



DIL REQUEST FOR APPLICATIONS

Fall 2013 – *Development Engineering*

The [Development Impact Lab](#) (DIL) invites affiliated researchers* to apply for grants supporting the design and rigorous testing of innovative solutions for international development.

For this competition, DIL expects to award approximately 8 seed grants (up to \$75,000) and 4 project grants (up to \$200,000). These funding limits represent total costs, i.e. direct costs plus indirect costs (such as university overhead). Grants will be issued as sub-awards from a parent contract between USAID and UC Berkeley; therefore all awards are subject to US government policies and regulations.

Deadline: Applications must be submitted by **October 30, 2013 at 11:59 PM US Pacific Time.**

RFA Release	August 30, 2013
Submission Deadline	October 30, 2013
Award Notification	December 15, 2013
Earliest Start Date	January 30, 2014

Eligibility: This competition is open to researchers with Principal Investigator status at DIL-affiliated centers and institutes*. Please do not circulate this RFA externally. If you have questions regarding your eligibility to apply, please send an email to dil-grants@berkeley.edu.

Focus: Proposals must address one of two research tracks within the field of *Development Engineering*:

Track 1 “Development Solutions” focuses on the design, evaluation, and translation of novel development solutions that incorporate technological, economic, and social innovation.

Track 2 “Measurement Solutions” focuses on design and validation of technologies (e.g. wireless sensors, meters, data analytics) for monitoring the impacts of development interventions.

Questions? Email dil-grants@berkeley.edu

This RFA, application documents, updates, and notifications are available at:

<http://dil.berkeley.edu/technology-portfolio/competitions-incentives/fall-2013-rfa/>

Annual Cycle: DIL anticipates circulating at least one Request for Applications (RFA) each year, through 2017. During the Fall semester, RFAs will focus broadly on *Development Engineering*. RFAs released during the Spring semester will focus on variable topics. The next RFA will be issued by UC San Diego in Spring 2014, and it will focus on Information and Communication Technology (ICT) for development.

* Applicants must have Principal Investigator (PI) status at a DIL-affiliated center or institute. Eligible PIs include those appointed at the University of California, Berkeley; the Blum Center for Developing Economies (with sites across the University of California); the Center for Effective Global Action (CEGA); Technology and Infrastructure for Emerging Regions (TIER) and the Mezuri Group; Policy Design and Evaluation Lab (PDEL) at the University of California, San Diego; the LBNL Institute for Globally Transformative Technologies (LIGTT); Centre for Technology Alternatives for Rural Areas (CTARA) at IIT Bombay; Global Change Programme at Jadavpur University; and select Colleges at Makerere University. Select non-affiliated researchers who have been notified of their eligibility may also submit applications. Note that funds may be used to support faculty-mentored students or collaborators beyond the immediate DIL network.



OVERVIEW

The Development Impact Lab (DIL) is an international network of innovators addressing global development challenges through science and technology. Funded by the U.S. Agency for International Development (USAID), the network includes researchers at the University of California (UC), the Lawrence Berkeley National Lab (LBNL), and select partner universities. The broader consortium includes non-governmental organizations like BRAC, the Aga Khan Development Network, Innovations for Poverty Action, and IDEO.org as well as partners like Cisco, IBM, Intel, Lemelson Foundation, Microsoft Research, and the Omidyar Network.

Over the next 5 years, DIL will conduct a series of grant competitions to identify and support scientific breakthroughs with the promise to improve livelihoods, welfare, and economic development in low- and middle-income countries. Funded research projects can fall at any stage along the innovation pipeline – from problem discovery and solution design, to prototyping and piloting, to rigorous evaluation in the field. In some cases, the Lab may also support translation or hand-off of a proven solution to scale-up partners.

Through its annual competitions, DIL also seeks to advance the field of *Development Engineering* (DevEng), a nascent discipline that formalizes the design of complex technological solutions for social and economic development. DevEng couples engineering innovation with novel market- or community-based interventions, to ensure that poor households can actually adopt and benefit from new devices, services, and infrastructure. This inter-disciplinary approach seeks to prevent major failures in the design of “pro-poor” technology, by tightly linking innovation with development theory and economic analysis.

A detailed example of the DevEng approach is provided in the Appendix. In broad terms, the discipline is being envisioned as a set of tools and techniques for addressing challenges in two areas:

- 1) The design of scalable “development solutions” that integrate technological advances with social and economic innovations; and
- 2) The reliable measurement of development impact, using novel technologies for continuous monitoring of intervention outcomes in the field.

Each of these research tracks is further described in the following sections.

Questions? Email dil-grants@berkeley.edu



TRACK 1: DEVELOPMENT SOLUTIONS

The innovation of new development solutions can be described as a continuous cycle of discovery, design, evaluation, and scale-up:

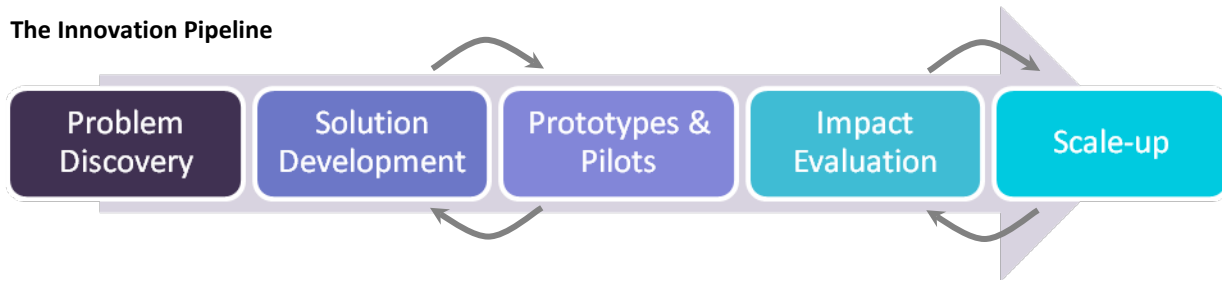
DISCOVERY: Development innovation begins with the observation of current practice—and the measurement of human development indicators—within a particular community, institution, or environment. Careful observation can reveal potential barriers to development (or opportunities for growth) that may be amenable to intervention. This “discovery” phase of research can be qualitative and focused, providing rich detail on the experiences of a few people; or it can be quantitative and representative, capturing trends across large populations. It can be a community-led and participatory exercise, or a researcher-directed process. In either case, the resulting observations are used to form theories, models, or hypotheses about the process of development—and how we might solve a particular development puzzle. While problem discovery is an important step, innovation can also begin with discovery of a breakthrough technology that could solve a previously identified bottleneck. Either way, the cycle of innovation begins with a process of *discovery* and hypothesis generation.

DESIGN: Once a development challenge is identified, the hypothesized solution must be translated into design parameters or product profiles; these are the technological, operational, and economic performance targets for the proposed intervention (tailored for a specific environment or context). Design parameters can derive from a need discovered in the field, or may be adapted from an existing technological innovation. Rapid, serial prototyping is used to develop and refine the solution, and pilots are used to guide redesigns and incremental improvements. Pilots are often carried out in idealized settings (for example, in laboratories or in well-developed field sites); however, a successful pilot intervention will necessarily advance to the next stage: rigorous evaluation in the field.

EVALUATION: Rigorous evaluation provides “proof of concept” for a new development solution, enabling us to quantify the impacts of the intervention in terms of beneficiary outcomes. Social scientists have developed a range of experimental and quasi-experimental techniques for evaluation of interventions at scale, in the “real world.” For example, some methods involve the comparison of a treatment group with a counterfactual or control group, using representative sampling and validated instruments to measure changes in outcomes. Evaluation results can be used to optimize the proposed solution and expose unanticipated consequences. In addition, the process of evaluation formally tests the theory or model underpinning the researcher’s approach. Careful evaluation, including both quantitative and qualitative data analysis, can enhance the likelihood that a new solution will succeed at a broader scale—because it articulates how and why the intervention works.

SCALE-UP: Proven development solutions are typically scaled up through partners, although this stage often benefits from continued academic involvement (known as “translational research”). For example, operating at scale may involve small modifications or tweaks to the product or service as it is rolled out. This creates the opportunity for rigorous evaluation of the solution in a new context, providing insights about the external validity (or generalizability) of a “proven” approach. Scale-up is often accompanied by high quality monitoring, to track ongoing performance and expose outstanding needs or bottlenecks. With the process of monitoring in place, the innovation cycle can begin once again—advancing from observation and discovery to solution design, evaluation, and scale-up.

The Innovation Pipeline



While the stages of development innovation are presented in linear fashion above, the process may in fact be non-linear, for example with continuous cycles of scale-up, evaluation, and further scale-up. Similarly, the discovery and design stages may occur in tandem, or as sequential cycles of iteration.

In this call for applications, research at any stage in the innovation pipeline can be supported.

TRACK 2: MEASUREMENT SOLUTIONS

A second element of DevEng is innovation in the measurement of development outcomes and the demand for (or use of) new products or services in low-resource communities.

Understanding consumers in developing countries is challenging, because of rampant market failures and lack of marketing infrastructure. In the Global North, market surveys, web logs, computerized receipts, and utility meters are used to track consumer consumption, preferences, and willingness to pay. This helps businesses and governments to develop, target, and refine their programs and products. In contrast, in developing countries there is limited capacity to accurately forecast demand. Low-income households are often excluded from markets, for lack of money; as a result, market-based surveys are inherently biased. Consumption trends are further distorted or obscured by corruption, limited access to financial services, high transaction costs, and missing public infrastructure (such as electricity or water).

To elucidate market demand within these constraints—and to understand the adoption, performance, and social impacts of new solutions in the field—requires innovative methods combining novel measurement technologies (like low-cost utility meters, data-logging sensors, and RFID) with econometrics and behavioral economics. These techniques can be used to measure the demand for private sector services, as well as the welfare impact of public services.

In this call, DIL will support research projects that advance the measurement of development outcomes, including the evaluation of social or economic impact as well as the assessment of consumer demand.

In summary, the DevEng approach aims to generate sustainable and scalable solutions that meet human development needs, while addressing the market failures and institutional breakdowns that are common in emerging economies. DIL’s annual competition is intended to seed new research in this field, by funding teams of natural scientists and engineers working alongside economists and other social scientists.



FALL 2013 GRANT ELIGIBILITY

To qualify for funding, applications in either track must meet the following criteria:

- Projects must be led by a Principal Investigator holding an appointment at UC Berkeley or another DIL-affiliated center or institute. If uncertain, potential applicants are encouraged to confirm eligibility by emailing dil-grants@berkeley.edu.
- Research teams and projects must reflect expertise in both science/engineering and economics/social science.
- Projects must focus on issues relevant to one or more eligible developing country. Eligible countries are defined as the nearly 100 countries in which USAID currently maintains a mission. For a list of these countries, visit <http://transition.usaid.gov/locations/missiondirectory.html>
- Requests may not exceed \$75,000 in total costs (for seed grants) or \$200,000 in total costs (for project grants). The performance period for each award may not exceed 2 years.

Projects in **Track 1 (“Development Solutions”)** are encouraged to demonstrate the following attributes:

- Alignment with the DevEng approach, including novel contributions to the discipline (e.g. new innovations, and techniques for design, piloting, rigorous evaluation or impact measurement).
- Compelling evidence of the development challenge to be addressed.
- Empirical evidence, theory, or model predictions suggesting that the proposed solution will address the identified development challenge, and will be better than other [existing] solutions.
- An estimate of user demand for the solution (if available), or a plan for estimating demand.
- Evidence or argument in support of the solution’s financial and environmental sustainability.

Projects in **Track 2 (“Measurement Solutions”)** are encouraged to demonstrate the following:

- A novel approach for measuring a relevant development outcome, in a “real world” context. This can include the performance, consumer use, or impact of a technology in the field. It might also include a difficult-to-measure human behavior that cannot be quantified using standard survey techniques.
- Plans to validate the novel measurement approach, or benchmark it, against existing techniques. An example is the design of a low-cost, wireless instrument to measure household water consumption; this could be benchmarked against self-reports from household surveys.
- Evidence that measurement of a particular outcome (e.g. technology performance, use, or social impact) is both scientifically important and relevant for public policy or private sector scale-up.

Projects may include both a novel development solution (Track 1) and novel measurement technology (Track 2).

Along with financial support, DIL will offer high-level technical assistance to its grantees, providing access to expert advisors and scale-up partners through an extended network of private, public and NGO leaders. For example, we can provide introductions to industry leaders in key sectors (i.e. telecoms in Indonesia, power utilities in Kenya, etc.) or requests for assistance from foreign government ministries.



APPLICATION INSTRUCTIONS

All applications should be submitted to DIL at dil-grants@berkeley.edu by **11:59 PM US Pacific Time on October 30, 2013**. The email Subject Line should read **"Fall 2013 RFA – [Project Name] – Application"**.

Please follow these instructions carefully when developing your grant application:

1. Applicants should submit all application documents in one email to dil-grants@berkeley.edu. The attachments should include:
 - a. Application Cover Sheet
 - b. Research Narrative
 - c. Budget Spreadsheet
 - d. Principal Investigator's CV
 - e. Letters of Support, if applicable
2. **Application Cover Sheet** must be completed using the Word template available at http://dil.berkeley.edu/wp-content/uploads/DIL_RFA_Fall2013_Application_Template.doc
3. **The Research Narrative** must include responses to all questions listed in the Narrative Guidelines. It may be developed with the Word template at http://dil.berkeley.edu/wp-content/uploads/DIL_RFA_Fall2013_Application_Template.doc OR with an editor of your choice. If a question is not applicable for you, clearly explain why. Text should use 11-point font and one-inch margins. It must not exceed 6 pages. No supplements, appendices, or additional materials will be reviewed.
4. **The Budget** must be developed using the spreadsheet available at http://dil.berkeley.edu/wp-content/uploads/DIL_RFA_Fall2013_Budget_Template.xls. It must include a brief written justification explaining the purpose of each line item in the budget. The total request must include both direct costs and any allowable indirect costs (based on your institution's Federally Negotiated Indirect Cost Rate Agreement). Sub-awards are not permitted. However, two organizations may apply together as a consortium; in this case, two separate budget spreadsheets must be submitted. Please **unlock** all spreadsheets and do not password-protect any sheets. The last tab has a sample budget filled in, for your reference.
5. Support letters are optional. Applicants may submit no more than 2 letters of support from collaborating institutions, scale-up partners, subject-matter experts, or policy-makers. Letters should be saved as a single attachment and included with the emailed application package.

Please note that DIL reserves the right to request additional information from applicants as necessary.

REVIEW PROCESS

Applications received by the submission deadline will be screened by staff for eligibility and completeness. A two-stage peer review process will be used to evaluate all eligible applications. The DIL conflict of interest policy is available upon request.



EVALUATION PHILOSOPHY

DIL seeks to fund projects that are committed to:

- Integrating social, economic, and technological innovation to solve development challenges;
- Fostering equitable collaboration between co-investigators in the US and in low- and middle-income countries;
- Conducting rigorous research that results in publication opportunities for doctoral and postdoctoral trainees;
- Contributing actively to the evolution of “development engineering” as a discipline; and
- The long-term vision to realize a sustainable solution with on-the-ground impact.

These are not strict criteria for the evaluation of applications, but they are principles to be considered when drafting your application.

OTHER CONSIDERATIONS

Multiple Submissions: Each PI may submit multiple applications under this call. There is no limit to the number of applications submitted by any given institution. An award made during this round does not preclude funding in future rounds of competition.

Human Subjects: Winning applicants with research involving human subjects will be requested to provide official approval of their research protocols by an Institutional Review Board (IRB) recognized by the University of California, Berkeley. Otherwise, the project PI must work with DIL staff to submit a protocol for consideration by the UC Berkeley Committee for the Protection of Human Subjects.

Support Letters: Letters of support are not required. However, if research or other work is to be done outside the US, applicants are encouraged to submit a letter from a host university or institution. Additional letters advocating the proposed approach or confirming the value of the research—from scale-up partners, collaborating institutions, policy-makers, or USAID staff—are welcome. No more than 2 letters will be accepted.

Eligibility: Applicants must have Principal Investigator (PI) status at a DIL-affiliated institution. Eligible PIs include those appointed at the University of California, Berkeley; The Blum Center for Developing Economies (with sites across the University of California); the Center for Effective Global Action (CEGA); Technology and Infrastructure for Emerging Regions (TIER); the Mezuri Group; Policy Design and Evaluation Lab (PDEL) at the University of California, San Diego; the LBNL Institute for Globally Transformative Technologies (LIGTT); Centre for Technology Alternatives for Rural Areas (CTARA) at IIT Bombay; Global Change Programme at Jadavpur University; and select Colleges at Makerere University. Select non-affiliated researchers who have been notified of their eligibility may also submit applications.



DIL 2013 RFA – NARRATIVE GUIDELINES

INSTRUCTIONS: in your Research Narrative, please include responses to the questions and prompts below. The narrative (exclusive of the budget and budget justification) should NOT EXCEED 6 PAGES. Do not include any additional pages; appendices and supplementary materials will be discarded.

1. **Project Name and Track.** Include a project name no longer than 4 words; this name will be used for all correspondence. Please also identify your application as falling within Track 1, Track 2, or BOTH.
2. **Summary.** Provide a short, one-sentence description of your proposed project. Note that “innovation” can refer to either a development solution, or an approach for measuring impacts.
3. **Development Challenge.** Summarize the challenge that your solution or approach will address. What is its scale and impact? How many people are affected by this problem? If possible, provide quantitative evidence of the need for innovation (e.g. disease burden, loss of productivity, or noisiness of current measurement approaches). Include references for data and assumptions.
4. **Approach.** What is the solution that your project will advance? How will it address your development challenge? What is your theory or model of change (and/or your hypothesis)? This section of the narrative should reference the scientific literature and any preliminary, unpublished results that have informed your approach. How does your approach translate into improved outcomes for the poor? Please include an estimate of the number of people expected to benefit from this solution.
5. **Innovation.** What are the innovative elements of your approach? How will this project advance current knowledge? Refer to the scientific literature. Why is your solution more promising (e.g. cost-effective, versatile, etc) than existing alternatives?
6. **Outcomes.** For each of the outcomes that you expect to measure, please provide a description of the measurement strategy and justification for the selected approach. If your project is experimental, describe the research design that you intend to use.
7. **Vision for Success.** What does success look like, both for your project and for your broader solution? What are some likely paths along which the solution can eventually scaled up? * What types of organizations are likely to fund and implement it at scale? Projects with a clear path to scale-up (including the identification of potential translation or scale-up partners) are particularly encouraged.
8. **Relevance.** How can findings from this project inform other development efforts or enterprises? For whom might this research be most valuable, and why?
9. **Project Plan.** Please outline a project plan with the following components: a) Key Activities; b) Timeline; c) Deliverables; and d) Milestones.

* Scaling up involves widespread uptake of products and services by target populations as a result of the solution being adopted by major service providers, implementing organizations, or enterprises (public or private sector or NGO).



DIL 2013 RFA – COVER SHEET

Project Name (4 words)			
Focus Location	<i>Enter the country or countries and region(s) targeted</i>		
Principal Investigator (PI)			
PI Email Address			
Secondary Contact Email			
Summary	<i>Enter a 1-sentence description of the development innovation proposed, in language appropriate for a non-technical reader.</i>		
Total Direct Costs (USD)	\$	Total Indirect Costs (USD)	\$
Total Costs (USD)	\$		
Project Start Date		Project End Date	
Institution Receiving Award*			

* Applications may be submitted to DIL directly by investigators, but please enter the institution that will receive grant funds.

Project team: Please list all co-investigators and field research partners on this project. Do not list a partner organization without an identified point of contact (i.e. Name and Title/Position).

Name	Title/Position	Institution	Country	Field/Discipline	Gender (opt)

Stakeholders: Please list the stakeholders for this project, including communities, government agencies, USAID operating units or programs, multi- and bi-lateral institutions, foundations, NGOs, businesses, academic researchers, etc. Do not list a stakeholder without an identified point of contact (i.e. Name and Title/Position); these should be individuals or organizations with existing links to your project.

Organization	Contact	Nature of partnership

Outside Resources: If your project directly builds on or incorporates existing infrastructure, equipment, funding or other resources, please list these below. For grant or contract funding, provide the project title, PI, and funding agency. You may include any other non-Federal resources (e.g. private grants, unrestricted funds) or third party contributions that are directly utilized by the project. Only include contributions with estimated dollar values, and describe how the resource supports your project.

Award or Other Resource	Estimated Value (USD)	Description (for award, include dates)

USAID Resources: if you have received or applied for any USAID funding or in-kind support for this project (or a related research study), please describe below.

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APPENDIX: AN EXAMPLE OF THE DEVELOPMENT ENGINEERING APPROACH



Over the last decade, the Government of India has invested millions of dollars in solar microgrid systems to provide electricity to hundreds of rural communities in Rajasthan. These systems (comprised of solar powered generators, storage, and distribution infrastructure) have been installed and maintained through contracts with public and private sector companies. A local entrepreneur is typically hired to operate and maintain each microgrid, to collect a flat monthly usage fee from each household, and to report any equipment failures. Yet this approach has been scaled without pilots or rigorous economic evaluation, as often happens in the development sector.

Within just a few years, much of the microgrid infrastructure has disintegrated. Many households eventually stop paying for electricity, or they simply connect their homes to the grid without registering. Faced with a steady loss of revenue, the entrepreneurs (many of whom are from other villages) leave their posts and return home. Batteries burn out, damaged solar panels are left unrepaired, and ultimately the grids stop operating at capacity.

These failures can be prevented.

Researchers believe that a sustainable solution for rural electrification will require household-level “smart” meters to enable pay-as-you-go consumption of power. This could reduce theft and expand access to electricity for households unable to pay a flat monthly fee. To optimize the mix of power generation and storage technology, designers also need to understand the consumption patterns and demand for electricity among rural households. They also need to provide the right incentives for entrepreneurs to operate and maintain the grids. A Development Engineering approach might include the following activities:



1. *Development of a low-cost smart meter to measure small loads on household connections to the grid.*
Better metering technology can enable pay-as-you-go service delivery. As demonstrated by the strong global demand for mobile phone scratch-off cards, the pay-as-you-go model (which allows consumers to purchase services in small increments) may be more appropriate for households with small, unpredictable incomes.
2. *Piloting of prototype meters and wireless communication systems, deployed in the local context.*
These pilots, implemented across a small number of microgrids, would enable testing and refinement of the technology and the design of a deployment and marketing strategy.
3. *Randomized evaluation of the solution at a slightly larger scale, to reveal impacts on human development.*
Randomized experiments with variable discounts in the cost of electricity would enable estimates of consumer demand and willingness to pay. This approach, combined with metering data, can reveal household user trends and the long-term performance of grids in the field. More accurate consumer information can be used to modify the infrastructure’s design and plan scale-up. A rigorous evaluation can also provide governments with information about the longer-term impacts of rural electrification—including important indicators like household income, schooling, health outcomes, time use, and livelihoods.
4. Steps 1-3 can be iterative and overlapping, until an optimal model for scale up is realized.