describing business models whereby BMETS are entrepreneurs and leaders.
- Providing professional advocacy for BMETs.
- Establishing a career path for BMETs.
- Raising the profile and status of BMETs.
- Establishing a career ladder from BMET to PhD.
- Articulating employment opportunities for graduates, including career progression.
- Creating success stories as encouragement.
- Creating a community of professionals who serve as mentors, collaborators, and problem solvers.
- Exhibiting leadership.
- Raising awareness and demonstrating evidence.
- Using science fairs to educate youth and increase awareness of the professional path of BMETs.

Securing and Developing Quality Trainers

- Identifying trainers.
- Vetting potential trainers, ensuring right level of skills and experience, including “hands-on.”
- Building the capacity of local trainers, ideally with hospital and practical, hands-on experience.
- Developing quality standards of training.

Utilizing Broad Stakeholder Support and Collaboration

- Containing a mix of stakeholders with bodies to advocate, certify, and regulate.
- Identifying key stakeholders (HTM, Ministry of Health/Education, academia, private sector).
- Providing networking, including access to BMET societies and creating a support network; providing access to BMETs in the USA, Canada, Europe, etc. for advice and knowledge.
- Creating country-based alliances.

Involving Ministries of Health Directly

- Recognizing the need for public policy at the highest levels.
- Providing definitions of “sustainable” training programs.
- Establishing ownership of training and outcomes by Ministry of Health and training facilities.
Planning for and Accessing Financial Resources
- Utilizing financial planning and resources.
- Mobilizing resources for maintaining the training programs.

**Funding**

Participants answered two questions. First, “How are BMET training programs currently funded?” Second, “How might BMET training programs be funded in the future?” In answering the questions, participants considered current funding models as well as potential models to fund BMET training. Some ideas offered for consideration included, tuition, hospital/facility paid training fees, school fees, government funding, government aid, foundation funding, corporate initiative, social funding/crowdfunding, micro-financing, micro-franchising, social impact investing, manufacturer fee, or remittance fee.

One training program described the challenges they faced in securing funds for training BMETs in part because of the lack of awareness of BMETs as a profession, the lack of understanding of the importance of and need for BMETs, and other needs deemed more pressing by funders. During the interviews, a staff member from an international aid agency appreciated the need, but was clear that aid was not available unless the project fits within their existing portfolio. However, she did suggest that framing the needs within the existing portfolio might be a successful strategy.

Participants identified the current funding mechanisms for BMET training, including the following:

- Grants or other non-financial contributions from foundations, NGOs
- International aid organizations
- Government funding
- Hybrid funding model (NGOs and government)
- Tuition, other school fees

Participants also offered innovative ideas for potential future funding sources.

<table>
<thead>
<tr>
<th>Future Funding Ideas by Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Governments:</td>
</tr>
<tr>
<td>- Charge government for services now provided for free (e.g., train-the-trainer, internships, consulting to hospitals)</td>
</tr>
<tr>
<td>Facilities:</td>
</tr>
<tr>
<td>- Tie equipment donations and BMET training to hospital financing</td>
</tr>
<tr>
<td>- Charge local facilities for services now provided for free (e.g., train-the-trainer, internships, consulting to hospitals)</td>
</tr>
<tr>
<td>Trainers:</td>
</tr>
<tr>
<td>- Training workshops</td>
</tr>
<tr>
<td>Students:</td>
</tr>
<tr>
<td>- Tuition fee-based through private and public stipends</td>
</tr>
<tr>
<td>Community:</td>
</tr>
<tr>
<td>- Crowdsourcing within communities</td>
</tr>
<tr>
<td>- Matching funds</td>
</tr>
<tr>
<td>NGOs:</td>
</tr>
<tr>
<td>- Equipment donations with donor assuming cost of training</td>
</tr>
<tr>
<td>Private Sector:</td>
</tr>
<tr>
<td>- Manufacturers equipment fees (taxes, equipment discounts free up training funds)</td>
</tr>
<tr>
<td>- Tax breaks to incentivize vendors to finance BMET training</td>
</tr>
<tr>
<td>- Local private sector</td>
</tr>
<tr>
<td>Partnerships:</td>
</tr>
<tr>
<td>- Public-private partnerships (PPP)</td>
</tr>
<tr>
<td>- National and regional HTM service centers</td>
</tr>
<tr>
<td>Fee for Service:</td>
</tr>
<tr>
<td>- Repair services</td>
</tr>
<tr>
<td>- Rental services of test equipment</td>
</tr>
<tr>
<td>- Consulting fees</td>
</tr>
</tbody>
</table>
Strategy Development: Creating the Future

Working in small groups, participants reviewed the initial vision and identified strategies they considered necessary to create this future.

The participants considered current strengths, weaknesses, opportunities, threats; current and future funding models; scalability, replicability, and sustainability; stakeholders and champions; cultural issues; and external factors.

The groups identified nine initial strategies of importance.

1. Establish a forum to share, learn, and discuss common challenges and opportunities in order to reach agreement on a standardized, but flexible BMET training.
2. Create a global alliance.
3. Create an HTM alliance.
4. Ensure this group of experts remains cohesive.
5. Engage multiple stakeholders and funders to promote BMETs.
6. Ensure countries cooperate to achieve a scalable BMET model.
7. Create unified accreditation standards, international certification (expand AAMI standards).
8. Select trainees by gaining stakeholder consensus, and agree on entry level (pre-qualifications), mechanisms of assessment and selection (interview, experience) and assessment (attitude, aptitude, and compare to existing workers).
9. Define metrics for health outcomes.

Action Planning

From among the strategies identified, participants chose to merge related strategies and restate others. The six remaining or restated strategies appear in the following tables. Working in small groups, participants developed an Action Plan for each strategy by identifying the relevant tasks to be completed (responsible parties, target dates, available resources, resource needs, and cost of each task.) Due to time constraints, however, not all tasks were completed for each strategy. For example, the stakeholders working on Strategy 1 did not identify who would be part of the core team or advisory board.

The six strategies and related information (responsible parties, target dates, resources, and cost) reflect the collective wisdom of the stakeholder group. In the final report to the GE Foundation, these strategies might be enhanced or replaced based on what is learned subsequently about training BMETs in low resource countries.

The six strategies included the following:

1. Create an international advisory body to assure quality of BMET education through defining core competencies.
2. Create a global alliance that focuses on the promotion of the BMET profession in low resource countries.
3. Ensure the strict selection of BMET trainees/trainers.
4. Engage multiple stakeholders and funders to promote BMETs.
5. Create sustainable, scalable funding strategies for BMET training to improve public health outcomes.
6. Define metrics for BMET health impact/outcomes.

<table>
<thead>
<tr>
<th>Decisions/Steps/Tactics Needed</th>
<th>Responsible Parties</th>
<th>Target Dates</th>
<th>Available Resources</th>
<th>Needs/Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify experts (advisory board) from the field who are willing to advise and recruit them</td>
<td>Core team</td>
<td>Mid-Sept. 2015</td>
<td>Contacts, full-time staff</td>
<td></td>
</tr>
<tr>
<td>Seek support from established bodies for credibility purposes (WHO, AAMI, IFMBE)</td>
<td>Core team</td>
<td>Jan. 2016</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identify key stakeholders from the countries (MOH, MOE, schools/universities)</td>
<td>Core team; advisory board</td>
<td>Jan. 2016</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identify vendors and manufacturers</td>
<td>Core team</td>
<td>Mid-Sept. 2015 to Jan. 2016</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create list of core competencies</td>
<td>Core team</td>
<td>Mid-Sept. 2015 to Jan. 2016</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Send draft core competencies to peers for external review</td>
<td>Advisory board network</td>
<td>Jan. 2016</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buy-in from every organization/individual working in the field: &quot;We agree to implement the core competencies in our work&quot;</td>
<td>Core team</td>
<td>June 2016</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Decisions/Steps/Tactics Needed</th>
<th>Responsible Parties</th>
<th>Target Dates</th>
<th>Available Resources</th>
<th>Needs/Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify alliance members and funders and engage them</td>
<td>GEF-AAMIF Participants</td>
<td>6 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Share experiences, challenges, materials, and curricula</td>
<td>1 year June 2016</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Determine what works, where, and why (gap analysis)</td>
<td>1 year June 2016</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Build compelling case for BMETs as a recognized profession (targets; indicators; recommend country-level scalability plan)</td>
<td>2-3 years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agree on compatible, flexible, BMET training</td>
<td>2-3 years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identify outcomes based on pilots</td>
<td>3 years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create and roll-out of modular model(s) in various languages</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Decisions/Steps/Tactics Needed</th>
<th>Responsible Parties</th>
<th>Target Dates</th>
<th>Available Resources</th>
<th>Needs/Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gain consensus on entry and exit levels</td>
<td></td>
<td>Year 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gain consensus on mechanics of assessment/selection, e.g., references; direct interview, equivalency (recognition of prior learning or experience or academic)</td>
<td></td>
<td>Year 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assess applicants against code of conduct, behaviors as entry level requirements</td>
<td></td>
<td>Year 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gain consensus on how to accommodate existing workers alongside trainees</td>
<td></td>
<td>Year 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Engage multiple stakeholders and funders to promote BMETs

*(Estimated Time: 9+ Months)*

<table>
<thead>
<tr>
<th>Decisions/Steps/Tactics Needed</th>
<th>Responsible Parties</th>
<th>Target Dates</th>
<th>Available Resources</th>
<th>Needs/Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify country needs and priority areas</td>
<td>Core stakeholders</td>
<td>1-2 months</td>
<td>Volunteer network</td>
<td>1 staff, travel, logistical support</td>
</tr>
<tr>
<td>Identify potential funders</td>
<td></td>
<td>3 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Figure out a pitch with data and tailored messaging</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identify stakeholders (international and local) to deliver message/pitch</td>
<td></td>
<td>1 month</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Media coverage, promotion/education campaigns</td>
<td></td>
<td>2-3 months</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Create sustainable, scalable funding strategies for BMET training to improve public health outcomes

*(Estimated Time: 6 Months)*

<table>
<thead>
<tr>
<th>Decisions/Steps/Tactics Needed</th>
<th>Responsible Parties</th>
<th>Target Dates</th>
<th>Available Resources</th>
<th>Needs/Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify legal form/entity (purpose, governance, hosted, legal seat, operating funding source)</td>
<td>AAMI, WHO, Stakeholders</td>
<td>End 2015</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Define “asks” for contributions</td>
<td></td>
<td>End 2015</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Develop messages/outreach to address different potential donors</td>
<td></td>
<td>End 2015</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Implement transparent accountability mechanisms</td>
<td></td>
<td>End 2015</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selection criteria for projects to fund</td>
<td></td>
<td>End 2015</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Develop near and mid-term outcome measures</td>
<td></td>
<td>End 2015</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Catalyst for development of professional development criteria, terms of reference, curricula, training materials and technologies</td>
<td></td>
<td>End 2015</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Define metrics for BMET health impact/outcomes

*(Estimated Time: 5.5 Years)*

<table>
<thead>
<tr>
<th>Decisions/Steps/Tactics Needed</th>
<th>Responsible Parties</th>
<th>Target Dates</th>
<th>Available Resources</th>
<th>Needs/Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form group to create gold standards: to answer the question, “What is the health impact if 100% of available equipment is in service?”</td>
<td>Epidemiology, economist, HTA; Clinical (ER, OR, OB); Engineer: BMET, BME, sciences, etc.</td>
<td>6 months</td>
<td>2 staff</td>
<td>Potential Funders: GEF, World Bank, IMF</td>
</tr>
<tr>
<td>Pilot study</td>
<td></td>
<td>1 year</td>
<td>2 staff and 1 graduate student</td>
<td>2 staff and 1 graduate student</td>
</tr>
<tr>
<td>Study paper</td>
<td></td>
<td>3-4 years</td>
<td>2 staff and 1 graduate student</td>
<td>2 staff and 1 graduate student</td>
</tr>
</tbody>
</table>

The six strategies provide a good starting point for considering goals involved in creating a training model that is scalable, replicable, and sustainable in low resource countries. The participants pointed out that some tasks can be undertaken quickly, while others, such as engaging stakeholders and conducting research, will have a long time horizon.

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8 Promoting the awareness of BMETs should occur simultaneously with training BMETs.
NEXT STEPS

The final project report describing a BMET training model that is scalable, replicable, and sustainable is due to the GE Foundation in October 2015. It will build on the data collected at the stakeholder meeting and described in this meeting summary along with other data gathered outside the stakeholder meeting, including input collected during interviews and meetings with corporations, NGOs, and other stakeholders. The data will be analyzed and result in a set of recommendations included in the final report to the board of directors of the GE Foundation. At this point, the GE Foundation anticipates distributing the final report to stakeholders.

As a direct result of this meeting, AAMI created a listserv for the virtual and ongoing convening of the meeting participants. The listserv site will be include additional stakeholders and materials, as identified in support of this effort.

ACKNOWLEDGEMENTS

The GE Foundation and the AAMI Foundation would like to acknowledge the help and support of Tony Easty, the 2015 IUPESM World Congress leaders, Anna Worm, Adriana Velazquez Berumen, Tom Judd, Antonio Hernandez, Nathan Williams, and many others who helped to make the GEF-AAMIF 2015 Stakeholder Meeting a success. Further, the GE Foundation and the AAMI Foundation extend their gratitude to all of the participants, many of whom traveled long distances, for their commitment and passionate contributions.

CONCLUSION

Participants identified the most critical needs necessary to build a scalable, replicable, and sustainable BMET training model taking into consideration existing training programs, trainers, students, stakeholders, and the HTM field. An ideal training model would include training programs that build partnerships and engage a network of interested parties across academia, hospitals, governments, funders, NGOs, associations, communities, and targeted groups to garner funding, expertise, support, and other necessary resources.

The programs should vet, develop, and continuously evaluate trainers to ensure that students are appropriate prepared by competent trainers. Program faculty must possess both theoretical and practical knowledge and experience; be able to bridge the gap between theory and practice; have an understanding of pedagogical approaches and learning strategies; and be committed to developing and empowering students and committed to their own growth and development. Ideally, the trainers will be local, able to converse in the local language, understand the local customs, and have a local network on which to rely.
The programs also must focus on the student life cycle from pre-admission to professional BMET. They must recruit and admit students with the greatest likelihood of success in the training program as well as the profession, in terms of both aptitude and attitude. Pre-assessment and routine evaluations are critical factors to success.

The HTM field should advocate for and raise awareness of the global HTM profession by collecting success stories and then communicating those stories broadly. Further, they need to take responsibility for developing a core curricula based on valid research and international standards on which local training programs can rely. Additional research on health outcomes is necessary to demonstrate the impact of the work of BMETs and support the technician’s credibility with their peers.

Clearly, meeting participants recognize the significant work required in order to build a scalable, replicable, and sustainable BMET training model. This meeting revealed a core group of committed individuals who are willing to contribute to doing that work and address the pressing need for trained BMETs in low resource countries.

The participants identified six strategies as critical next steps, including:

1. Create an international advisory body to assure quality of BMET training based on core competencies.
2. Create a global alliance that focuses on the promotion of the BMET profession in low resource countries.
3. Ensure the strict selection of BMET trainees/trainers.
4. Engage multiple stakeholders and funders to promote BMETs.
5. Create sustainable, scalable funding strategies for BMET training to improve public health outcomes.
6. Define metrics for BMET health impact/outcomes.

The six strategies identified by the participants provide the impetus for further discussions. While the community can address some tasks quickly, others will require considerable time and effort. To date, securing funding for training has not been easy, and funding for community building will likely be difficult to garner. Nonetheless, the work done in the field thus far must continue, and it must be better organized and supported. Creating a training model that is scalable, replicable, and sustainable in low resource countries requires the entire stakeholder community to work together for this common purpose.
## APPENDIX A – PARTICIPANT ROSTER

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APPENDIX B – ABOUT PROJECT CONSULTANTS

Jackie Eder-Van Hook, PhD

Jackie Eder-Van Hook has 25+ years of senior management experience, most recently as the president of Transition Management Consulting, Inc., a national consulting firm, where she serves as a consultant and trusted advisor to governing bodies and CEOs.

Previously, Jackie led health care technology associations and coalitions, Advanced Initiatives in Medical Simulation, Center for Telehealth and E-Health Law/CTL, Home Care Technology Association of America/NAHC, Consumer Health Access through Technology/Intel coalition, and the National Health Policy Council. She served as interim executive for membership associations, charitable nonprofits, and a public-private agency.

From 1996-2000, she was a senior official at the Agency for Health Care Policy and Research (now AHRQ), where she was recognized for management innovation by US Health and Human Services Secretary Donna Shalala and AHCPR Administrator John Eisenberg, MD, and again by the US Office of Personnel Management.

Jackie is a well-respected writer with 40+ published articles on management, leadership, and healthcare and served as a peer reviewer for the international section of the OD Journal and reviewed presentations for the Academy of Management.

Jackie earned a doctorate in Human and Organizational Systems and a Masters of Arts in Human Development from Fielding Graduate University, a Masters of Science in Organization Development from American University (AU/NTL), and Bachelor of Arts in Political Science from San Diego State University. She is a graduate of the GIC/GISC International Organization and System Development Program and the Newfield Network, an international coaching program.

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Chris Love, MSOD, MH

Chris Love has consulted to healthcare, nonprofit, educational, community, and corporate clients for over 25 years, specializing in positive change methodologies. She is president of Chris Love Associates, LLC, a leadership and management consulting firm.

Chris offers reflective leadership retreats for healthcare, education, clergy, nonprofit, and other service professionals through her affiliation with the Center for Courage and Renewal. Currently, she co-leads the organization’s work to develop a national program called “Aging with Courage and Wisdom.”

Chris previously worked for the national consulting firm Alan Newman Research as a qualitative market research project manager and for The Martin Agency as a direct response account supervisor.

She has published articles about her work in the journal New Directions for Teaching and Learning and online, and has published a newsletter for oncology nurses for the Mayo Comprehensive Cancer Center. As a writer and editor for English language publications in Europe and Asia for five years, Chris published dozens of news and feature articles. For nearly two years, she worked in the Middle East in post-secondary education and refugee resettlement. Chris has also taught technical writing at the college level.

Chris earned a Masters of Science in Organization Development from American University (AU/NTL) and a Master of Arts in Humanities degree from The University of Richmond. She is a Phi Beta Kappa graduate of the College of William and Mary, where she received a Master of Arts in English. She was trained at the Taos Institute in Appreciative Inquiry by David Cooperrider.

Chris’ volunteer contributions include chairing and serving on the boards of at-risk youth homes in Montana and providing cross-cultural awareness leadership for Youth Homes Montana.

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APPENDIX C – STAKEHOLDER MEETING AGENDA

2015 Stakeholder Meeting
BMET Training in Low Resource Countries

AGENDA

Thursday, June 11

6:00 - 7:00 p.m.  Welcome Reception
E11even Restaurant - 15 York Street

7:00 - 9:00 p.m.  Opening Remarks: Mary Logan, AAMI Foundation, Asha Varghese, GE Foundation, Dinner
E11even Restaurant - 15 York Street

Friday, June 12

8:00 - 8:40 a.m.  Breakfast & Networking
Metro Toronto Convention Center, 222 Bremner Blvd., South Building, Room #501

8:40 – 8:50 a.m.  Welcome Remarks: Mary Logan, AAMI Foundation

8:50 – 9:40 a.m.  Activity #1: Defining Success - Jackie Eder-Van Hook, PhD
If we are successful here today, what will we have accomplished by the end of this meeting?

9:40 – 10:00 a.m.  Remarks and Q&A - David Barash, MD, GE Foundation

10:00 – 10:20 a.m.  Break

10:00 – 11:15 a.m.  Activity #2: Considering the Vision – Stakeholders
  1) Identify the key factors that make BMET training programs scalable.
  2) Identify the key factors that make a BMET training program replicable in another location.
  3) How are BMET training programs currently funded and how might they be funded in the future?
  4) Identify the key factors that make a BMET training program sustainable.

11:15 – 12:30 p.m.  Activity #3: SWOT - Jackie Eder-Van Hook, PhD
Identify the Strengths, Weaknesses, Opportunities, and Threats of current efforts to train BMETs

12:30– 1:15 p.m.  Networking Lunch

1:15 – 2:35 p.m.  Activity #4: Creating the Future - Jackie Eder-Van Hook, PhD
Identify the strategies that we must embrace now to create this future.

2:35–2:50 p.m.  Break

2:50 – 4:15 p.m.  Activity #5: Action Planning & Implementation – Chris Love
Identify the activities and resources that are necessary to achieve the identified strategies.

4:15 – 4:30 p.m.  Wrap-Up, Next Steps, and Closing - Jackie Eder-Van Hook, PhD, Mary Logan, and Asha Varghese