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I. 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 the Comprehensive Initiative on Technology Evaluation (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 decisions in emerging market economies. Our evaluations will also allow the development community to analyze specific product applications leading to better, data-driven programmatic decisions and overall product designs. By applying our evaluation methods, CITE will help to identify the bottlenecks that prevent products from achieving measureable impact.

During the first half of CITE's third year CITE is able to report milestones and achievements related to: (i) impact within MIT; (ii) contribution to USAID through the Global Development Lab (the Lab) and Higher Education Solutions Network (HESN); and (iii) global partnership.

2. Major Milestones and Events Completed

During this reporting period (October 1st 2014 – March 31st 2015) the Solar Lantern evaluation report was released and a panel event hosted by CITE to further raise awareness of its first evaluation. To date, CITE conservatively estimates that over 2,500 individuals have read results from the report. In addition, following release of the report, feedback from partners Mercy Corp and Solar Sister confirmed the value of reports such as this to advance evidence-based decision making in development.

The executive summary of CITE's second product family evaluation, water filters in Ahmedabad, India, was submitted to USAID for review during the first half of year 3. The integrated report and comprehensive reports from the Suitability, Scalability and Sustainability (3S) teams will be submitted by the middle of May 2015. Initial findings from the work have been accepted for publication at two conferences, and presented at events internally at MIT and externally, including at TechCon 2014. Initial results from the work provide significant insights and identify development opportunities as well as provide data for decision making in the form of Consumer Reports-style charts.

CITE has increased productivity during year 3; 4 evaluation projects are underway in two countries, as compared to one in each of the first two years. Three of the 4 evaluation projects included an initial field trip to scope out the project; all three of these field visits have been completed at the time of writing this report. A single field trip was required as part of the fourth evaluation and this has now also been completed. As part of the initial water test kit evaluation field visit, water quality results have already been provided to each of the 234 participants in the study.

Development of partnerships has been a key achievement during this reporting activity. CITE has continued to build a learning community at MIT, extending its outreach to the Media Lab, Office of Digital Learning (ODL), International Development House (iHouse), and the Tata Center for Technology and Design. Collaboration with local NGOs, universities (including Makerere Resilient Africa Network, (RAN) within the Higher Education Solutions Network (HESN)), global organizations such as the UN World Food Program (WFP) and Malaria Consortium, and USAID (in Washington and the Missions) have been instrumental in shaping the CITE year 3 evaluations and providing support in the field.

CITE's partnership with Prof Ankur Sarin and Indian Institute of Management -Ahmedabad has evolved significantly during the first part of year 3. Prof Sarin and his students are collaborating fully as research partners in the Water Test Kit evaluation. A joint effort on instrumentation for technology evaluation is underway with the Singapore University of Technology and Design/MIT International Design Centre (IDC) and Sensen. Sensen is a new social enterprise, which has come out of MIT, and is being led by previous CITE Research Assistant (RA), Amit Gandhi, to focus on the development of the sensors which were incorporated into the Solar Lanterns as part of the CITE evaluation which took place in year 1. A new partnership has also been formed between the London School of Economics and the Scalability team to guide the application of commercial supply chain methods to less opaque markets in developing countries.

CITE course development has also continued as part of our year 3 activities. Significant achievements are the development of a new initiative with the PSC and iHouse at MIT to create new teaching materials for undergraduates through a summer partnership with an MIT alumnus. A semester-long seminar is currently underway to allow participating iHouse undergraduate students to cultivate the skills and gather the information necessary to write a development-focused teaching case. In addition, CITE's edX Postdoctoral Associate Fellow has developed a framework and content for a new edX course on the evaluation of products designed for the developing world to be aimed at professionals. edX is an organization established by MIT and Harvard University that developed an open-source technology platform to deliver online courses.

3. 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.

The annual work plan for the third year of the initiative was developed to guide project activities in line with this goal. Hence, CITE proposed the following suite of technology evaluations for year 3 based upon an extensive survey of USAID and partner organizations or based upon learning gained in year 1 and 2: (i) Post-Harvest Food Storage (PHFS) technologies; (ii) Cold Chain Storage technologies; (iii) Educational Technologies; (iv) Water Test Kits (WTK); (v) Malaria Rapid Diagnostic Tests (RDTs); and (vi) completion of the Water Filter Evaluation carried out during year 2.

Beyond these evaluations, during this reporting period (October 1, 2014 to March 31, 2015), CITE also focused its energy on releasing the Solar Lantern evaluation report, re-development of the CITE website, and on-going central CITE activities related to: (i) development of CITE methodologies; (ii) cultivation of hubs and a sustainable spin-off from CITE; (iii) course development; and (iv) engagement with partners.

The key activities undertaken in year 3 during this reporting period are described below in relation to the evaluations in progress and additional focus areas and central activities as outlined above.

Project 1: Post-Harvest Food Storage (PHFS) Evaluation

For the PHFS evaluation, Jarrod Goentzel, CITE Scalability Lead, is heading a team to analyze the social, economic and technical aspects of crop storage in Uganda by smallholder farmers in order to bring the technologies to scale through partnership with the UN WFP.

The smallholder farmers working in close proximity to the technology have the most interaction with it, but they are strongly influenced by high-level social and political factors, market forces and climatic changes. In order to capture the complexities of PHFS, CITE is using a mixed research method utilizing simulation, optimization, and statistical modeling that is informed directly by empirical data and surveys conducted in the field. Scalability and sustainability form the basis of the work for year 3; we anticipate future activities to focus around the suitability component.

CITE is working in close partnership with (i) the WFP, to integrate its data gathering activities into their Special Program on the role of storage and handling in post-harvest loss, and (ii) Makerere University to facilitate data collection components of the field research.

During this reporting period the PHFS team have communicated closely with USAID about goals and desired outcomes of the research. Conversations with Martin Fowler from the USAID Mission in Uganda and interaction with the WFP have been instrumental in shaping this evaluation. A detailed PHFS research framework has been produced and initial pilot field visit to the Kampala, Gulu and Jinja regions of Uganda completed. The field visit was undertaken by two CITE RAs during January 2015 to leverage the network and activities of the WFP to scope out and begin an evaluation of the storage technologies used in the WFP project. The activities completed during the pilot visit included the following:

1. Speaking with agricultural practitioners at USAID, WFP, and local NGOs to understand local crop loss and current efforts to reduce it.
2. Giving input on a monitoring and evaluation plan for a 16,000 farmer WFP post-harvest storage project that will be instrumental to CITE's evaluation of crop loss.
3. Engaging with major procurement groups, including WFP, to understand the crop supply chain from farmers to procurement to scope further CITE research.
4. Interviewing farmers and small artisanal manufacturers in Gulu and Jinja to (a) help craft input on the WFP M&E plan and (b) to scope further CITE research.
5. Training for four Makerere students to enable them to interview farmers and actors in the crop storage and grain supply chains in conjunction with WFP partners in Gulu and Jinja.

The four Makerere students have now completed interviews with farmers and other actors at 30 and 90 days from the beginning of the WFP Special Operation's Monitoring and Evaluation initiative.

After the pilot visit to Uganda in January, the PHFS project team is working to analyze data and information collected in order to refine and adapt the scope of its CITE evaluation. In particular, the team is finalizing the research questions and data collection plan that will be administered during the upcoming field visit in June 2015.

Project 2: Cold Chain Storage Evaluation

Prof Dan Frey, Suitability Faculty Lead for CITE, developed an outline scope of work for a cold chain storage evaluation during this reporting period. Following feedback from USAID, including Angela Shen from the USAID Bureau for Global Health, it was determined that the most appropriate avenue to pursue was a novel design option rather than evaluation. The team has now submitted a request for funding to the Tata Center for Technology and Design at MIT and are awaiting the outcome.

Project 3: Educational Technology Evaluation

The CITE Educational Technology team is led by Prof. Eric Klopfer. Prof Klopfer is a Professor in the Department of Urban Studies and Planning and the Director of the Scheller Teacher Education Program Lab at MIT. During year 3, the CITE Educational Technology team aims to create a framework to evaluate educational technologies. The framework will serve to examine and analyze the appropriateness of a single educational technology for achieving specific educational objectives. The framework will be

replicable and help to aid education decision-makers in how a technology may fit into a classroom based on a set of metrics, including implementation, adoption, impact on learning, impact on teaching practices, and potential market impact. The 3 S's (suitability, sustainability, and scalability) will be addressed through the evaluation of the technology's fit and impact in the classroom as well as alignment with local goals and expectations. The framework will be of general use for evaluating appropriate uses of educational technologies in developing countries.

During the first half of year 3, the Educational Technology team has completed a literature review of the education landscape in India, education technologies for language learning, and technology evaluation frameworks.

The team has communicated with USAID about the goals and desired outcomes of the research. This has included significant interaction with Tony Bloome from the USAID Bureau for Economic Growth, Education, and Environment and Rebecca Leege from World Vision in regard to the All Children Reading Grand Challenge. As a direct consequence of these conversations, there will be a specific adaptation of the educational technology evaluation framework designed to help USAID evaluate submissions in its literacy-based prize competition.

In addition, the team has reached out to potential partners in India to acquire more detailed information on educational technology programs and projects and will have completed an initial fact-finding trip to Mumbai, Ahmedabad and Delhi in April 2015. Through their interaction with USAID and the USAID India Mission, the researchers were successful in scheduling meetings and visits for their April visit with a large number of foundations, education organizations, and universities. The initial trip to India will include visits to schools in both urban and rural settings and meetings with a variety of stakeholders in the education space. The team plans to partner with Indian universities (IIM-Ahmedabad and The Indian Institute of Technology (IIT)-Gandhinagar) to complete a first draft of the framework over the summer of 2015. A second, follow-up visit in late summer 2015 will serve to refine the framework and assist in completing a final and replicable product.

Project 4: Water Test Kits (WTK) Evaluation

Jennifer Green, CITE Sustainability lead, is heading a team during year 3 to perform an evaluation of water test kits in Ahmedabad, Gujarat, India. The initial work plan for this evaluation focused on the importance of training and was constructed in collaboration with the Water and Sanitation Management Organization (WASMO), which is based in Gandhinagar in India. Unfortunately, WASMO withdrew from the project shortly before the fieldwork component was to be undertaken. However, new partners were found, as described below, and the project adapted accordingly.

During the duration of this reporting period Jennifer Green worked in consultation with USAID to form new, on the ground partnerships, with the Vikram Sarabhai Centre for Development Interaction (VIKSAT) and Prof Ankur Sarin from the Indian Institute of Management – Ahmedabad (IIM-A), in order to structure a new framework for the evaluation. VIKSAT is a not-for-profit think tank that carries out environmental and forestry programs in rural areas. They have a strong interest in community managed water and sanitation programs. Prof Sarin worked with CITE previously on the water filter evaluation and this new collaboration represents a significant evolution of that partnership.

The new approach for the WTK evaluation, which has been developed during the first half of year 3, is in line with the Lean Research Initiative being developed by Kendra Leith, CITE's M&E Manager, in collaboration with International Development Innovation Network (IDIN). The WTK evaluation is divided into five subtasks. These tasks include research on WTKs, which represents the focus of the work, research on the use of social media for data collection, development of CITE methodology and outreach and partnership activities.

The team recently returned from Ahmedabad, India, where the first phase of the field work was completed on single parameter hydrogen sulphide (H₂S) WTKs in an urban setting. This phase of the work focused on the sustainability (S3) component of the evaluation and included field testing and administration of a baseline Knowledge, Attitude and Practices (KAP) survey. The technical performance (S1) component of the work was completed during the summer of 2014. As part of the field testing during this reporting period, a second H₂S vial was provided to each participant so they could also conduct a test of water quality in their homes. CITE has now provided water quality data to 234 participants and plan to return to the test sites in May in order to understand how knowing the quality of their water has affected the participant's behavior.

In addition, during the recent trip to India the team also completed a scoping study in order to lay groundwork for the second field visit to India in May to collect data from rural communities on both single parameter and multi-parameter test kits. The scoping study, which is complete, included a mapping exercise of water sources and local livelihoods and water & sanitation awareness training for the communities and people the team visited. The WTK evaluation team also provided real-time updates for social media whilst in the field and piloted group voice SMS messaging.

The team is now analyzing the data collected as part of the field trip in March and in parallel have begun an evaluation of multi parameter test kits using on-line surveys.

Project 5: Malaria Rapid Diagnostic Tests (RDT) Evaluation

Jarrod Goentzel, CITE Scalability Lead, is heading a small team who are studying how the use of RDTs for malaria can be scaled up in private sector clinics and pharmacies in Uganda by analyzing the supply chains that carry these devices. This work is being undertaken within the scope of a project initiated by UNITAID and facilitated in Uganda by an implementing partner, the Malaria Consortium. UNITAID's goal in this project is to develop a sustainable private sector market for malaria RDTs in five malaria endemic countries: Kenya, Tanzania, Nigeria, Madagascar, and Uganda.

Since a majority of individuals in the country obtain medical care from the private sector, it is important to understand how to improve the quality and services offered there. The CITE research project analyzes how agents in the end-to-end supply chain, from manufacturers and importers to distributors and retailers, make decisions about which products to carry and the criteria these different actors use to evaluate strategic options.

During this reporting period the CITE team has communicated with USAID about goals and desired outcomes of the research. This has included significant interaction with Lawrence Barat from the USAID

President's Malaria Initiative as well as the Malaria Consortium. These conversations have significantly influenced the scope and direction of this evaluation.

A significant portion of the work carried out during this evaluation has been in collaboration with experts from the London School of Economics. Together, CITE and Gilberto Montibeller have explored how Multi-Criteria Decision Analysis (MCDA) can be used to understand the adoption of technologies among consumers and design business models in the private sector. This MCDA approach has framed the Malaria RDT evaluation.

The data collection for this evaluation has been completed during this reporting period. One CITE RA, and a student from the MIT Sloan School of Management, who volunteered their time to the CITE program, traveled to Uganda to hold focus groups and interviews with manufacturers, distributors, and retailers. Data surveys and semi-structured interviews were conducted with 28 private sector retailers, two first line buyers, three distributors and two manufacturers. The team is now engaged in analyzing the data to understand the private sector's preferences. The insights gained will directly impact product design and health outreach, which will guide further development of the Malaria Consortium program and scaling of the rapid diagnostic tests.

Project 6: Completion of Water Filter Evaluation

The CITE water filter evaluation team, led by Susan Murcott, has continued to work together to analyze, report and publicize the results of the water filter evaluation, internally at MIT and externally through conferences and other public events.

A key activity has been writing, editing, peer reviewing and re-editing the Water Filter Evaluation reports (three comprehensive reports – S1, S2 and S3, the full Integrated Report and the Executive Summary) based on feedback from CITE faculty leads. The draft version of the Executive Summary was submitted to USAID at the beginning of the second half of year 3.

In addition, the results from the water filter evaluation have been communicated in the following ways:

1. Two posters at MIT Water Night;
2. Two presentations; the first was at TechCon on “Evaluating Technologies to Reach Scale”, and the second was at MIT Water Night on “Redefining Water Challenges: CITE's Technology Evaluation for Water Filters”;
3. A workshop/breakout session for the Scaling Development Ventures conference to take place on April 11, 2015 on “Getting the Right Products to Scale: Technology Evaluation of Water Filters”;
4. Two publications have been accepted for presentation at conferences during 2015 (Humanitarian Technology: Science, Systems and Global Impact 2015, HumTech2015, May 12 – 14, 2015 and the 7th International Conference on Engineering Education for Sustainable Development, Vancouver, Canada, June 9 to 12, 2015) and submitted for publication in journals.

5. A five minute plus video on the CITE water filter evaluation has been produced by a previous CITE RA. This will be made available on the CITE web-site during the second half of year 3

Two further publications are in progress, a working paper based on the water filter scalability evaluation results and a working paper analyzing the business model for the Dolphin supply chain.

Release of the Solar Lantern Evaluation Report

The report of the first CITE evaluation, which was on solar lanterns in Uganda, was released during this reporting period. The report was featured on the front page by MIT News and gained additional press coverage including an article in the Boston Globe. There were 1,170 MIT page views of the MIT News release, 578 CITE landing page views and 85 views of the solar lantern video. CITE conservatively estimate that over 2,500 people have now been exposed to CITE's results from the solar lantern report, based on page views on the MIT news release (1000+), page views on the CITE website (1000+), page views on the Boston Globe and SciDevNet, which have great reach with an engaged, intellectual audience, social media posts and clicks, video views, Solar lantern event attendees and presentations at TechCon.

In addition, CITE hosted a panel event on the March 12th to further raise awareness of the Solar Lantern Report. Panel members were Prof Dan Frey, Jennifer Green, Jarrod Goentzel, Amit Gandhi (previous CITE RA) and Dave Ferguson from USAID's Global Development Lab. Tom Murphy, a reporter for Humanosphere and founder of the aid blog A View From the Cave moderated the event. CITE registered 67 individuals as attending from 15 different organizations representing Higher Education, NGOs and private institutions.

One organization has reported that it has used the results from the solar light evaluation. Solar Sister used CITE's findings to affirm adaptation of its business model to improve sustainability.

Redevelopment of the CITE web-site

The CITE web-site was conceived as the primary mechanism for communication and dissemination of CITE work. A redevelopment of this platform has been undertaken during year 3 to enhance many of the current features, and to introduce new ones. The new CITE website will be more interactive and engaging by integrating more social media platforms, discussion boards, and two way feedback mechanisms. The new web-site will help CITE better track downloads of reports and keep in touch with our growing evaluation community.

During this reporting period CITE followed MIT and USAID procurement procedures to bring on board a vendor to work with on this redevelopment project. CITE also convened a small focus group of CITE staff and students to work closely with the vendor to achieve our redevelopment goals. During the first half of year 3 the visual design and functional requirements for the updated website have been finalized using wireframes and usability testing. A working Drupal site has been developed and content is currently being prepared. We are aiming for a launch in May of this year.

Development of CITE methodologies

During this reporting period the individual 3S teams have developed methodologies in line with their areas of expertise.

The Suitability team is currently working on a joint effort with the SUTD/MIT IDC and in collaboration with Sensen to incorporate instrumentation into various aspects of a 3S style evaluation to provide more quantifiable data in a distributed form to cover a wider geography over a longer period of time than current field methods allow. The team also aims to partner with researchers at D-Lab and the Teso Women's Development Initiative in Uganda to run a sensor-based field study of prolonged clean cook stove adoption.

In addition, the Suitability team are analyzing the performance of CITE's current Multi Criteria Decision Analysis (MCDA) approach in comparison to other decision strategies. International student Maarten Vrouenraets, who is visiting Prof. Dan Frey from the Delft University of Technology (TU Delft) - Delft, The Netherlands, is using a combination of simulation and empirical data from the Solar Lantern and Water Filter Evaluations to compare alternative decision strategies based on (i) quality of the guidance provided for the decision maker, (ii) feedback available for third parties to facilitate product improvement and (iii) the amount of information needed to apply the decision strategy.

The Scalability team has been working closely with Gilberto Montibeller, an expert from the London School of Economics, to apply an enhanced MCDA analysis in order to understand the adoption of technologies among consumers in a developing country context and design business models for the private sector. This method has been implemented as part of the malaria RDT evaluation. This work and that of the PHFS team, work will extend more broadly the application of commercial supply chain methods to less opaque markets in developing countries and will result in a toolkit for future CITE evaluations (and other organizations) to use.

The Sustainability team is developing a methodology which incorporates aspects of the Lean Research approach being developed in partnership with IDIN. In particular, during this reporting period the Sustainability team developed and implemented an approach to data collection that includes components of direct benefit to the participant, who is often the end user of the product being evaluated. Examples include training and sharing research findings directly with the participants. The Sustainability team plan to continue to develop this methodology during the second half of year 3 and will present their work as a draft CITE generic method for evaluation. This generic method will be refined and made available publically during the first half of year 4.

During this reporting period the 3S teams met regularly to discuss and develop the overall CITE methodology within the context of the water filter evaluation. Together, the teams have focused on a MCDA approach and a Consumer Reports-style of presenting the data. Integration of the results into a single chart was explored during the completion of the Water Filter Integrated Report but proved challenging.

CITE plans to convene a Methodology Working Group at the beginning of year 4 to consolidate the learning that has taken place organically over the first three years of the program. The first task of the

working group will be to refine and update the individual 3S white papers which will be made publically available during the fall of 2015. This working group will also be tasked with articulating the overall CITE methodology framework. One component of the framework will be the CITE generic method. CITE aim to submit a draft copy of the framework to USAID at the end of year 4 and to make it publically available during the final year of the program.

In collaboration with IDIN, D-Lab Scale-Ups and colleagues from Tufts, CITE has continued to develop the Lean Research Initiative. The Lean Research Initiative, led by MIT D-Lab, the Fletcher School at Tufts University and Root Capital, is an approach to monitoring, evaluation, research and learning in the contexts of international development and humanitarian work. Building on D-Lab's expertise in human-centered development and design, Lean Research places the experience of the research subject and key stakeholders at the center of decisions in the design and implementation of Monitoring, Evaluation, Research and Learning (MERL). It incorporates the following key principles:

- 1) Rigor, following best research practices for the discipline;
- 2) Respect, maximizing the value of the experience and outputs to the research subjects and key stakeholders;
- 3) Relevance, addressing priority issues for stakeholders and producing results that are understandable, accessible, and actionable; and
- 4) Right-size, using only the protocols, subjects, and resources necessary to inform decisions.

Lean Research is also a growing community of practice committed to developing, implementing, and learning from this approach. It includes over 120 researchers, practitioners, donors, M&E specialists, and policymakers from government agencies, multilateral institutions, non-governmental organizations, donor agencies and academia. The community members have participated in events, provided feedback, or signed the declaration. They engage in working groups, produce resources and publications, and participate in convenings to share practices.

During this reporting period, the team has created the Lean Research declaration, framework and working paper. The Lean Research Working Paper provides evidence and examples of why this approach is necessary.

Finally, CITE convened a Methodology Seminar series during this reporting period coordinated by Prof Dan Frey and Susan Murcott. Each seminar, to be led by a CITE student, member of staff or faculty, provides a forum within CITE to share thoughts and perspectives on methodologies for technology evaluation. The seminar series is meant to serve as an opportunity for cross-fertilization of ideas and experience between the 3S teams and also more easily allow for discussion and debate of the overall CITE methodology framework. The achievement of this seminar series was the wide participation from all in this endeavor and the breadth of topics covered, with 13 presentations having taken place during this reporting period. The seminar series has developed a rich body of knowledge from which CITE will be able to publish and draw from in the months and years ahead. In particular, the CITE team will draw on this body of knowledge to inform development of methodology for year 4 evaluations as well as to articulate the overall CITE methodology framework.

Cultivation of hubs and a sustainable spin-off from CITE

During this reporting period CITE has continued to be engaged in activities related to the scalability and sustainability of CITE itself.

CITE Director, Prof Bish Sanyal, travelled to India in January of this reporting period to meet with Bimal Patel from CEPT, Ashish Nanda, Ankur Sarin, Rakesh Basant and Prem Chander from IIM-Ahmedabad, Hiran Vedam and Chinmay Ghoroi from IIT– Gandhinagar and Joy Sen and Subrata Chattopadyay from IIT-Kharagpur, in order to continue to develop relationships which will be critical for the formation of an Innovation Hub in India. Prof Sanyal also met with HK Mittal from the Department of Science and Technology and Sheila Desai of USAID India to discuss opportunities for funding.

As a consequence of Prof Sanyal's visit to India IIM-Ahmedabad, IIT-Gandhinagar, The Center for Environmental Planning and Technology (CEPT) and UC Berkeley have been requested to formalize a proposal for products they would like to evaluate and projects they would like to incorporate into the initiative. These ideas will be included in a redraft of a proposal (Development Technology Initiative (DTI) – A proposal for Indo-US Educational Cooperation to Foster Technological Innovation, Evaluation and Entrepreneurship) initially developed in January of 2015, for funding to facilitate future meetings to develop the scope and business plan for the project. The role of the technology hub as an incubator will be highlighted. CITE will continue to engage with the Indo-US Science and Technology Forum and Department of Science and Technology, India, with a view to submitting a revised proposal for funding to support further meetings. Prof. Sanyal proposes a further visit to India in July of this year to finalize the proposal and partnerships.

In addition, during the first half of year 3, a scope of work has been developed for a graduate student to determine demand and refine the concept for a financially sustainable organization (spin-off) that aims to increase the development impact of consumer products and technology designed for poor people in developing countries.

Currently, CITE must produce both actionable results and original methodological research. By separating these functions and monetizing the former, both CITE and a spin-off would produce greater impact in their respective applied and theoretical fields. Further, splitting these two functions harmonizes the institutional and organizational settings in which each organization would operate. As a program solely focused on methodological research housed at an academic institution, CITE would be better positioned to focus solely on research and teaching. At the same time, as a financially independent private company, a spin-off would be focused on creating value (in the form of development impact, increased returns, shorter design horizons and lower product research costs) for its clients.

Prof Stephen Graves, CITE Faculty Lead from the Sloan School, is leading the work with Derek Brine as external advisor.

CITE Course Development

Brittany Montgomery, a CITE RA, has continued to prepare a curriculum for a new undergraduate course in Technology and Development to be taught in the Fall of 2015. The syllabus and teaching materials have evolved during this reporting period. An integral component of the new class are case-

based studies and CITE, the PSC and iHouse are partnering in a new initiative this semester. The aim of the collaboration is to create new teaching materials for undergraduates, while providing current students a unique field-based learning opportunity. Through a coordinated semester-long seminar currently being led by our CITE RA, and a 2015 summer partnership with an MIT alumnus, students will cultivate the skills and gather the information necessary to write a development-focused teaching case. The completed teaching cases will form an integral part of the new undergraduate curriculum on Technologies for Development.

In addition, Dr. Gaurav Kewlani, a mechanical engineer, joined the CITE team during September 2014 as an edX Postdoctoral Associate Fellow. During this reporting period Dr. Kewlani has been supporting CITE staff to develop a new edX course entitled “Evaluating products designed for the poor”. This course will provide practitioners (NGO professionals, student inventors, field workers, and project evaluators) who work in developing nations with an introduction to evidence-based methodologies for the evaluation of technologies designed for the poor.

The first offering of the course, which is planned for this coming summer, will be for-audit only, and participants will learn about effective strategies for conducting product evaluations, participate in case studies and group activities, and will get the opportunity to apply what they learn for use in future career engagements. They will also examine the application of CITE’s methodology to solar lanterns and water filters, to better understand the real world significance of various specific details of evaluations (and especially of the 3S approach).

During this reporting period a framework and course content for the different modules of the edX course have been developed. This material is currently being moved on to the edX platform. Dr Kewlani is also currently receiving training from the ODL at MIT so that video recording can subsequently begin. CITE are also exploring ways to coordinate with the Scheller Teacher Education Program (STEP) to get some assistance with video recording and editing through Prof. Eric Klopfer, who is leading the CITE Educational Technology evaluation.

Engagement with partners

CITE distinguishes two categories of partner: core strategic partners and project specific partners. During this reporting period, CITE has developed a strategy for core partnership engagement during year 3 and beyond.

The strategy defines:

1. The motivation for CITE to partner with external organizations (feedback from core partners on what we have done to date and input for the selection of products to evaluate and development of methodologies),
2. The motivation for external organizations to partner with CITE (including but not limited to: MIT/CITE intern, MIT residency, participation in CITE Methodology Seminar, opportunity to influence selection of CITE evaluations and access to wider MIT CITE resources),
3. Mechanisms of engagement (including but not limited to telephone surveys to solicit feedback and a partner convening scheduled to take place during a CITE retreat on May 29th).

Activities are now underway in preparation for the convening in May.

4. Engagement of Partners and Other Actors

4.1.1. Interdisciplinary Collaboration

CITE has broadened its interdisciplinary network at MIT during this reporting period. 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) continue to be the main partners in CITE. However, in addition, CITE is now also partnering with Prof Eric Klopfer, Director of the Educational Arcade, housed at MIT's Media Lab, to broaden the scope of CITE's evaluations through development of the Educational Technology evaluation framework. The ODL and the SUTD/MIT IDC have both provided funding (which will be counted as leverage for the CITE program) to support (i) the development of a CITE edX course and (ii) a joint effort on instrumentation for technology evaluation. Finally, CITE is now partnering with iHouse at MIT in a new initiative to create teaching materials for CITE courses related to Technology for Development, and with the Tata Center for Technology and Design at MIT to co-host seminars featuring external speakers.

In this way, during this reporting period, CITE has continued to build the multidisciplinary ecosystem of MIT faculty, staff, and students focused on issues around technology in development.

4.1.2. Partner Engagement

CITE has engaged with a growing number of partners during this reporting period, including NGOs, private sector partners, universities and global organizations. The majority of this engagement has already been described previously in this document as part of the evaluation and cultivation of hub activities.

However, in addition, the following partner engagement activities are of note:

1. Jennifer Green, CITE lead for the WTK evaluation, has continued to develop the partnership with the Hanken School of Economics in Helsinki, through Prof. Karen Spens. Prof. Spens, who will be the next Rector of the School, is the supervisor of PhD student Linda Annala who has contributed to the fieldwork for both the WTK and water filter evaluations. CITE is working to formalize the relationship with Hanken this year.
2. Dr. Beverly Brown, from Boston University's Center for Global Health and Development, presented at a CITE seminar during this reporting period to discuss potential avenues for joint work. In addition, CITE has had conversations with the Global Alliance for Clean Cookstoves, Engineers without Borders and Jon Pearlman from the Human Engineering

Research Lab at the University of Pittsburgh. CITE will be following up with all these organizations and individuals as part of the product selection process now underway for year 4.

3. The Technology Exchange Lab (TEL) has participated in the CITE Methodology Seminar during this reporting period. This represents a significant progression of early conversations held during year 1 and 2. TEL will be invited to participate in the core partner convening in May of this year.

4.2. Summary of Collaboration Across HESN

CITE, UC Berkeley and Harvard University's South Asia Institute continue to explore together how the three institutions could collectively contribute to India's effort to strengthen the entrepreneurial capabilities of its leading research universities. An initial proposal to seek funding for further exploratory meetings is being revised as a consequence of further discussion and research during this reporting period.

Following initial conversations at TechCon this year, a formal partnership has developed between CITE and Makerere University, who are part of the ResilientAfrica Network (RAN). Makerere students are helping to facilitate field research for CITE's PHFS Project in Uganda by interviewing farmers and actors in the crop storage and grain supply chains. This collaboration bolsters student involvement in research initiatives, and has developed a template for meaningful HESN collaboration which we hope to build upon during year 4.

Michigan State University's Global Center for Food Systems Innovation has been helpful during this year in giving feedback on the CITE PHFS project design and has connected the team to other researchers in this area.

Finally, CITE has continued to work with IDIN on the Lean Research Initiative during this reporting period.

4.2.1. Data

CITE will make its quantitative data public for the solar lantern and water filter reports and will work with USAID and the IRB to determine if data from surveys can also be made publically available. A Malaria RDT data set has also now been collected and is currently being analyzed. This will be made publically available once the report has been released during the second half of this year. Water quality data has been made available to all 234 participants in the WTK evaluation.

4.2.2. Solutions (Creation, Testing, Scaling)

CITE's overarching goal is the creation of an innovative methodology for evaluating technical products in emerging market economies. CITE is, therefore, making a direct contribution to the testing of technological solutions to the issues of poverty.

As well as ranking of products CITE's methodology provides insight into user needs, barriers to scale and gaps in the market.

Identification of gaps in the market and user needs will lead to the creation of new products. The CITE water filter evaluation has demonstrated there is a gap in the water filter market between low-cost, ineffective cloth and jali mesh filters and the higher-priced, effective filters in the gravity non-electric and reverse osmosis categories. Research on a low-cost, effective alternative to what's currently on the market could reveal opportunities for product innovation in Ahmedabad's water filter market and beyond.

A CITE evaluation also incorporates a rigorous analysis of supply chains which enables solutions to scaling to be identified. Specifically, solutions for scaling PHFS technologies and Malaria RDTs in Uganda are being sought as part of the CITE evaluations this year.

4.2.3. Student Engagement

During the first half of year 3, CITE has been engaging students on the campus of MIT in the following ways: Student participation in the CITE Seminar and Methodology Seminar series, which has resulted in a large body of work that CITE will draw on during the next few months; participation beyond CITE in poster sessions and presentations on campus to highlight CITE work, including at MIT Water Night and during Poverty Action Week. CITE students also contributed significantly to the visit by Dave Ferguson in March, presenting their work over breakfast. Former CITE RA, Amit Gandhi, was a valuable member of the Solar Lantern evaluation publicity panel.

Off campus, CITE students have made significant contributions in the following ways: CITE RA, Corinne Carland, presented the CITE lightning talk at TechCon and CITE RA, Brittany Montgomery, contributed to the break out session led by Prof Sanyal on novel course development. In addition, former CITE RAs Shuyue Liu, Yiyue Zhang and international student Akshay Jain also represented CITE during the break-out session at TechCon - Evaluating Technologies to Reach Scale. Leading up to TechCon 2014, CITE RAs Cauam Cardoso and Brittany Montgomery were part of the TechCon Student Committee, which helped to plan student focused activities for the event including a career panel. Both Cauam and Brittany participated as part of this panel, sharing their professional development experiences to a broad audience.

Globally, CITE students have continued to have the opportunity to experience firsthand field work in developing countries. They have worked closely with international students from India and Uganda during this reporting period. All the students have benefited significantly from this cultural exchange.

During the later part of this reporting period, Jesse Kaminsky has taken over the role of CITE Student Engagement coordinator and is now working in close collaboration with Nai Kalema from IDIN to broaden the range of student engagement opportunities available on and off campus.

5. USAID Engagement

5.1. USAID/Washington Interactions

USAID/LAB CITE has had several, significant interactions with the Lab during this reporting period. Our team has been involved in initial conversations with Alexis Bonnell in regard to the development of the Global Innovation Exchange platform. CITE looks forward to playing a key role in this initiative during year 4 and onwards. CITE communication's officer, Lauren McKown, has worked closely with Alma Aliaj during this period to promote the release of the Solar Lantern report to a broad audience. CITE has also worked with Sarah Hughes to provide feedback to inform better support for innovators within the Lab. Finally, CITE hosted a visit to MIT from Dave Ferguson to participate in the Solar Lantern panel event. This was an important opportunity for Dave to meet with the team and hear about the work being carried out this year in detail. A particular highlight were presentations by CITE and IDIN students.

5.1.2. Other (Non-Lab) USAID/Washington Interactions

USAID/Bureau for Global Health CITE worked with Angela Shen and Rochelle Rainey to obtain valuable feedback on the cold chain storage and WTK evaluations which guided the development of the final year 3 work plans.

USAID/Asia and Middle East Bureau CITE has had several conversations with Mitch Kirby to discuss the potential of the Educational Technology evaluation framework that is under development as part of the year 3 work plan.

USAID/Bureau for Food Security CITE's Scalability team has had discussions with Ahmed Kablan as part of the PHFS evaluation. The Bureau has provided valuable feedback to guide the work as well as facilitated helpful connections to the Food Security programs funded by USAID at Purdue and Kansas State Universities. In addition, Jarrod Goentzel, CITE research lead, participated in the USAID Climate Resilient Maize Convening in February of this year which was hosted by the Bureau and the Lab.

USAID/President's Malaria Initiative CITE has continued to work closely with Lawrence Barat, Senior Malaria Advisor at the USAID/President's Malaria Initiative to develop and implement the Malaria RDT evaluation, which is part of the year 3 work plan. These conversations helped CITE to develop the evaluation strategy that became part of our Year 3 work plan.

USAID/E3/Education CITE has continued to work closely with Tony Bloome to discuss synergy between the Education Technologies evaluation and the All Children Reading Grand Challenge. As a consequence, Scot Osterweil attended the Mobiles for Education Alliance Symposium which took place from Oct 20-22 in Washington, D.C. and Scot and Stacey Allen both attended the All Children Reading Grantee Workshop in Washington, D.C. in February 2015. The CITE team will visit a number of Grand Challenge/ USAID grantees during a field trip to India in April.

5.2. USAID Mission Interactions

USAID Mission interactions have been a particular highlight this period.

USAID/India: During this reporting period CITE has been in close dialogue with USAID/India's science and technology advisor, Dr. Sheila Desai. The USAID India Mission provided concurrence for field trips during this reporting period for both the WTK evaluation and the Educational Technology Project. The Mission met with CITE researchers from both teams and has been very engaged in providing support and feedback for the proposed work and facilitated meetings at the appropriate level with Indian institutions.

In addition, Dr. Desai continues to engage with CITE, including face to face meetings held during January of this year. At this time, Prof Sanyal met with Dr Desai to continue discussions regarding the development of an innovation hub in India, and also to provide detailed feedback and an update on the water filter evaluation carried out in India last summer.

USAID/Uganda: Jarrod Goentzel has been engaged with the USAID Mission from Uganda in order to obtain feedback and facilitate concurrence for the PHFS work and malaria RDT projects currently underway. Martin Fowler has been a tremendous asset to the PHFS project, meeting with the CITE researchers in the field and being instrumental in setting up meetings with the appropriate stakeholders.

USAID/Pakistan: CITE met with Kamran Niazi and Kanwal Bokharey at TechCon, during November 2014, to discuss potential future opportunities for collaboration.

USAID/West Bank and Gaza: CITE met with Dave Harden at TechCon, during November 2014, to discuss potential future opportunities for collaboration.

6. Monitoring & Evaluation

6.1. M&E Updates

Not Applicable

6.2. Deviance from M&E Targets

We are on track to meet or exceed most of our targets. We have exceeded our targets for the following areas:

- HESN_2.3in2 Number of stakeholders engaged in problem solving with CITE. We have engaged many partners in our evaluations and they have provided valuable feedback and insights. We recognize the importance and value of partnerships. Thus, we have engaged

more partners than we originally predicted. Our target was three, but we have engaged 31 during this period. Thus, we likely need to adjust this target.

- HESN_3.2in1 Number of visitors to the CITE knowledge-sharing platform. We thought that we would have 1000 visitors per year to the website based on initial traffic in the first six months. However, that number has been much higher. During this six month period, we have had 2,248 visitors. Thus, we will likely need to adjust this target.
- HESN_3.3zCITE-in2 Number of students serving as fellows, interns, etc. We have already exceeded our target for this year as we have been able to engage many US and international students in our fieldwork. They have proven to be very valuable assets in the lab and field. We will likely need to adjust this target as well.
- HESN_Oin7 Number of students serving as fellows in developing countries. We are on track to meet our target for US students, but we have also been engaging international students. We did not anticipate their participation in the evaluations when we set the targets at the beginning of the program. This year, we have engaged 13 international students. We should set a target for this indicator as well.
- HESN_Oin6 Number of product families evaluated. We included four evaluations in our work plan this year, as we had resources to complete all of these evaluations. We will likely need to adjust this target for the future.
- HESN_2.2in2 Number of citations. Initially, we defined citations very narrowly. We only counted citations in academic journals and our targets were based on this assumption. However, we can count references in other publications and project documents. Thus, we will likely continue to exceed this target. We will likely need to adjust this target.
- HESN_3.3in3 Number of new development related classes. We have added the CITE methodology seminar and a new case study class. It was necessary to add the methodology seminar to explore and develop the methodology further. We added the case study course to prepare for a new class to be taught in the fall.

We are also below our targets in the following areas:

- HESN_3.4in1 Number of students participating in short-term practica. We thought that we would have more students engaging in short-term practica, but they are engaging in fellowships. In the end, this is preferable as they are participating in more long-term, substantive research activities. However, this also partly due to a misunderstanding in reporting. All the fellowships were also counted as short-term practica in year 1. The target was set based on the assumption that the fellowships would also be counted as short-term practica. This is not correct. Thus, this target needs to be adjusted.
- HESN_2.2zCITE-in1 Number of requests for evaluations. We proactively reached out to USAID and our core partners last year to get their input on which products to evaluate. We received 578 requests. Thus, it is unlikely that we will meet the target for this year, as we have already received critical information from many of our partners. When we originally set this target, we did not realize that we would collect many of our requests at one time. Thus, we will likely need to adjust this target for the next 2.5 years.

- HESN_3.2zCITE-inI Number of evaluation downloads. Unfortunately, our website and the associated analytics do not track this information. However, our new website will enable us to track this data in the future. Over 2,500 people have seen the evaluation results.

Here are some other things that we need to address:

- We are now reporting on beneficiaries reached. We do not have a target for this indicator. During this period, we reached 234 people through the water test kit evaluation. We shared the results of their water tests with them.
- We should add Gin3-# of transformative innovations, technologies, or approaches that were piloted with human, financial, or institutional resources contributed by HESN Development Labs. We are already piloting our approaches and we should report on this data. People are also starting to adopt the methodologies.
- We still need to set the target for number of organizations using CITE data in decision-making processes. We will set this target after interviewing our partners and gathering their feedback on the solar lantern and water filter evaluations.
- We would like to be able to report on # of requests for the methodology. CITE is planning to add this indicator as a custom indicator.
- There are a number of indicators that appear in DevResults, but not in our M&E plan such as number of beneficiaries, datasets, datasets cited and number of development programs/projects/efforts undertaken collaboratively by Network members. CITE will update the M&E plan accordingly.
- We will report the skills, knowledge and attitudes of the students in the annual report, once all of the students have had the opportunity to participate in their field experiences.

7. Lessons Learned / Best Practices

As CITE has matured over the two and a half years of the program, a significant number of lessons have been learned. During this reporting period CITE would like to highlight the following broad and specific insights that have been made.

Broadly speaking, CITE is increasingly aware of the value that “true” partnership plays both strategically and on the ground operationally. Working closely with experts from NGOs, global organizations, university partners, USAID and USAID missions has been critical to the success of CITE evaluations this year in shaping an effective research question and facilitating access to the relevant stakeholders. CITE is also beginning to recognize that best practice combines research with outreach and partnership activities. As well as being ethical, this leads to greater impact.

The importance of planning and context has also become increasingly apparent during this reporting period. All of our CITE evaluations during year 3, except one, are benefiting from initial pilot visits to scope out the work and refine methodology and logistics.

Finally, broadly speaking, CITE is recognizing that its approach to evaluation of technology is leading to significant development insights that are relevant to a number of stakeholders and can provide knowledge to address questions of scaling and poverty beyond the Consumer Reports-style of reporting.

Specifically, during this reporting period CITE has learned the importance of planning Institutional Review Board approvals and travel plans early, that data collection methodology requires adaptation to the context where concepts may be abstract and decision models can inform policy making for various actors, from government agency to metal artisan to smallholder farmer.

8. Future Activities

Broadly, future CITE activities will focus on (i) refinement of methodology and generation of new insights for the base of the pyramid, (ii) dissemination and replication leading to global adoption of the CITE approach and (iii) capacity building at the individual and institutional level.

Specifically, CITE will complete analysis of data collected for the Malaria RDT evaluation over the coming two months and aims to submit a draft report to USAID by July 2015 as well as a Master's thesis. These results will also be submitted to the Malaria Consortium to inform scaling of Malaria RDTs in Uganda. Follow up field trips for the WTK evaluation are planned in May and during the coming summer for the PHFS evaluation and development of the educational technology framework. Reports will be submitted to USAID and our partners as well as journal articles and a proposal for follow up work from the educational technology team.

During the next month CITE will review the body of knowledge gained through all of the evaluations carried out and in progress to date, with feedback from external partners. The aim will be to define a framework within which to construct the evaluation of products for year 4. This review will culminate in a retreat and convening with partners on May 29th.

In parallel, field based instrumentation approaches will also continue to be developed during the second half of this year to better assess suitability of target products. CITE aims to apply these techniques within its year 4 framework for evaluation.

In the coming months, the Lean Research team will obtain feedback on the working paper and refine it. The team will collaborate with Root Capital and Sustainable Food Lab to create a practitioner's field guide for Lean Research and case studies. The CITE sustainability team will continue to apply the Lean Research principles in the field.

Going forward, CITE will focus additional efforts to share methodologies and results, including the development of a toolkit for practitioners so they can replicate the CITE evaluation process, and decision models that can be used to inform policy making for various actors, from government agencies to metal artisans to smallholder farmers. The launch of CITE's new website, expected in May of this year, will play an important role here, providing a more organized and dynamic home for evaluation

reports and resources, interactive features like a monthly discussion board, and new opportunities to get involved. CITE will also seek to play a key role in the development of the Global Innovation Exchange platform during the coming months and years to disseminate information, and advocate for technology evaluation within development.

CITE will continue to work with UC Berkeley and Harvard's South Asia Institute to collaborate in India with USAID and the Government of India to develop an innovation corridor and evaluation hub. This will provide institutional learning and longevity. An additional proposal for funding to support development of this initiative will be made to Higher Education Partnerships for Innovation and Impact (HEPII) during the second half of year 3. In addition, CITE will determine if there is demand for a spinoff that is a self-sustaining technology evaluation resource for international organizations. This work will be carried out over the summer of 2015 and it is hoped to present the findings at a convening of Cornerstone Partners at the beginning of year 4.

We also expect a number of additional publications to be completed during the final half of year 3 including a paper that examines the experience of the first CITE class: Evaluation of Technologies for International Development, an additional paper on rainwater harvesting and a publication on the nature of technological challenges for slum upgrading in India. The second two publications have provided specific insights into scaling a technology solution successfully in India and identification of future products for evaluation by CITE in relation to building materials including materials used for foundations in slums.

In addition, we will be revising the three methodology white papers from each of the 3S teams in light of lessons learned.

9. Environmental Monitoring

Not Applicable

10. Risks/Issues and Mitigation

The primary risk associated with the program relate to working in developing countries and the inherent political, economic and climatic vulnerabilities. CITE carries out due diligence before traveling and we are able to take full advantage of MIT's policies and procedures in the event of a natural disaster or unrest. The other risks include annual allocation of budget, the inherent complexity of working with partners, and the constraints of the academic calendar. To address budget risks, we consider worst and best case scenarios for the budget and always build in a buffer. Our learning is still evolving with regard to mitigating partner risk. We have realized that there is an advantage in diversifying partnerships and recognized the benefits of creating enabling and enhancing partners. As part of the water test kit evaluation, CITE will report back on this challenge, reflecting on this experience. We are leveraging partners on the ground to be able to collect data when our students cannot travel to mitigate the constraints of the academic calendar.