EXTREME
design for extreme affordability

2016-17



d. HASSO PLATTNER Institute of Design at Stanford

Stanford | ENGINEERING

STANFORD GRADUATE SCHOOL OF BUSINESS

User's Manual for Building Great Partnerships

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Introduction

Without great partners, the Design for Extreme Affordability course would not exist. In our thirteen year history, we have worked with 44 partners in 27 countries to complete 120 projects. We have learned from each of these interactions, and we value the continued friendship of our student and partner alumni. This document contains a distillation of the insights we have gained by working with our partners, and it is intended to serve as a 'user's manual' for prospective partners.

To quickly understand what partnering with the Extreme Team is like, here it is in a nutshell:

The course spans two academic quarters; it runs from January to June in Stanford's d.school. The class is composed of interdisciplinary teams of graduate students from many different departments at Stanford. It is co-taught by faculty members from the Business School and the Mechanical Engineering Department. The teams learn 'design thinking' and then apply it to projects that serve customers in developing economies. The results are a prototype and an implementation plan for a product or service that addresses the partner's design challenge.

We have two goals: every student has a great educational experience and every partner gets a great project outcome.

We partner with for-profit or non-profit organizations who work with us to design a product or service that serves the needs of the world's poor. We are seeking organizations who:

- Will commit to a relationship with our teaching team and our students;
- Can provide a bridge between needs and solutions through implementation;
- Are open to design thinking, an iterative process that starts from needs rather than technology.

Course Timeline (more on page 6):

July-September 2016: Teaching team and prospective partners communicate to determine the potential for a partnership (page 6).

August 15, 2016: Partners submit wish lists of project topics (page 6).

January 19, 2017: Partners join us at Stanford to introduce their wish list to the class (page 8).

End of January 2017: Students form project teams matched to partner wish list projects.

Second half of March 2017: Students visit the communities for whom they are designing (page 8-9).

April-June 2017: Students continue to work on their projects, with extensive partner interaction.

June 8, 2017: Private final presentations to partners followed by a public expo (page 9).

July 2017 through June 2018. Optional: for projects that are not immediately handed back to partners, students may receive support to continue work on their projects (page 10).

If your organization is interested in becoming a partner, keep reading this document and then draft a wish list (page 5) to send it to us at extreme@dschool.stanford.edu by August 15, 2016.

What is this course all about?

Design for Extreme Affordability ('Extreme' for short) is a two-quarter course sequence offered in the Hasso Plattner Institute of Design at Stanford (the d.school). The class is composed of interdisciplinary teams of graduate students in the fields of engineering, business, medicine, education, science, and other disciplines, and it is co-taught by faculty members from the Business School and the Mechanical Engineering Department. The teams spend winter and spring quarters learning 'design thinking' and applying it to projects for customers at the base of the economic pyramid. The design process focuses on identifying and meeting the needs, aspirations, and cultural norms of the world's poor.

Student teams have developed affordable lighting products, water storage, filtration, and distribution devices, irrigation pumps, well-drilling rigs, crop processing equipment, sanitation equipment, nutrient fortification equipment, medical devices for treating asthma, pneumonia, club foot, jaundice, and burns, joints for prosthetic limbs, and incubators for premature infants. Many of these products have been successfully launched and now are in the hands of hundreds of thousands of the world's poor. Several new for-profit companies and non-profit organizations have grown out of these projects. You can see more at the course website, extreme.stanford.edu.

An advertisement for a highly successful irrigation pump developed in collaboration with our partner in Myanmar.

How does Extreme work with partner organizations?

The success of each class project relies heavily on developing a strong partnership with an organization on the ground in a developing economy. Each partner collaborates on one to three design projects each year. The partner interacts with Extreme staff before the course begins to scope out potential projects, and then works with the student teams for five months. At the end of the course, students typically hand off their final designs to their partner organizations, who manufacture and distribute the products or deliver the service. We also offer the option of teams continuing to work with their partner for up to another year. If the partner wishes to be a consumer, but not a producer, of the product or service, we can help the team found their own organization or find a suitable production and distribution partner. You can see more on the partners page of our website: extreme.stanford.edu/partners.

What is Extreme looking for in a partner?

Commitment to a relationship

We want to form personal relationships with our partners. **We look for organizations with whom we can establish mutual trust, who are excited about working with us, and who want to see the partnership succeed as much as we do**. Specifically, we are looking for partners who will:

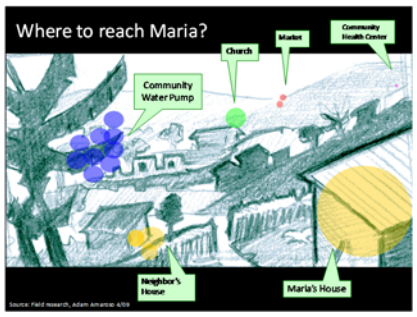
- Collaborate with staff before the class starts to set up the partnership.
- Collaborate with one, two, or three project teams from January to June.
- Communicate regularly with us through reliable email or phone links.
- Host staff and students who visit the partner's project sites.
- Travel to Stanford (either physically or virtually), once in January to introduce their projects to the class, and once in June to attend the final presentations.

Unique bridge between needs and solutions

Great partners combine two characteristics: **intimate connection to the needs of the poor** and **an ability to implement ideas on a large scale**. Some organizations that are closest to the needs may not have the capacity to implement a new product or service. Because the responsibilities of their position do not include new product development, they typically are not able to invest the time necessary to communicate with student teams. Conversely, organizations that are in the business of implementing new product ideas are better aligned with the goals of the student teams, but these organizations sometimes are insulated from the needs of the poor. **Our partners bridge this gap between need and solution**, because they have a strong connection with the poor they are trying to serve, yet are in the business of implementing new ideas.

Openness to design thinking

We are seeking partners who are open to following the design process wherever it leads. This often means not presupposing a particular solution to a problem. In addition to specific design projects, Extreme helps partners understand design thinking. Many partners have stated that this exposure often is as valuable as the products themselves, and it has revolutionized the way their organizations operate.



Example of staying open to design thinking: One year two student teams were commissioned to redesign a micronutrient fortification device to be attached to cassava mills in Rwanda. One team discovered that a significant portion of Rwandan communities did not have access to this food source, but virtually all the families pumped their water from a community well. The team designed a device that could be attached to the well pump-head to deliver a liquid supplement directly into the flowing water. Their partner demonstrated the flexibility to accept and celebrate their solution even though it was not what the partner originally had in mind.

Overview of the Time Line

1. **July-September 2016:** Communication with course staff to evaluate the potential for a partnership. Please contact us as early in this interval as possible.
2. **August-December 2016:** Course staff visit prospective partners to better understand the organization, the need(s) described in the wish list, and the environment students will be visiting.
3. **August 15, 2016:** Partners should submit their wish lists on or (ideally) before August 15. We will converse via email to fine-tune the descriptions. Receiving wish lists of projects in early summer helps us to publicize the course on campus and recruit students with the proper mix of skills.
4. **January 19, 2017:** Evening session with students and partners to describe the partners and their wish lists in more detail.
5. **End of January 2017:** Teams form and select projects. Communication with partners begins. Background research is performed, and early prototypes are built.
6. **Last Two Weeks of March 2017:** Student site visits with partners.
7. **April-June 2017:** Intensive work solely on partner projects. Teams will conduct regular email, Skype, or phone interactions with partners.
8. **June 8, 2017:** Final Presentations and Handoffs to Partners. Design Expo.
9. **July 2017 through June 2018**. Optional continued interaction with Partners (see page 9).

The Wish List

Submit by August 15, 2016 to extreme@dschool.stanford.edu

We rely on our partners to plant the initial seeds of the team projects by providing a 'wish list' of initiatives about which their organizations are enthusiastic. Successful wish lists typically contain three or four 'opportunities' or 'problems' upon which our partners want one or two student teams to focus the design process. A good candidate for a wish list item is something you would describe as, 'if only we had more time or personnel, we would ...' Don't worry about it being too mundane or ordinary; it just needs to **be of real value to your constituents.** Here are some tips on making a good wish list:

Find a balance between a broad scope and tight specification. The best project descriptions are broad enough to encourage creative need-finding, but specific enough to focus a team's attention so that they make real progress. For example, a project on 'improving nutrition' probably is too broad, while 'designing a more efficient cook stove' is a bit too narrow. 'Helping families obtain and prepare their meals more effectively' is a good balance. The opportunity to create value might be a better cook stove, but perhaps it's the fuel or the cooking utensils or the food storage and transportation systems. Students are more likely to stumble upon a truly innovative solution if we encourage need finding and exploration on a broad level. While we have had some teams come up with a reframed solution that looks very different from the partner's initial wish list, we have also had many teams whose final solution looks very much like what their partner initially scoped. The goal of this course is to find elegant solutions to existing problems, regardless of how that solution is achieved or where it originated.

Be candid about your organization's capabilities and aspirations. Your organization's in-house expertise and resources are key factors in deciding on the path forward. You should not hesitate to state clearly what your organization can and cannot do. For example, it is important for a team exploring crop irrigation opportunities to know that their partner has great metal-working capability, but does not have access to any plastic-forming equipment.

Include only those problems or opportunities that your organization would be enthusiastic about developing and taking to market (regardless of whether you will actually make or buy the designed product). Our students are serious about getting their solutions into real people's hands, and our most successful outcomes have arisen when our partner has been ready and willing to take the innovation to their constituents.

Provide your thoughts/plans for the future of a successfully delivered project. This will inform the students' project selection, help the teaching team predict outcomes, and increase the potential for a student team to develop a novel solution. Any or all of the information in your wish list is appreciated:

- Existing research or project plans (i.e., potential solutions already attempted and/or rejected).
- Level of interest, capability, and willingness to implement the project after the course concludes, including any timeline or resource constraint issues.
- Forecasts for the market size or impact that a successful solution might address (i.e., timescales, phases, geographies etc.), and how your organization plans to support implementation.
- Thoughts/plans on who would be responsible for taking a project forward. (See Pg. 9, The Handoff/Continuation).
- Thoughts/plans on a resulting student project's unique intellectual property (IP). This includes any initial IP issues, such as providing student teams with IP you already have developed. Stanford's intellectual property policies are administered through the Office of Technology Licensing, and are set up to allow the partner a path to develop and implement a solution, with or without further student interaction.

Providing the information above does not represent a binding commitment on your part, but will assist the teaching team and students in understanding your ideas and matching teams to your projects.

Example of a successful wish list: One year a team who worked on a wish list that identified 'food preparation' as a primary concern spent time in the markets where food is purchased, and they visited the makers of cooking utensils; they experienced the entire journey of food preparation. Having spent hours watching Ethiopian women prepare their families' food, they realized that the fragile mitads—the clay cooking surfaces used to cook Ethiopian injera—were a major problem. They often cracked or shattered after the slightest impact by a child or animal. Most families were forced to replace their mitad every three months; at a cost of $4.00 each, mitads were as expensive as a child's school fees. After building many prototypes, the team designed a metal band to fit around the mitad's edge, greatly increasing its structural resistance to damage, and extending its average life to two years. While no one saw this exact opportunity in advance, framing the wish list item as 'food preparation' provided ample scope for need-finding that resulted in a terrific product.

January Partners Dinner

Date: January 19, 2017

This class session is devoted to introducing the partners and their wish lists of projects. Some partners will attend in person, some by sending a US representative, some by Skype, and some by sending video clips or still photos. Of course, no one can tell your story better than you, so we encourage you to join us in person if you can. This event occurs early in the course, before the teams form and the international projects begin. Our purpose is to raise both our students' knowledge level and especially their excitement level about the partner projects, so that students will begin thinking and talking among themselves to see 'who wants to work on what.' In that way, teams form naturally by February, and many students already will have begun filling in the necessary background information.

The Perfect Team Visit in March

Dates Range: March 18, 2017 – April 2, 2017

We ask our partners to host a seven-to-twelve day visit by (usually) four students during Stanford's Exam Week and Spring Break, which occur during the last two weeks of March. Ideally, there will be two students from each of two teams, consisting of two men and two women, but some variation around the ideal is necessary to accommodate the team compositions and travel schedules that arise. In most cases, teams are able to arrange their winter-quarter exams such that they can have a bit more than a week in the field. Exact dates will be set in February, when we make airline reservations. We pay for the flights. We ask our partners to arrange and pay for ground transportation and accommodations, but we emphasize that our students do not need to stay in 5-star hotels. What they really need is a complete cultural immersion, by eating local food, attending religious services, shopping at the local markets, etc.

Here are activities that have worked well:

Homestay(s) - The purpose of the Spring Break trip is to allow students to gain empathy for the real people for whom they are designing products and services. Our students are seeking deep and focused need finding, rather than getting a broad or general sense of the country. For example, students will want to spend time with the people who might benefit from their solution. The perfect scenario would be to do at least one full day and night homestay with a family, in order to understand their access to electricity, light, food, shelter, water for irrigation, etc., in the full context of their lives.

Market Visit – It is very useful for need finders to visit local markets to observe and interact with the selling and buying part of a culture. What do people buy? How do they make their purchase? How often do they visit the market? How difficult is it to transport goods to and from the market? How do they finance their purchases? These observations are important to understand the current product and service landscape as well as to identify what's missing.

Partner Host Team – Students want to travel and work with the people to whom the eventual handoff will be made. Handoff means not only handoff of the project at the end of the course, but also the handoff or transfer of design thinking to the partner organization's staff. During the spring break trip, our students enjoy sharing their design-thinking mindsets and methods with the organization's staff, by conducting joint brainstorming sessions or working together overnight to craft a new prototype. The open-minded exchange of knowledge in both directions has been a component of the most successful visits for both the students and the partner staff.

'Side-by-side needfinding' **-** The staff member guiding the students on-the-ground should feel welcome to conduct need finding research along with the student team. It is important that the staff member is in 'learn-mode' rather than 'sell mode.' We teach our students to approach need-finding as an ethnographer. This means that you set aside all past knowledge and encounters with a person or culture, and you look at a scene through a beginner's eyes. This can be an awkward shift for a staff member who is used to working with this client-family every day and who feels that he or she can answer for the family, but the most surprising insights will emerge when everyone lets go of previous conceptions and engages with a customer through a fresh set of eyes and ears.

The Point Person – We encourage you to choose one or two key people in your organization as a 'point person' for the project. Our most successful projects have been developed by teams who had a specific point person on the ground (within the partner organization), who continue to keep the need-finding conversations going after the students travel back to the US. We also ask you to give a copy of this document to the point person so that he or she has this information and is comfortable offering us suggestions to improve it.

Implementation Plan Issues – Students construct both a working prototype of their solution and an implementation plan for launching it. To build the implementation plan, students must understand the socio-economic factors that affect end-users, existing sales and distribution networks, local manufacturing capabilities, raw material availability, and business practices such as the role of middlemen, access to market information, financing for large purchases, competitive products/solutions, import restrictions, and tariffs. The spring break trip is a great opportunity to explore these issues.

June Presentations and Expo

Date: Thursday, June 8, 2017

Each team will make a formal, half-hour presentation to their partner organization. These are conducted throughout the day (ten presentations between 9:00am and 5:00pm). Ideally, each partner has one or more representatives here at Stanford to receive the final report. These presentations are formal and are not open to the public. Partners can sit in on as many presentations as they wish, and/or spend more time during the day with their specific teams, asking questions, trying out the prototypes, or planning next steps. We video-record the presentations and each partner receives an online link to view, or a DVD copy of, their presentations, together with electronic copies of the final implementation plans. That evening, after the formal presentations are complete, we hold an open-house Design Expo, in which the public is invited to see the projects and meet the partners and the students in an informal celebration.

The Handoff/Continuation

At the end of the course in June, the teams present their partner with a prototype of their solution together with an implementation plan. From there, a variety of paths have been followed, some of which have included extending the partnership beyond the end of the course. We should emphasize that there is no specific expectation at the outset that a partner should commit to post-course participation, but we want you to be aware of this possibility so that you can let the idea simmer. At the other end of the spectrum, if the partner is uninterested or unable to take a project forward, then it is possible that the students will continue the project on their own. We do ask our partners to make a firm decision by mid-May about how they want the project to proceed, and what continuing relationship, if any, they want to arrange. Here are some possibilities:

1. **Handoff immediately to partner.** In this scenario, the student team makes a complete handoff to their partner in June, meaning that they provide the partner with their implementation plan, their final presentation, the prototype(s) of the product or service, and any other project materials that might help the partner implement their solution. This is a perfectly acceptable outcome, which occurs most often when all of the student team members are graduating immediately.

2. **Continue working with partner.** In many cases, several student team members are enthusiastic to continue the project with the partner. One project involved the re-design of Proximity Design's pump frame. The team created a simple tripod design that lowered the cost of the frame, made it more durable, and made it easier to transport. By the end of the course, the team had a working prototype, and the project was ready to set up manufacturing in Myanmar. One student traveled to Myanmar for the summer to support the roll out of the product. Four months after the course had concluded, Proximity was selling tripod pump frames to farmers.

   The typical time frame for the initial phase of continued projects begins in July and extends into September. Some team members may travel to the host country during the summer to complete the handoff. Some work may extend throughout the following academic year. Most continuing teams have been successful in securing funding from the Social Entrepreneurship Laboratory to defray the costs of continued prototyping and travel. We require that students produce one or more robust prototypes that are ready for field-testing before traveling back to the partner's site.

3. **New entities.** Some new for-profit companies have formed from course projects. One example is *d.light*, (www.dlightdesign.com). Several teams were working with Proximity Design on their wish list, which contained only irrigation-based opportunities. However, one team that visited Myanmar discovered that affordable lighting and power were huge needs for Proximity's customers, and the team was eager to pursue solutions in that space. Proximity's founders, Jim Taylor

and Debbie Aung Din Taylor, decided that it was worthwhile to allow one team to pursue an opportunity outside their organization's core competencies, and they cheered the team on. After the course, the team decided to continue to develop their product, and Proximity gave their blessing to the team to found *d.light* in exchange for a position as distributor of *d.light's* products in Myanmar.

In some instances, a non-profit organization may be the best economic structure in which to pursue implementation, but a for-profit partner may not be interested in that option. *Embrace* began as a non-profit entity founded by course members who decided to carry on their ultra-low-cost neonatal incubator project full-time after graduation. Embrace now consists of both a for-profit corporation (www.embraceinnovations.com) and a non-profit organization (www.embraceglobal.org).

Delegation

We understand that portions of the work associated with this partnership will be delegated to members of your staff, and we encourage you to do so. Most partners designate an existing staff member on-site to be the main liaison. Please give this document to all your staff members who will be involved.

Cost Sharing

Stanford will cover costs incurred by the students for prototyping materials or other equipment. The course also pays for the students' airfares during March to visit the partner organizations in the field. In turn, we ask the partner to arrange and pay for the ground costs (lodging, ground travel, translation, and some food expenses), understanding that our students want to share the lives of the real users as closely as possible. We do not expect lavish accommodations or sight-seeing tours. For the past six years, we have been able to raise funds to support teams that continue to work with partners after the course concludes; these arrangements are made on a case-by-case basis.

Ideas from Left Field

Occasionally students have conceived opportunities and solutions that are completely unexpected and that might go far beyond the realm of the partner's original wish list. The point of need finding and prototyping is to discover the unexpected—to experience the creative accident. You never know when you will trip over an elegant, pragmatic solution. To maximize the possibility of a creative outcome, we teach students (and we ask partners) to suspend judgment and criticism while in the need finding and ideation parts of the project. During the spring break trips, we encourage you and the student team to conduct one or two brainstorming sessions. Wild ideas from the field not only are encouraged, they are cherished. Try not to judge an idea until it has been (quickly) prototyped. Students will, of course, need to incorporate your organization's constraints when deciding which idea to carry through to implementation. But, at the outset of a project, we have found that hidden gems of great ideas are more likely to be noticed when we suspend judgment and doubt, and welcome the unexpected.

Once the student team returns to Stanford, refines their problem definition, and starts to produce more complete prototypes, it still may be the case that the team's direction is not completely aligned with an organization's capacities. Our course is based on partnerships with strong organizations, and we work with the teams to ensure that they honor your constraints and work within your organization's capabilities. This requires candid and forthright communication and as well as open minds on everyone's part. Perhaps this was not the solution you had envisioned, but with a 'twist here and there' it still could make a huge impact on those in need. Is there a way to secure the resources necessary to implement a solution, perhaps by reworking the team's implementation plan? Is there a way for your organization to play a major role in implementation by forming an alliance another entity? While setting off to solve one problem, it's entirely possible for you and your teams to come across a GREAT solution for another problem. Design thinking just works that way.

A Note on the Partner/Student Relationship

Some partners have asked us, 'Aren't the students working for me?' During the course itself, it helps to think of the interaction as a partnership, rather than a consulting relationship or internship. You are bringing in outsiders because they have fresh eyes and fresh ideas. This can sound great at the outset, but at times it can be uncomfortable and disconcerting as naïve questions and ideas bubble to the surface. Students are motivated by the possibility of solving big problems, and they realize that making a real impact requires a strong partner on the ground who is capable of implementing a solution. They are passionate about helping their partners break through their current constraints.

Improving as We Go

The course and the projects that we conducted in 2016 were hugely different from those in 2003, on every dimension. We view the course as a continual 'prototype in progress,' and every year we learn how to improve almost everything we do. We learn faster when our partners take ownership in the course and share their insights with us about how we can do a better job on our end (for example, by suggesting that we write this document and encourage our partners to share it with their staff). Our mission statement has only two elements: to help our students learn, and to help our partners succeed. Your insights contribute to both goals.