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# HIGHER EDUCATION SOLUTIONS NETWORK - QUARTERLY REPORT

Massachusetts Institute of Technology—MIT  
Comprehensive Initiative on Technology Evaluation (CITE)  
AGREEMENT NO. AID-OAA-A-12-00095

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## Acronyms & Abbreviations

<b>AMPS</b>	Academic Media Production Services
<b>CITE</b>	Comprehensive Initiative on Technology Evaluation
<b>CTL</b>	Center for Transportation and Logistics
<b>DUSP</b>	Department of Urban Studies and Planning
<b>DIL</b>	Development Impact Lab at University of California, Berkeley
<b>EECS</b>	Electrical Engineering and Computer Science
<b>ESD</b>	Engineering Systems Division
<b>HESN</b>	Higher Education Solutions Network
<b>HST</b>	Health Sciences and Technology
<b>IAP</b>	Independent Activities Period
<b>ILP</b>	Industrial Liaison Program
<b>IDC</b>	International Development Conference
<b>IDIN</b>	International Development Innovation Network
<b>IR</b>	Intermediate Result
<b>IST</b>	Information Services and Technology
<b>MIT</b>	Massachusetts Institute of Technology
<b>MechE</b>	Department of Mechanical Engineering
<b>M&amp;E</b>	Monitoring and Evaluation
<b>OAA</b>	Office of Acquisition and Assistance
<b>ODL</b>	Office of Design and Learning
<b>OEM</b>	Original Equipment Manufacturer
<b>OSP</b>	Office of Sponsored Programs
<b>PSC</b>	Public Service Center
<b>RA</b>	Research Assistant
<b>SSRC</b>	Sociotechnical Systems Research Center
<b>SUTD</b>	Singapore University of Technology and Design
<b>TA</b>	Teaching Assistant
<b>TPP</b>	Technology and Policy Program
<b>UNICEF</b>	United Nations Children's Fund
<b>UROP</b>	Undergraduate Research Opportunities Program
<b>USAID</b>	United States Agency for International Development
<b>WFP</b>	World Food Programme
<b>3S</b>	Suitability, Sustainability and Scalability

## Executive Summary

The Department of Urban Studies and Planning (DUSP), D-Lab, the Sociotechnical Systems Research Center (SSRC), the MIT Center for Transportation and Logistics (CTL) and the Public Service Center (PSC) are the main partners in CITE, a network of MIT faculty, staff, and students with expertise in technology design and testing, systems engineering, supply chains, community ethnography, institutional and public policy analysis, market systems analysis, and regional economics. CITE's goal is to develop a rigorous product evaluation method that will help development organizations make educated product deployment. Our evaluations will also allow the development community to analyze specific product applications leading to better, data-driven programmatic decisions and better overall product designs. By applying our evaluation method, CITE will help to identify the bottlenecks that prevent products from achieving measurable impact. CITE will house the results of its work in a dependable, web-accessible knowledge database that will inform the decisions of development practitioners and technology innovators.

This Year 2 Quarter 1 Report details the progress made in reaching our Year 2 objectives, associated activities, results, as well as overall program management from October to December 2013.

The milestones for **Objective 1: Formalize the CITE product evaluation method** during Y2Q1 included the 3-S teams analyzing and finalizing their solar lighting evaluation reports and the methodology white papers that will be submitted to USAID in Y2Q2. As part of the plan for teaching an improved version of the ESD.S20 | I.S941: Evaluation of Technologies for International Development class that was taught in Spring 2013, a curriculum for a new course in Technology and Development to be taught next year is currently being developed.

The milestones for **Objective 2: Establish the product CITE evaluation cycle** during Y2Q1 included exploration of product family prioritization using the Pugh Methodology. Sessions were held during the CITE Seminar, and as a result a small group has been established within CITE to analyze product selection criteria. CITE is also exploring engaging new partnerships with the private industry via the MIT Industrial Liaison Program (ILP). And, as part of the student recruitment strategy, CITE participated in orientations on campus and co-hosted a quad-lateral International Development Night Dinner with student leaders of international development organizations at MIT. For Fall 2013, CITE has 14 Research Assistants and one student intern working on CITE programmatic matters. The CITE Team is also looking at ways to hire more students to work on targeted product family evaluations.

The milestones for **Objective 3: Cultivate hubs, USAID and HESN lab connections** during Y2Q1 included active conversations with UC Berkeley's Development Impact Lab (DIL) and Harvard University in creating a hub for innovation and evaluation in India in collaboration with USAID/India.

Beyond these activities under our Year Two Objectives, CITE focused its energy on launching its [webCITE](#), [Facebook page](#), and distributing the first [InCITE Newsletter](#). CITE also continues to collaborate and align our work with the International Development Innovation Network (IDIN) to leverage the USAID cooperative agreements into a larger, campus-wide initiative for international development research at MIT in partnership with USAID, MIT Senior Administration, and MIT Resource Development.

## Part I: Key Activities

### I.1. Summary of Key Activities

CITE's overarching goal is to increase the impact and cost-effectiveness of products designed for people living in poverty by developing and implementing a product evaluation methodology. CITE's results framework consists of two objectives and the following intermediate results (IR):

Objective 1: Develop product evaluation methods, conduct evaluations and publish results

IR 1.1: Create a method for evaluating products designed for people living in poverty

IR 1.2: Increase the number and influence of CITE evaluations on products designed for people living in poverty

Objective 2: Develop a network of organizations and individuals who contribute to value, use, and act on CITE data

IR 2.1: Establish successful collaborations within HESN partners

IR 2.2: Create knowledge-sharing platform to share product evaluations

IR 2.3: Practitioners access to and use of CITE evaluations and data for decision making

IR 2.4: Contribute to the next generation of development leaders that are trained in evaluation approaches and value and understand rigorous product evaluation

The annual work plan for the second year of the Comprehensive Initiative on Technology Evaluation (CITE) was developed to guide project activities over the twelve-month period from October 1, 2013 to September 30, 2014 and outlined the proposed activities in support of CITE's Year 2 objectives, but that is adaptable to opportunities as they arise throughout the year. Year 2 objectives and associated activities are listed below. The achievements of Year 2 Quarter 1 are as follows:

#### **Objective 1: Formalize the CITE product evaluation method**

##### **I.1 Complete product evaluation**

The Suitability and Sustainability teams finalized laboratory testing and began compiling their final proof of concept reports on solar lighting devices and on the Solar Sister organization, and the Scalability team conducted outreach to Original Equipment Manufacturers (OEMs). The S-teams are currently working to complete the final reports, and the final solar lighting evaluations will be completed and submitted to USAID in Y2Q2.

In preparation for the second product testing, the Sustainability Team is working with the Hanken School of Economics in Helsinki, Finland and their HumLog Institute to arrange for a visiting PhD student, Linda Annala, to support the Sustainability team on the water filter evaluation, including field work this summer. Linda will support remotely during spring semester (short trip here to visit March 18-21) and then will spend one month in India with the Suitability Team and two months at MIT. CITE's

Sustainability team will be providing housing and Hanken School of Economics will be finding funding for all other costs, including MIT Visiting student fees.

## **1.2 Produce 3 white papers/journal articles on product evaluation**

The Suitability, Scalability and Sustainability teams are in the process of completing their white papers that will be delivered to USAID during Y2Q2. The white papers outline the process of attribute based comparative product testing and suggests to a path forward for further improving the methodology.

## **1.3 Develop an improved version of ESD.S20.11.S941 Course**

As a way to engage RAs and students, a classroom setting to share our progress and learning in product evaluation methodology was created in the form of a weekly seminar. For Fall 2013, CITE Seminar with CITE faculty, staff, 14 RAs and one intern met on a weekly basis for two hours, and met for 11 sessions (please see seminar schedule with topics in Appendix I). CITE faculty and staff gathered with the RAs and intern during an informal happy hour on 10/18/2013 in order to improve communication and solicit feedback. One of CITE's RAs, Brittany Montgomery is working with Professor Bish Sanyal in developing a curriculum for a new course in Technology and Development to be taught next academic year.

## **Objective 2: Establish the product CITE evaluation cycle**

### **2.1 Define a product family prioritization process**

CITE spent two seminar sessions in Fall 2013 exploring the product family prioritization and evaluation process using the Pugh methodology. Professor Dan Frey led this methodology. As a result, CITE generated a preliminary chart outlining product selection criteria and product families (please see Appendix II for the proposal for CITE Project Selection Process). After this process the team felt it was important to consult our partner organizations to determine which product category will be of most use to them. As part of this process, key stakeholders at USAID were interviewed to solicit their perspectives and a report is currently being compiled. Kendra Leith and RA Kate Mytty are spearheading this effort and will be outreaching to NGOs during the Spring semester. Christine Pilcavage, Kendra Leith and Corinne Carland are analyzing and refining the Pugh chart and the selection/evaluating criteria that were developed in class. Further, the CITE team has made the strategic decision to go ahead with batch selecting the 8 product families that will be evaluated over the course of the 5 year cooperative agreement in order to reduce the amount of time and resources spent on product selection. The selection process will be concluded in Y2Q2 and will be based on information gathered from extensive USAID and NGO interviews and background research conducted during Y2Q1 and Y2Q2.

Since water filtration devices scored well in the Pugh product selection process, CITE has decided that this will be the second product family (following solar lanterns) and that water filters evaluations will begin in the spring of 2014. The location of the next evaluation will be India.

Christine Pilcavage, Derek Brine and Jeff Asher have had contact with the Indian organizations the Consumer Education and Research Center (CERC) and Consumer International India (CI) to assist in gathering market information and background product research for our next evaluation in India.

## 2.2 Formalize relationships & engagements with existing NGO partners

On 4 October in Cambridge, Prof. Frey met with Toshi Nakamura, Co-Founder and CEO of Kopernik. Among other things, they agreed that water filters and related treatment methods are a high priority for both parties.

On 18 October, a conference call with Mercy Corps was held to follow up on summer 2013 internship and discuss possible future internship and collaboration.

## 2.3 Explore new partnerships with the private sector

Professor Oli deWeck and Jarrod Goenzel are arranging for a meeting with the MIT Industrial Liaison program in Y2Q2 to plan a private sector engagement meeting this year. In addition, Derek Brine is in contact with Saida Benhayoune, Program Director for the D-Lab Scale Ups program about how CITE can be involved in the plans for putting together an industry consortium.

## 2.4 Develop student recruitment strategy

CITE's student engagement strategy has been developed in coordination with USAID. During Y2Q1, CITE has been engaging students on the campus of MIT in the following ways:

**Student Orientations:** CITE hosted booths at several Fall 2013 student orientations at MIT. As a result over 70 students signed up to be included on CITE's mailing list.

- Academic Expo (8/27/2013)
- Activities Midway (week of 8/26/2013)
- Graduate School Council Booth (week of 8/26/2013)
- [MIT Go Global](#) (9/10/2013)

**CITE-Public Service Center (PSC) Internship Dinner:** On September 11, 2013, CITE took part in the annual PSC internship dinner. Since CITE and PSC have a collaboration on the summer internship program, this was another opportunity for CITE to promote activities to the students. Approximately 40 students participated.

**Department of Urban Studies and Planning (DUSP)-PSC Internship Luncheon:** On September 18, 2013, DUSP and PSC hosted a lunch that brought together DUSP graduate students on internship opportunities at MIT. Four DUSP students were featured, and including Sara Hess, CITE-PSC summer intern. CITE was also given an opportunity to feature its programs and student engagement opportunities. Approximately 60 students attended the information session.

**[Scale-up Development Venture \(SDV\) Dinner:](#)** CITE participated in the SDV dinner in collaboration with D-Lab on Sept. 30, 2013 with key international development student organizations in preparation for the SDV conference in February 2014.

**International Development Night Dinner:** CITE in collaboration with [MIT's Public Services Center](#) (PSC), [The Technology and Culture Forum at MIT](#), and [D-Lab](#) hosted an International Development Night Dinner on October 29, 2013. Invitations were sent to student leaders of international

development organizations at MIT. Nearly 60 students, staff, faculty and members of the MIT community attended this event.

### **CITE Research Assistants**

CITE RAs are an integral part of program. Each of the department/centers that makes up CITE—DUSP, CTL, D-Lab and SSRC—recruit researchers to assist in research.

For the 2013 Fall academic year (beginning September 1, 2013), 14 RAs have been working on CITE programmatic matters, of which four RAs are being paid in full or partially by another program (leveraged cost to CITE) and an additional two RAs are funded fully by DUSP (cost sharing). Please see Appendix IV for what students are engaged in with CITE and [CITE's Website](#) for their profiles. The RAs worked anywhere from a semester to the academic school year or for three-months during summer. They were hired at 50% or 100% RA-ship (a normal 100% RA-ship equal to 20 hours/week work).

### **CITE Student Intern/Student Engagement Coordinator**

Sydney Beasley, an MIT Undergraduate, has been working with CITE members since summer 2013, and extending into Fall 2013 is exploring ways to engage the larger MIT student community. She is coordinating and assisting in the planning of Scale-Up Development Ventures conference planned for February 8, 2014 and [MIT Poverty Action Week](#) organized by MIT's Global Poverty Initiative to be held during the week of February 10, 2014.

## **Objective 3: Cultivate hubs, USAID and HESN lab connections**

### **3.1 Determine hub partners and locations**

From October 9 to 11, 2013, Professor Bish Sanyal and Derek Brine traveled to UC Berkeley and met with the Development Impact Lab (HESN member) to continue the discussion on possible collaboration. MIT-CITE discussed the following three areas as possible areas for partnership:

- Creation of a minor in 'Development' Engineering
- Joint edX course
- India Experiments Program: multi-collaboration

CITE is currently in discussion with University of California, Berkeley's Development Impact Lab (DIL) and with the South Asia Institute at Harvard University to create a hub for innovation and evaluation in India. We are in contact with Sheila Desai from the USAID India mission who has been in touch with the Indian Ministry of Science and Technology about supporting such an effort. A trilateral dinner discussion was held on December 11, 2013 when Dr. Sheila Desai visited MIT (please see Appendix V). A preliminary proposal/scoping document will be developed and shared with USAID in Y2Q2. In addition CITE is coordinating a meeting to be held in Delhi with USAID to convene MIT, UC Berkeley, Harvard, and the Government of India along with other collaborating partners. An additional meeting is also being explored to coordinate product market research of activities for CITE's product evaluation (water filtration devices and other possible products).

In addition, CITE has been continuing discussion with Chulalongkorn University in Thailand for a possible hub partnership. Exploration has been sought with additional local partners, such as the Rockefeller Foundation's regional office in Bangkok. However, the recent protests against the Thai Government have stalled progress in our collaboration.

### **3.2 Generate at least 2 substantive collaborations with HESN member labs**

As mentioned above, CITE has been engaging with Berkeley and Harvard in creating a dedicated test-bed/hub in India to rigorously evaluate the impact of frugal technologies on the urban poor and innovate new technology/products that meet their needs. MIT, Berkeley and Harvard will draw on the collective strengths of each institute and will work in partnership with Indian academics, entrepreneurs, business leaders, and municipalities to assess technology adoption, its use and its impact on the urban poor. Bish Sanyal is leading a team within CITE (RAs Anirudh Venkatanarayan Rajashekar, and Akanksha Raina) with this trilateral effort, and we are expecting to have a formal meeting with the other partners in India in late March/April.

A selection of key events, publications, and communications products for this Quarter are listed below:

#### **1.1.1. Events**

- Go Global Fair: 9/10/2013
- Scale-up Development Venture student engagement dinner: 9/27/2013
- DUSP-PSC internship opportunity explanation luncheon: 9/18/2013
- International Development Night dinner hosted by CITE, PSC, T&C and D-Lab: 10/29/2013
- CITE Seminar: weekly meeting during Fall 2013: Sept. 18 through Dec. 11, 2013
- CITE-HESN: Visit to UC Berkeley by Prof. Bish Sanyal and Derek Brine: Oct. 9-11, 2013
- TechCon 2013: Nov. 16-18, 2013
- USAID/Washington visit: Nov. 19-20, 2013
- Dr. Sheila Desai, USAID/India visit Dec. 11-12, 2013

#### **1.1.2. Publications**

DUSP Research Assistant, Brittany Montgomery is working on a paper for publication that examines the experience of the first CITE class—ESD.S20 11.S941: Evaluation of Technologies for International Development. Another DUSP Research Assistant, Cauam Ferreira Cardoso is working on a manuscript for the MIT Press for a book on Appropriate Technology. The abstract of the book is as follows: The Appropriate Technology (AT) model became prominent in the 1970s through the work of the economist Fritz Schumacher's *Small is Beautiful* (1973). He promoted small-scale, low-cost, labor-intensive, context specific and environmentally friendly technologies that benefited the poor. The movement's legacy and influence from its inception until now though is widely contested. Many argue that it reached its peak in the 1980s and fell out of favor shortly thereafter. Through the use of a

systematic review, this paper looks at how AT as a development strategy has changed over time, and offers as a conclusion an alternative narrative of AT’s lifespan based on analysis of thematic findings drawn from the literature. This examination of AT’s evolution showed that the model didn’t in fact diminish but was transformed as a result of changing socio-political contexts and adoption of the model by different development players with different development agendas.

Both Brittany and Cauam are working with Professor Bish Sanyal.

### 1.1.3. Communications

November 2013 was an active month for CITE in terms of communication endeavors. On November 12, 2013 CITE launched a [Facebook](#) page and on November 13, 2013, [CITE’s beta ‘webCITE’](#) was launched. Further, [InCITE Newsletter](#) was sent during Fall 2013 to over 100 individuals with 64.7% open rate.

### 1.1.4. Travel

No international travel occurred using full or partial HESN funding occurred during the past Quarter:

Location (City and Country)	Number of Travelers	Partner(s) Engaged (If applicable)	USAID Engagement (If applicable)	Outcome(s) & Next Steps

## Part 2: Intra-Development Lab/ University Engagement

### 2.1. Interdisciplinary Collaboration

CITE research is conducted amongst multiple departments, Initiative and Centers: Department of Urban Studies and Planning; D-Lab; MIT Center for Transportation and Logistics; Sociotechnical Systems Research Center; Department of Mechanical Engineering; Engineering Systems Division, and Sloan School of Management.

As mentioned in Part I, CITE collaborated with three other internationally-focused initiative and centers to promote international development and technology at MIT: [MIT Public Services Center](#) (PSC), [The Technology and Culture Forum at MIT](#), and [D-Lab](#). As a kick-off event for the 2013-2014 academic year, the quad-lateral partnership hosted an International Development Dinner where the various centers

introduced their programs to students leaders at MIT. In addition, CITE has been collaborating with D-Lab's Scale Up Development Ventures conference planned for February 8, 2014 and [MIT Poverty Action Week](#) organized by MIT's Global Poverty Initiative held during the week of February 10<sup>th</sup> in 2014. Further, CITE is Working with the D-Lab Scale Ups program to establish an industry consortium focused on technology designed for the developing world.

## 2.2. Partner Engagement

The following partners were engaged during the past quarter:

Partner	Partner Type (Funded/ Unfunded)	Location (City and Country)	Outcome(s)
Mercy Corps	Unfunded	USA, but discussion on Jakarta, Indonesia	Conference call with Mercy Corps on 10/18/2013 to follow up on summer internship; discussion on future internship/collaboration
Kopernik	Unfunded	Cambridge, MA USA	On 10/4/2013 in Cambridge, Prof. Frey met with Toshi Nakamura, Co-Founder and CEO of Kopernik discussed products for evaluation.
Solar Sisters	Unfunded	Rhode Island, USA	Phone conversations/email contact in relation to the Uganda Solar Lantern report
Peace Corps	Unfunded	USA	Exploring having Peace Corps work with MIT students in field testing, and exploring Masters International program at MIT; conversation started with David Fields

## Part 3: High Value Areas of Collaboration [HVAC] (Lab-to-Lab)

### 3.1. Summary of Collaboration Across the HESN

### 3.1.1. Data

Partner	Completed / Ongoing Activity [Indicate tie to activity number]	Outcome(s)
UC Berkeley	.	Developed contacts within UC Berkeley DIL Lab for CITE; continuation on discussion of joint hub in India.  Tentative meeting in India in March 2014.

### 3.1.2. Solutions (Creation, Testing, Scaling)

Partner	Completed / Ongoing Activity [Indicate tie to activity number]	Outcome(s)
UC Berkeley-DIL	Oct. 9-11, 2013: Discussions on collaborative course on development engineering. Initial conversation on possible joint hub development in India  In addition, MIT is engaged with Berkeley DIL and Harvard's South Asia Institute to explore collaboration in India with USAID and the Government of India to 1. Strengthen entrepreneurship in Indian universities; engage research on technological innovations, evaluation, and commercialization; and build a network in India to promote technological innovations in product design	Developed contacts within UC Berkeley DIL Lab for CITE; continuation on discussion of joint hub in India.  Tentative meeting in India in March 2014.

### 3.1.3. Student Engagement

Partner	Completed / Ongoing Activity [Indicate tie to activity number]	Outcome(s)
Multiple HESN partners	2013 TechCon Student Summit	Two CITE students, Cauam Cardoso and Maia Majumder were both part of winning teams. ( <a href="#">HESN Story Map Blog</a> & <a href="#">HESN Development Labs Student</a> )

## Part 4: USAID Engagement

### 4.1. USAID/Washington Interactions

#### ***USAID/OST: Securing Water for Food Grand Challenge for Development***

CITE worked with Ku Lanakila McMahan and Abigail Casey to recruit student evaluators for SWFF Grand Challenge: Eleven MIT student finalist were sent to USAID and six MIT students were selected as e-interns to work with SWFF beginning December 2013.

#### ***USAID/Power Africa Initiative @ MIT: October 18, 2013***

Power Africa and Trade Africa Coordinator Andrew Herscowitz and USAID Energy Division Chief Allen Eisendrath met with CITE's Bish Sanyal, Derek Brine and Christine Pilcavage to explore possible areas for evaluation in the field of energy.

#### ***USAID/DIV***

CITE's Sustainability team continued to have discussion with DIV's Armand Lanier regarding Solar Sister and the Uganda Solar Lantern report.

#### ***USAID/OST***

CITE helped to promote USAID visit at MIT: Nov. 19, 2013 USAID Research and Innovation Fellowships Team and liaised with Christa Hasenkopf and Courtney Matson @ USAID/OST.

#### ***USAID/Washington visit: November 19-2, 20130 (schedule Appendix VI)***

During a two-day visit in November, CITE met with 14 USAID bureaus, offices and initiatives. In addition to this post-TechCon2013 meetings, USAID/OST/HESN orchestrated a visit to Capital Hill and CITE members paid a courtesy visit to Senator Elizabeth Warren and Senator 'Ed' Markey's offices.

##### USAID-CITE meetings

Office of Science and Technology

Water / Grand Challenge

Power Africa

Mobile Solutions

President's Malaria Initiative (PMI)

Development Innovation Ventures (DIV)

Global Partnership  
Office of Education  
OFDA  
Office of HIV/AIDS  
Bureau for Food Security  
Global Health Bureau  
Middle East Bureau  
Asia Bureau

### **Weekly calls with USAID/OST/HESN; AOR Dr. Amit Mistry**

Weekly phone call with USAID/OST/HESN CITE's AOR, Dr Amit Mistry were conducted to help guide CITE faculty with the initial implementation of CITE and aligning CITE's objectives with HESN's results framework during Y2Q1.

During the fall 2013, CITE worked with Amit Mistry to identify employees at USAID to interview for CITE research. Our goals were to understand the following:

- Whether USAID staff members would be potential users of the technology evaluation framework created by CITE;
- Which areas within USAID purchased technology frequently and how they evaluate those products;
- How/whether USAID works with their grantees to recommend technologies and generally;
- Learn how USAID documents the use of technology in the field; and
- Identify which technology evaluations would be most relevant for USAID.

CITE has interviewed people working in these eight areas:

1. Office of Education
2. Grand Challenges
3. Development Innovation Ventures
4. Bureau for Global Health
5. Bureau for Food Security
6. President's Malaria Initiative
7. Water/Sanitation
8. Acquisitions and Assistance

Our next step is to reach out to more USAID missions to gain insights from other areas within USAID that are closer to the work in field. Having learned that most of USAID does not purchase technologies, we're shifting our focus towards interviewing agencies that make rapid technology purchases for relief or development efforts. We believe that these organizations are much closer to selecting and using technologies and thus will be able to provide insights that can potentially influence CITE's format.

## **4.2. USAID Mission Interactions**

As a follow up to Bish Sanyal's summer trip to India, CITE has been in a dialogue with USAID/India's science and technology advisor, Dr. Sheila Desai for possible collaboration in India. CITE participated in a side meeting with Dr. Desai at the 2013 TechCon in November, and Dr. Desai came to MIT and met with CITE members on December 11, 2013. A special dinner with members from MIT, Harvard University and UC Berkeley attended to discuss development issues in India and the idea of creating a hub in India with Indian partners (please see Appendix V for schedule).

## **Part 5: Monitoring & Evaluation**

### **5.1. Progress Narrative**

At this time, we are meeting our targets for FY14 Q1 and on-track to meet our targets for the year. Based on the first quarter results, it is likely that we will exceed our targets in the following areas: # of classes supported by HESN Development Labs with human, financial, or institutional resources contributed by HESN Development Labs as well as # of students serving as CITE fellows, interns, research assistants, teaching assistants and undergraduate researchers.

We reached one major milestone: the launch of our website. We will begin to report the number of visitors to the website in the second quarter of FY14.

We have also made significant progress toward establishing a hub in India through discussions with Chulalongkorn and Berkeley-Harvard. Our target is to set up one hub in FY15.

## **Part 6: Lessons Learned / Good Practices**

One of the best lessons learned from Y2Q1 was attained during TechCon 2013: that having engaging face-to-face opportunities to discuss with and learn from other HESN partners yields in concrete results. For example, MIT-CITE was able to further the discussion started with UC Berkeley on a hub in India. CITE engaged in a new conversation about collaboration began with William & Mary's AidData after a side workshop hosted by CITE that was attended by AidData.

## **Part 7: Future Activities**

CITE's Suitability, Sustainability and Scalability teams are currently working to complete the CITE's first product evaluation reports on solar lanterns and white papers that will be submitted to USAID during Y2Q2.

As mentioned in Part 3, MIT has been engaging UC Berkeley's Development Impact Lab and Harvard's South Asia Institute since Year 1 to collaborate in India with USAID and the Government of India to Strengthen entrepreneurs in Indian universities; engage research on technological innovations, evaluation, and commercialization; and build a network in India to promote technological innovations in product design. The meeting with USAID/India, India's Government--the National Science and

Technology Entrepreneurship Development Board (NSTED) and the Department of Science and Technology (DST), and the American universities is tentatively scheduled to take place in March. Further CITE is planning to combine its initial research / market research trip for the second product evaluation with this meeting.

CITE will also follow up on the various manuscript / papers that are currently in draft form to publication.

CITE's Professor Oli deWech and Jarrod Goentzel will be exploring a meeting to engage the private sector to be held at MIT in collaboration with MIT's Industrial Liaison Program.

**Part 8: Appendix**

## Appendix I: Fall 2013 CITE Seminar schedule

	<b>Date</b>	<b>Topic 1 (45 min)</b>	<b>Presenter</b>	<b>Topic 2 (45 min)</b>	<b>Presenter</b>	<b>Readings</b>
1	18-Sep	Intro to CITE	All			
2	25-Sep	Product Prioritization: What should matter?	Dan Frey/ Derek Brine	Pugh Session 1	Dan Frey/ Derek Brine	Background product information packet
3	2-Oct	Pugh Session 2	Dan Frey/ Derek Brine	Pugh Session 2 continued	Dan Frey/ Derek Brine	
4	9-Oct	Big E: Evaluation in International Development (RCT, M&E, etc.)	Kendra Leith	Case Study - bednets (UNICEF)	Sara Hess/ Jarrod Goentzel	UNICEF case study
5	16-Oct	Suitability Definition and Methods	Dan Frey/ Derek Brine	Solar Lighting Suitability	Dan Frey/ Derek Brine	Solar Lighting Suitability Report Overview
6	23-Oct	Sustainability Definition and Methods	Jennifer Green	Solar Lighting Sustainability	Jennifer Green	Evolution of Diffusion and Dissemination Theory
7	30-Oct	Case Study - Tofu and Tempeh cooker	Morgan Edwards/Jessie Press-Williams	Case Study - food storage (GrainPro, PICS)	Elizabeth Resor/Jarrod Goentzel	Tofu and Tempeh Case Study; GrainPro Case Study; PICS Case Study
8	6-Nov	Report on summer internship	Rafa Rahman and Bryan Ranger			
9	13-Nov	Reflect on preliminary research experiences	Group Discussion	Discuss updates to our research strategy	Group Discussion	
	20-Nov	USAID meeting - no session				
	27-Nov	Thanksgiving - no session				
10	4-Dec	Refelction from TechCon 2013 & USAID	Bish Sanyal			
11	11-Dec	USAID/India	Dr. Sheila Desai / Derek Brine			

## Appendix II: A proposal for CITE Project Selection Process



### **A Proposal for the CITE Project Selection Process**

Dan Frey and Derek Brine

This document describes a proposal for the way the Comprehensive Initiative on Technology Evaluation (CITE) will select its product evaluation projects. This process is intended to guide the CITE team in making sound, justifiable decisions relevant to the needs of practitioners and to help all the team members and stakeholders understand the reasons behind those decisions. Importantly, it is also a creative process; we do not assume the set of alternatives is fixed at the outset, but rather, we generate better options as we proceed.

Below is a graphical depiction of the proposed selection process. At its core are two runs of a Pugh matrix surrounded by periods of preparation, documentation, and creative work. This makes the overall process a short version of Pugh Controlled Convergence<sup>1</sup>.

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<sup>1</sup> Pugh S (1990) *Total Design*. Addison-Wesley, Reading, MA.

# CITE Project Selection Process

<u>Who</u>	<u>What</u>	<u>How Long?</u>	
Project selection process team Wide sample of stakeholders	<b>Preparation</b>	<ul style="list-style-type: none"> <li>• Generate 5 to 12 alternatives</li> <li>• Select 3 to 9 criteria</li> </ul>	1 week
All CITE staff	<b>1<sup>st</sup> Run of a Pugh Matrix</b>	<ul style="list-style-type: none"> <li>• Eliminate weak concepts</li> <li>• Illustrate opportunities for new alternatives</li> </ul>	2 hrs
Project selection process team Wide sample of stakeholders	<b>Action Items</b>	<ul style="list-style-type: none"> <li>• Creative work to develop new alternatives</li> <li>• Info gathering to resolve uncertain matrix entries</li> </ul>	2 weeks
All CITE staff	<b>2<sup>nd</sup> Run of a Pugh Matrix</b>	<ul style="list-style-type: none"> <li>• Eliminate weak concepts</li> <li>• Build consensus</li> </ul>	2 hrs
Project selection process team	<b>Decision</b>	<ul style="list-style-type: none"> <li>• Document decision &amp; process that led to it</li> <li>• Communicate with stakeholders</li> </ul>	1 week

In the center of the figure is a list of the principal phases of the process. The first phase is preparation for an initial run of a concept evaluation session. We want to go into a meeting of the whole CITE team with 5 to 12 concepts and 3 to 9 criteria by which to evaluate them. A concept in this context is a succinct description of what products and technologies would be evaluated and by what means. For example, one concept might be “wheel chairs for rough terrain evaluated by means of lab tests for efficiency and ergonomics and field tests for durability and use patterns and expert assessments of manufacturability and field reparability.” A criterion in this context is a short denotation of a dimension for assessment such as “technological feasibility” or “potential for impact on poverty”.

A project selection process team is essential to the success of the overall endeavour. I suggest we assign one person who does most of the work and who draws upon a couple other process team members for tasks as needed such as facilitating matrix runs, making calls and visits to stakeholders, and research to resolve uncertainties.

The preparations for the first run of the Pugh matrix are the responsibility of the process team. A key challenge here is to coordinate inputs from a broad sampling of stakeholders. If one of our NGO partners has a great idea for a technology to evaluate, we will want to get that into the set of concepts for assessment. If a USAID staff member can help us firm up our selection criteria, we will have better buy-in for the decision. These sorts of inputs take time to elicit and coordinate. The chart suggests one week for preparation and that is an ambitious target so that the work would have to be taken up with some urgency if the selection process is to proceed at a reasonable pace.

In the first run of the Pugh matrix, all CITE staff (including students, faculty, and administrative personnel) need to participate. The weekly seminar is a good option for conducting these matrix runs. A facilitator from outside CITE will guide the process and ensure we follow the guidelines such as making our comparisons to a datum. In the first matrix run, we don't need to get down to a single project selection. We should, however, eliminate about half of the options as too weak to bring forward (at least without major modifications). Since we have about 7 selection processes to run, even projects that are eliminated can be brought back into later selection processes as the project definitions may evolve, later projects may have different objectives, or we may operate with modified criteria.

A major objective of the first run of the Pugh matrix is to prepare us for the creative work of developing new project definitions for the next matrix run. If we see patterns in the matrix such as weaknesses that, if overcome, might lead to dominant options, then we can work to reverse those negatives. Or people may observe options for hybrid projects in which the best properties of two different alternatives can be combined in a single product evaluation plan.

After the first run of the Pugh matrix, there is a two week period of work to resolve action items identified by the team. For example, in some cases, team members will disagree on the ratings that should be entered in the matrix. If we see that resolution of those elements is a key to making a decision, then we can conduct research, gather information, seek expert views, and otherwise seek to resolve disagreements on specific points. This period of work is structured by the project selection team, but should involve a wide sampling of stakeholders. This should be a phase of lively communication with USAID, NGO partners, HESN collaborators, and outside experts.

After a couple weeks to resolve the action items, a second run of the Pugh matrix should be made. At the end of the process, we need a decision on which project to select. The Pugh matrix cannot make that decision for us. The process can eliminate the weakest concepts. The process can document our rationale. We can aim to reach a consensus choice on which we all agree, however, that is not guaranteed to happen. If there is not complete agreement among the team members, it cannot be avoided that the CITE PI will make the decision. Having run our process, even team members who preferred other options can at least see the rationale for the chosen project and can work to further develop their preferred projects entering them into future selection processes.

In the last phase of the process, the decision is documented and communicated. A short document with text and photographs of the Pugh matrices could suffice. This process is led by the product selection team. The most significant points of contention should be described frankly and openly. Individuals expressing strong opinions are encouraged to allow their names to be associated with those positions so that the process documentation can serve to guide future deliberations. The documentation of the selection process should be disseminated widely among the CITE stakeholders, especially those who contributed concepts, selection criteria, and expert judgements.

The process described here is not static. It is an approach that has a strong track record of enabling better team performance in creative technical work like engineering design. Some scholars suggest the process

does not provide enough structure, but both experience and research<sup>23</sup> make us optimistic that the process is a good fit with the creative work we are pursuing. Because CITE project selection is not the same as engineering design, we may need to adjust the process as we proceed. If you see ways to improve the process, please communicate your views.

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<sup>2</sup> Frey, D.D., P. M Herder, Y. Wijnia, E. Subramanian, K. Katsikopoulos, and D. P. Clausing, 2009, "The Pugh Controlled Convergence Method: Model-Based Evaluation and Implications for Design Theory," *Research in Engineering Design* 20(1):41-50.

<sup>3</sup> Frey, D.D., P. M Herder, Y. Wijnia, E. Subramanian, K. Katsikopoulos, and D. P. Clausing, K. Oye, R. de Neufville, 2010, " Research in engineering design: the role of mathematical theory and empirical evidence," *Research in Engineering Design* 21(1):139-145.

## Appendix III: Pugh Methodology Selection Outcome

	Sanitation <small>Squatting pan and solid waste disposal</small>	ICT products <small>Financial services, agricultural services, mobile health</small>	Condoms <small>...and other barriers to disease and pregnancy</small>	Biomass Cookstoves	Jaipur Foot <small>...or other "frugal technologies"</small>	Water Purifier <small>Products that make locally-collected water safe to drink</small>	Irrigation Systems	Micro-finance	Municipal Water Quality	Vaccinations	Neonatal Resuscitation Devices
<b>Product Cost</b>	+				-		-			-	-
<b>Target Population Size</b>				-	-		-				-
<b>Nature of Need</b> <small>..that the product addresses</small>		-		-	+					-	+
<b>Safety Risk of Tests</b>		+	+				-			-	-
<b>USAID Involvement</b>		+			-		-			-	-
<b>In-house Expertise</b>		+					-			+	-
<b>Improvement Potential</b> <small>Importance for potentially improving quality of life in the third world</small>	+	+	-	-	+					+	
<b>Supply Chain Richness</b> <small>Including after market issues (repair, end of life, etc)</small>	+	-			+					+	+
<b>Ability to Test in Lab</b>			-		-		-		-	-	-
<b>Sustainability Richness</b>	+		-	-	-				+		
<b>Ease of Field Testing</b>			-				-		+	-	-

## Appendix IV: 2013 CITE RA and intern profiles

**Stacey Allen:** With a focus on the adoption of educational technologies by schools both in the US and abroad, Stacey will identify and interact with 1-2 communities of teachers in the developing world (as well as 1-2 communities in the US) in order to develop a framework for evaluation of educational games/technologies. This framework will then serve as the basis for analyzing the potential market and impact of ed tech in low-resource communities in the developing world. The framework will include a comparative component in which the technical, usability, scalability, and marketability are analyzed relative to existing pervasive educational technologies. Stacey is working closely with Professor Eric Kloper at MIT-DUSP on this issue.

**Sydney Beasley's** role within CITE is to promote awareness of the program and develop a culture of interest in technology evaluation across campus. Thus far Sydney has helped execute an international development dinner which was co-hosted by CITE. Going forward, she will be working to get CITE's name branded on the Scaling Development Ventures conference by organizing a student poster session. She will also be organizing a day of Poverty Action Week with Global Poverty Initiative, helping recruit for open positions as needed, and networking with relevant organizations.

### **DUSP**

**Anirudh Venkatanarayan Rajashekar:** Anirudh will help develop a strategic partnerships with international stakeholders to test the evaluation being created at CITE. The Hub will also serve as a CITE regional partner, enhancing the project's evaluation techniques, scoping out new products and ensuring extensive knowledge transfer and capacity building of local institutions. In addition, Anirudh will be part of the CITE research team and will provide inputs on products and evaluation techniques.

At CITE Anirudh is working on building a collaborative partnership with other universities in the Higher Education Solutions Network to undertake a targeted policy intervention in a municipality in India. He is also exploring the possibility of working in cooperation with some international NGOs to create testbeds for frugal products. He will also be assisting the CITE team in identifying and creating potential CITE Hubs.

**Ellen Chen:** Ellen will be distilling insights from readings for technology evaluation for the lit review. Her research Question is: To what extent can one learn from previously applied methodologies of technology evaluation from established industries, or adjust methods, to suit the development context? The purpose of this study is to determine the elements of a comprehensive assessment framework to guide and evaluate technology deployment in emerging market contexts. The objective is to understand what aspects of technology performance are key determinants in a product's success or failure, in order to help entrepreneurs and practitioners alike make better decisions in creating and incubating new, low-cost technologies designed to address development problems. This research will be based on a comprehensive review of current technology evaluation techniques for national agencies for innovation

and private industries. The extent and scope of this research points to the need for a systematic approach to development technology evaluation, by proposing an evaluation tool which allows cross-context comparison to test, assess, and catalyze technologies for development.

**Cauam Ferreira Cardoso:** Cauam is working on a paper with Bish Sanyal about the history of Appropriate Technology for the MIT Press. This historical perspective of the relationship technology and development will be an important resource for CITE. A draft abstract can be found below:

**ABSTRACT:**

The Appropriate Technology (AT) model became prominent in the 1970s through the work of the economist Fritz Schumacher's *Small is Beautiful* (1973). He promoted small-scale, low-cost, labor-intensive, context specific and environmentally friendly technologies that benefited the poor. The movement's legacy and influence from its inception until now though is widely contested. Many argue that it reached its peak in the 1980s and fell out of favor shortly thereafter. Through the use of a systematic review, this paper looks at how AT as a development strategy has changed over time, and offers as a conclusion an alternative narrative of AT's lifespan based on analysis of thematic findings drawn from the literature. This examination of AT's evolution showed that the model didn't in fact diminish but was transformed as a result of changing socio-political contexts and adoption of the model by different development players with different development agendas.

**Brittany Nikole Montgomery:** Brittany is creating a document / presentation that will integrate various portions of the students' reports from the Spring 2013 ESDES20 course. The idea is to present a slice or slices from each report and assess the learning process in something similar to a SWOT analysis. She will be working with Bish Sanyal in developing a curriculum for a new course in Technology and Development to be taught next academic year. This course will be part of a larger course tying in Developing Engineering at MIT.

**Katherine Mytty:** Kate is working with Kendra to conduct interviews with USAID and partnering organizations. This information will add to the knowledge around how technology evaluations are used in the industry by private ventures and through USAID and its grantees. She is also creating an annotated bibliography with information from USAID sources.

**Akanksha Raina:** Akanksha's work during this semester is to work on the Berkley-MIT-Harvard India initiative and help formulate the program and partnerships between the three institutions.

**Tania El Alam:** Tania is looking at the technological barriers to slum upgrading in India. She is doing an overview of the current ways and techniques of housing improvements in building technology (specifically looking at materials) in low-income settlements. She is tackling such questions as:

- What is the state of the art in research on technology of building materials for low-income housing? The issues with finding new materials is that they have to be low energy, low cost and recycled.
- How can we derive a set of standards to assess these technologies?

Contextual solutions' successes are going to depend on the availability of raw materials, on the local technologies, on the local knowhow, on costs of transportation etc.

### **D-Lab**

**Victor Lesniewski:** As the solar lantern evaluation draws to a close, Victor will be developing a series of research briefs for the technical suitability branch of the USAID-CITE project. The purpose of these briefs will be to identify and outline the novel contributions that graduate students can make to the areas of formative and summative product evaluation methodology in working on the CITE project. These briefs should clearly outline research questions, potential collaborations, engagement with the sustainability and suitability branches of CITE, and the interface with the Technology Evaluation Reports. His will help set a research direction for CITE technical suitability and help recruit a quality talent pipeline of incoming graduate students.

**Christopher Pombrol:** During the Fall 2013 Semester, Chris worked on the CITE Suitability to prepare an initial technical product evaluation. The focus is on solar lanterns in Uganda. He has participated in data collecting, designing product tests, and preparing the final report. Chris also worked on a presentation at TechCon 2013 and the USAID visit in November 2013.

### **CTL**

**Tim Breitbach:** This semester Tim is on the Scalability team that is developing the framework to evaluate the supply chains of the products CITE is examining. He is helping to put the finishing touches on the solar lantern evaluations and using a two-pronged approach. First, he is meeting with the Original Equipment Manufacturers (OEMs) to develop an understanding of their supply chain. In the larger context, the Scalability team is trying to develop the intellectual framework for evaluating supply chains in developing markets for future studies.

**Maitagorri Schade:** Maita is currently conducting a literature review on supply chain evaluation. She is also brainstorming ways to develop geographic mapping to visualize the supply chains from Scalability's GrainPro case study.

**Corinne Carland:** Within CITE, Corinne does research with the Scalability group and looking at product selection criteria.

### **SSRC**

**Maimuna Shahnaz Majumder :** As a CITE RA this semester, Maia will be performing sustainability evaluations of products used for development with a concentration in water, sanitation, and health technologies. Her focus will be on the design of context-appropriate quantitative methodologies to assess the sustainability of products ranging from solar lanterns to ceramic filters and more. She plans to bring her experiences from public health - including expertise in contagion theory and spatiotemporal modeling - to better understand the various technology diffusion strategies used in development and their impact on a product's sustainability.

## Appendix V: Dr. Sheila Desai's Schedule @ MIT with CITE

Wednesday, December 11, 2013

Time	Location	Content
10:00-11:30am	9-455	Meeting with MIT, UC Berkeley on India
11:45am-	TBD	Lunch with CITE staff
1:00-2:30 pm	5-233	Option: Dr. Ashok Gadgil's talk at Prof. Amos Winter's class: Global Engineering
2:00-2:45pm	9-414	Option: to join CITE's weekly call with USAID/Amit or Tour of MIT
3:00-5:00pm	9-450a	CITE Seminar: Presentation by Dr. Sheila Desai
6:00pm		Dinner

### **Dinner Discussion participants**

Bish Sanyal, MIT, CITE

Diane Davis, Harvard University

Ashok Gadgil, UC Berkeley DIL

Sheila Desai, USAID/India

Tarun Khana, Harvard University

Meena Heuvett, Harvard University

Daniel Hewett, Rhode Island School of Design

Amos Winter, MIT D-Lab

Tuli Banerjee, MIT

Malanie Mala Ghosh, MIT, MISTI-India

Derek Brine, MIT, CITE

Christine Pilcavage, MIT, CITE

## Appendix VI: USAID/Washington November 19-20, 2013 Visit schedule

MIT-CITE/USAID Visit and Consultations November 19-20, 2013												
Tuesday, November 19												
Time	Meeting	Location	CITE Attendees	USAID Attendees	Meeting 2	Location	CITE Attendees	USAID Attendees	Meeting 3	Location	CITE Attendees	USAID Attendees
12:00												
12:30												
1:00												
1:30	Meet Tom and Ingianni at Hart Building by Calder Statue											
2:00	Senator Warren (staff)	Hart 317	Bish, Derek	Tom, Tiora, Ingianni								
2:30					Securing Water for Food Grand Challenge Bureau for Food Security	W18						
3:00												
3:30												
4:00												
4:30	OST/IEA Leadership	7.9-450	Bish, Derek	Alex, Michele, Josh, Amit	GH/Center for Accelerating Innovation and Impact	W18						
5:00												
5:30	Senator Markey (staff)	Russell 218	Derek	Maggie, Ingianni, Amit								
6:00												
Wednesday, November 20												
Time	Meeting	Location	CITE Attendees	USAID Attendees	Meeting 2	Location	CITE Attendees	USAID Attendees	Meeting 3	Location	CITE Attendees	USAID Attendees
8:00												
8:30												
9:00												
9:30												
10:00	CITE Presentation	7.08/E/D	All	All USAID invited								
10:30												
11:00												
11:30												
12:00												
12:30	Office of U.S. Foreign Disaster Assistance	M17		All Embara, Tom								
1:00												
1:30	INV	TBD	Jennifer Green??	Amanda@IN/Team Amit	E3/Office of Education	6.9-35	Derek	Sahi, Tony, Bloome, Eric Johnson	(RAD) Supporting Developing Country Innovation and Scale-up Brown Bag			
2:00												
2:30	Mobile Solutions	Mezz		Charley Johnson, Amit	Power Africa	6.9-48		Sahi, Rama, Christine				
3:00	Asia Bureau	M18		Julie, Mervyn, Anne, Sarah	President's Malaria Initiative	Mezz		Tom, Larry, Barat				
3:30				Amit								
4:00												
4:30												