The Challenge Lab Model for Entrepreneurship Education: Solving Real-World Problems in a Competitive and Catalyzed Environment

Introduction

Sparked by political push[1] and dire warnings from industry[2], innovation and entrepreneurship has found its way into engineering education[3]. The resulting marriage (or at least the courtship) has been cultivated across academe through a wide variety of initiatives--from individual courses that introduce business concepts to engineers, to University-wide centers that promise exposure to entrepreneurial concepts as well as support for nascent student start-ups, to strategic initiatives like the privately-funded Kern Entrepreneurship Education Network[4] and the NSF-funded EpiCenter[5].

The Center for Entrepreneurship & Technology (CET) is one such initiative. Established in 2005, CET is an academic center within the University of California Berkeley College of Engineering, with a mission to equip engineers and scientists with the skills to innovate, productize, and commercialize technology in the global economy. The Center offers educational programs in entrepreneurship and innovation, including the undergraduate concentration in Engineering Leadership. Courses are taught using an approach favoring experiential activities, game-based catalytic exercises, and competition-based learning over prescriptive methods like lecturing and case study.

Within this already experiential rich environment, the Challenge Model for Entrepreneurship Education is being developed. The model is simple in principle; multi-disciplinary student teams compete in a tournament style format to develop a product, project plan or start-up idea that addresses a real-world need. The model is meant to accommodate a wide range of challenges, defined by the source of the challenge and the need that it addresses. Challenges could be externally generated, for example through an industry partner, or self-originated by students following their own opportunity recognition work. The need addressed by the challenge could be industry or market-based, or societal in nature.

While top performing teams are likely to carry their ideas to market, the explicit goal of the course is not to create student start-ups. Instead, the course aims to help students understand the entrepreneurial context of problem solving and how it can create better outcomes—i.e., "working the problem". A key element of this approach is to help students identify the best role for themselves within an entrepreneurial organization or team—leadership or operational—and what is needed to fulfill that role.

Challenge Lab courses are not meant as stand-alone courses on entrepreneurship, but rather as experiential complements to more traditional course offerings that educate students on the process. Hence, it fits well into the framework of the Engineering Leadership Concentration offered by the CET.

In this paper, we will focus on challenges that are externally sourced that address an industry or customer need. First we will describe, in general terms, the ideal model for this type of

challenge, the model that will be used in courses starting in 2014. This will be followed by a discussion on the evolution of this model based on experiences from the first two Challenge Lab course offerings. Finally, we will describe the benefits of such a course for students and industry.

Challenge Lab Concept

In Challenge Lab courses, students work in simulated start-up teams designed to create product prototypes, product plans, or start-up ideas to address a broadly-defined societal or market need. Within the overall goals described above, the four specific student outcomes are:

1) Gain experience with effectively refining ideas and pivoting based on feedback and external factors.

2) Gain experience building effective teams to develop and execute an idea.

3) Become comfortable with failure and how to adapt from failure.

4) Become adept at succinctly communicating ideas in terms of value proposition and business viability.

Challenges:

The real-world problems offered to students are called challenges, and for externally sourced challenges, are developed jointly with potential partners. At a minimum the sponsor provides core business requirements that drive the students to a real-world solution. Additionally, partners can participate through product management guidance, board meeting participation and feedback, stakeholder interviews, technical resourcing, competition judging, and required product licenses.

The course model can accommodate a variety of challenges, providing the flexibility to address a range of partner needs. The scope of the challenge can include the following (listed in order from most broadly defined to most narrowly defined):

- Platform challenge: Develop product and business ideas that leverage a new or existing platform. The final outcome of these types of challenges is a logical business plan.

- Market challenge: Develop product ideas to capitalize on a known, specific market need. The final outcome of these types of challenges is a product management plan.

- Product challenge: Develop a product to meet a specific customer need. The final outcome of these types of challenges is a product prototype.

Even for the more narrowly defined product challenges, the requirements are defined in a broad sense, providing room for creativity and differentiation among the competing teams. Likewise, even in the more broadly defined challenges, teams are expected to develop some level of product prototype that can demonstrate the key value proposition.

Course Format:

The course is based on an iterative problem solving approach, loosely following the Lean Startup methodology[6]. The course is structured into 4 iteration cycles throughout the semester, each

ending in major pitches in simulated Board Meetings. The iterative framework is spiral in nature (as opposed to incremental), moving from basic concept/ideation to Minimum Viable Product to final outcome (i.e., business plan, product management plan, or product prototype).

Feedback for driving the refinement of a solution is provided on several levels.

- After each iteration cycle (every 4 weeks), the Board members provide feedback on the business and technical viability, and value proposition.
- Within each feedback cycle, students practice their pitches, at least once, and the instructor and students provide feedback on topics aligned with the mini lecture modules. Pitches are designed to expose students to the 1, 5, 10 and 15 min pitch formats.
- On a weekly basis, students communicate with one or more technical mentors-- domain experts that can guide the students in understanding and incorporating technology and/or domain knowledge into their solutions.
- Students pitch their ideas to potential customers and elicit feedback.

The Board is a critical aspect of the course model, with their main function to provide detailed, insightful and actionable feedback that the student teams need to guide their concept development and pivots when necessary. They also act as an external reality check for student teams, and provide a real-world context to the course. As such, the Board should include individuals that are knowledgeable in the specific product domain and market, and/or are experienced in venture capital investment in new ideas. This should include representatives of the challenge partners, but is not necessary.

In addition to pivots and course changes that arise as a result of feedback, real-life interrupts (or curve balls) are introduced strategically during the semester to force teams to rapidly adapt their concepts and approaches. These forced pivots typically take the form of changes in requirements or narrowing the scope or market. The intent of these is to prepare students for the type of external or board level disruptions that are inherent in real-life entrepreneurial organizations.

The weekly class meetings consist of four, 25-minute segments. Segments include any of the following (in various combinations):

- Team pitches and feedback to the class. These range from 1-minute elevator pitches to 15 minute extended pitches.
- Mini-lectures on entrepreneurship topics, ideally synched to project activity. These include ideation, Lean Startup process, teaming, pivoting, presentation, culture, managing adversity, business and revenue models, and marketing.
- Catalyzed learning exercises that highlight the elements of the Berkeley Method of Entrepreneurship framework. These are mostly in the form of games that focus on the social aspects of entrepreneurship such as teaming, trust, communication, and roles.
- Presentations in Board Meetings. These are 3-minute pitches with 7 minutes of Q&A.

Though the class meetings provide some value, the vast majority of the workload, as well as the student learning, occur outside the classroom. Team meetings, customer development, advisor meetings, and prototype development all require significant student effort and commitment, and that high level of effort leads to a self-selecting, high performing cohort for the course.

Despite the workload, the course has attracted students from all over the University, with over half from engineering or computer science. This helps achieve the goal of fostering interdisciplinary solutions by distributing both the technical skills and business skills among all of the teams. Teams form by self-selection, based on interest around specific student-generated ideas. Diversity of skills on each team is also self-selecting and promoted through student discussions and interactions during early course activities and catalytic events. The instructors avoid active shaping of teams whenever possible, but minor tweaking may be necessary to avoid technically-biased or business-biased teams.

Tournament option[1]:

Competition is a given element of product or business development, both externally from competing companies and internally within larger organizations. The Challenge Lab model simulates this competition through a tournament style format that features team eliminations and rewards for the winners.

All initial teams participate in the first two iteration cycles (half of the semester), with members of these teams considered Founders. The outcome of the second Board Meeting is an initial cut that eliminates the weaker teams. Members of the cut teams than must get "hired" by the remaining teams, with a requirement of 100% employment. Part of the class immediately following the initial cut is an open market, with job seekers meeting with potential new teams to market their talents. The rehired students are considered Employees, rather than Founders.

A second cut follows the third Board meeting, with the remaining teams competing as finalists. The finalists can then hire students eliminated by the second cut as Consultants. However, it is not required that all eliminated students be rehired. The final module is then a competition among just the finalists, who share in a bonus grade "pool."

This competition format creates an environment akin to open innovation competitions. In such innovation competitions that specifically focus on generating revolutionary or highly innovative ideas (as opposed to evolutionary ideas), two elements have been shown to help promote the best outcomes: limiting competition to the strongest competitors and providing strong incentives[7]. The Challenge Lab encompasses these elements in the following manner:

- The primary incentive is provided through tangible prizes and bonus grades to the winning teams. The tangible prizes have included trips (funded by industry partners) as well as the adoption of winning products by the partners. Only the Founders of the teams earn prizes, but Employees and Consultants are eligible for any share of the grade

[1] The Challenge Lab model will work best with the tournament style elimination format described. In practice, any competition format, including non-elimination types, could be used as long as teams are competing against one another on the same challenge for some specified prize.

bonus pool that their new teams earn, incentivizing continued engagement even after a team is cut.

- Limiting competition is difficult in a classroom situation. However, multiple round tournaments in an open competition, in which the weaker teams are cut, provide a similar incentive to strong competitors in a limited competition[7].

Evolution of the Course

The Challenge Lab has its roots in a Mobile Applications and Entrepreneurship course that was taught out of CET since 2005. The idea was to create an instructional model that captured the competition and catalytic elements of the mobile apps' course, but was expandable to a broader range of challenges.[2] The development of this new model occurred over two semesters, with the development process itself following a Lean-type methodology—i.e., development occurred through the course offerings with feedback from students, instructors and other stakeholders used to drive refinement of the concept.

Initial pilot test, or the Minimum Viable Course (MVC):

The Challenge Lab concept was first introduced in Spring Semester 2013. Figure 1 shows the scheduled meetings for the course. Note that this was created in retrospective, based on the actual rather than planned activities. Consistent with the idea of a Minimum Viable Product, the course was loosely structured, focused on only a few key elements to test the basic value proposition.

- *Partner-defined challenge*: Students were tasked to create an interactive on-line platform for Berkeley's technology & entrepreneurship community. Teams were given a broadly defined Product Requirements Document (PRD) that provided a high-level description of the customer need. The lack of details was intentional to allow differentiation among the various solutions. A staff member with CET was assigned the role or Product Manager (her actual job title) and played an active role in the course, including close interaction with all teams.

- *Competition among teams, incentivized through award*: 11 students were handpicked based on previous performance in CET courses and programming/Web development reputation. The students organized into 3 teams—one team of 3 and two teams of 4. The winning team was offered part-time employment over the summer to fine-tune their design that eventually became the new Website for CET.

- *Stakeholder input and feedback*: The target users included a number of different stakeholders and user cases—students, faculty, mentors, staff, alumni, and potential investors. Two early class meetings were devoted to stakeholder interviews, so that teams could prioritize their development efforts. Stakeholders also provided feedback on prototypes, both front and back-end.

[2] Starting in Fall 2014, the mobile apps course will become one of the challenges offered through Challenge Lab.

- *Interrupts and surprises*. The initially unstructured format of the class combined with broadly defined product requirements proved to be a challenge for the students. Early in the semester, the surprises came weekly, mostly in the form of the deliverables required for the following week. Based on student feedback, these didn't force any major pivots or course changes, but did disrupt project schedules as they took time away from planned development work in order to produce the specific deliverables. As the semester progressed, the Product Manager provided more structure to the course, assigning priority to specific product features.

- *Minimum prescriptive activities*: Less than a quarter of the class time throughout the semester was devoted to guest lectures or catalyzed activities. These are shown in the schedule in Figure 1.

Based on a course survey and reflection exercise, as well as the regular course evaluation form, the key lessons learned were as follows:

- *Provide more structure to the course, but keep the broadly defined requirements.* The syllabus should more clearly define the steps in the overall process to better guide the students through development.

- *Include lectures and activities more relevant to the development work.* As a complementary, rather than a core, entrepreneurship course, the Challenge Lab should focus on topics and activities that are more relevant and better synchronized to the project experience.

- *Introduce fewer surprises and provide advance warning:* The frequent surprises and curve balls were confusing, and shifted student focus too far away from the actual product development. Schedule surprises into the course syllabus, and provide better preparation and debriefing regarding pivots.

- *Be more up front regarding the required commitment*. Warn students during the first class meeting about what the course would require-- significant teamwork, stakeholder and mentor interactions, and a fast-paced, compressed development schedule.

Scaled-up Beta test:

An improved Challenge Lab model was tested during Fall semester 2013, incorporating lessons learned from the pilot test. Two different challenges were offered in different sections. One challenge focused on Social Entrepreneurship (SE), partnered with Ashoka Thailand, part of a worldwide social entrepreneurship network, with the goal of developing products for Thai-based SE startups. The other challenged focused on Big Data, partnered with TerraCotta, with goal of developing product concepts for their in-line memory platform. The Big Data challenge was a broad-based one, with an emphasis on the process of going from idea to a pitch-able product. In contrast, the SE Challenges was more product-oriented, emphasizing development of testable prototypes for a specific customer need.

The syllabus and schedule for the two different sections are shown in Figures 2 and 3, but only the Big Data challenge will be discussed in this paper, as it better aligned with course model described earlier. The key elements of the Big Data challenge are described below.

Teams: The challenge engaged 24 students, organized in 5 teams. Teams were formed during the second class, in a highly interactive and frantic exercise. Students were told to bring ideas to class, and those with ideas wrote them on the boards and recruited other students to their team. Four teams formed quickly, while the remaining students struggled to agree on a specific idea. The fast-pace of the exercise was intended to introduce students to the compressed nature of the course, and to help identify which students were best suited for the course. One interesting development was how often one teams "founder" would consolidate a team, then switch at the last minute causing a reshuffle of teams. Pitches to recruit students were 1 min or less to capture interest while still allowing time for students to shop around.

Teams were given one week to reconfigure, but no teams changed after the initial team formation. Figure 4 shows the five initial ideas, any notable pivots, the final ideas, and the performance of the team in the tournament.

Pitches: Teams pitched their ideas in some form in 9 of the 15 weeks of the semesters, in 1, 3 and 5 minute formats. The pitches evolved from basic ideas through Minimum Viable Product (MVP) through business plan. Feedback was provided on both the idea and the quality of the presentation. Teams were allowed to choose their best presenters for the pitches, consistent with a real VC-pitch situation.

Board Meetings: Formal pitches to the Board were scheduled in the 5th and 11th week (open to all students) and to just the Board (closed) in the 13th week. The Board consisted of a CEO and COO of Total Phase, an embedded systems company, and a representative of TerraCotta as the third member.

Unfortunately, the initial Board Meeting was cancelled due to scheduling problems, and replaced with a pitch to the instructional team. This proved critical, as the students were unprepared for the harsher criticism and feedback (compared to in-class pitches) when they met the Board in the 11th week. At that meeting, the Board was tasked with evaluating the ideas as a VC with a decision on whether the team would get a second meeting. Though delayed, the cathartic experience proved to be a motivating factor, with all teams addressing the key issues identified in the earlier meeting, and demonstrating more mature ideas and higher quality pitches in the final board meeting

Forced Pivots: One curve ball was introduced during the sixth week to force team's pivot. Up until that point, teams had been working under a requirement that their idea should utilize some aspect of the TerraCotta suite of products. The curve-ball thrown at the students required the teams to use as many of the platform products as possible and specifically to include a real-time data element that would best leverage the speed advantage of the in-memory aspect of the platform. A TerraCotta representative introduced the curve ball, both in a general sense to the entire class and through specific feedback to each team after 1-minute pitches. In the 7th week, the teams presented 3-minute pitches highlighting how they pivoted and in what way, if any, their MVP had changed.

Team cuts and realignment: There were 3 elimination rounds in the tournament style competition. The first cut occurred in the 2nd week, and was an elimination of ideas rather than teams (see *Teams* section above).

The second cut came in the 9th week, and was based on 3 factors: (1) how well the team pivoted as a result of the curve ball (presented in week 7); (2) the quality of their product presentations in the 8th week, specifically how well it highlighted the value proposition as well as demonstrating the user experience; and (3) the overall progression of the team over the first half of the semester. A single team was cut, and the cut was announced in front of the class (the cut team's choice over a private debrief). A specific rationale was provided, and the subsequent discussion was highly supportive, focusing on the importance of learning from failure and reminding the remaining teams that two more would eventually be cut. Students that were cut then circulated among the other teams, marketing their skills and background. Though not required, the four cut students migrated to different teams—one to each team.

The final cut was made from four to two teams based on the public presentations in the 15th week (semi-finals). The cut was made by a panel of three judges: consisting of one Board member, a faculty expert in data science and Director of a major University center, and a Managing Director of an accelerator for enterprise start-ups.

The final cut came less than one week before the two finalists presented to the Board and three other TerraCotta representatives. Unfortunately, due to this compressed schedule, only one of the cut team members was hired as a consultant by a finalist team.

Gap Analysis: After the team cut in week 9, the remaining teams were evaluated based on criteria similar to what a VC would use to assess early stage start-ups (Figure 5). This analysis helped identify the team's weaknesses and strengths, and provided guidance for prioritizing subsequent development efforts.

Student reflection: The Challenge Lab is almost entirely experiential based, with minimal prescriptive instruction. But, experiential learning is only effective when students take time to reflect on the knowledge and skills developed through the hands-on activities. Students were required to turn in two self-reflection assignments. The first was an individual essay describing how the course helped to develop entrepreneurial knowledge and skills that were provided as a general framework. The second was a team video, highlighting both the teaming experience and the individual learning experiences.

Instructional team: The instructional team encompassed a diversity of skills and background, consisting of 3 individuals. A lead instructor managed the academic and pedagogy aspects of the course; this individual was a faculty member experienced in teaching project-based courses to engineers. A business mentor (Entrepreneur in Residence at CET) proved to be the most critical member of the team, providing weekly guidance to the teams, managing the overall development process, connecting students to relevant industry advisors, and teaching many of the lecture modules; this individual was experienced with both operational and leadership roles in both start-ups and established companies, with deep connections within the local business and technology community. A technical mentor guided students on the data science aspects of the project, including available data sources and algorithms; this individual was not only highly skilled technically, but was a veteran of innovation and entrepreneurship at Berkeley and within the local community, and provided valuable business-related feedback and industry connections for the teams.

Though the Big Data challenge of the Beta test proved popular, feedback from the students, mentors, and the industry partners indicated additional improvements were needed to the model.

Board meetings are critical: An early board meeting is essential, to provide the right level of expectation and expose students to external criticism and feedback. An additional board meeting has been added for subsequent courses.

Provide more activities around teaming: Team dynamics was the one issue that appeared the most in the self-reflection essays. In particular, students struggled with establishing roles and hierarchy within their teams. More activities early in the semester should be designed to help students form more effective teams and better navigate teaming issues.

Make the last cut earlier: The finalist teams need more time before the final presentations, both to differentiate themselves and to hire and incorporate potential consultants from cut teams. The iteration cycle has been changed from 5 to 4 weeks to allow for an additional cycle and more time between the semi-finals and finals.

Evaluate technical as well as business accomplishments: All grading was based on pitches, and focused on business viability, with little scrutiny of the technical quality of the products. Technical evaluation of prototypes will be required in the future.

More one-on-one time between mentors and teams: Use more class time to allow the instructional team to meet with teams, to informally discuss their ideas and provide feedback, and also to perform periodic gap analyses.

Benefits of Challenge Lab Format

To better understand the unique aspects of the Challenge Lab Model, it is worth examining current models for entrepreneurship education at the University level. These include the following.

- Bootcamps: short, intensive learning environments usually with lectures, speakers and case studies.
- Full semester, prescriptive-based courses: Essentially extended versions of bootcamps but possibly with experiential components such as highly-focused active learning modules and project-based activities.
- Industry/Clinical Immersion: teams work closely with real customers to identify opportunities and develop solutions.
- Business development courses: highly experiential, with the goal of facilitating initial development of student startups.
- Student competitions: co-curricular contests including business plan competitions, case competitions, and product design competitions.
- Accelerators/incubators: co-curricular programs for promising student businesses.

The Challenge Lab model combines the outcome-focused experience of immersion courses, and business development courses, but within a more controlled, safe, and supportive environment. The course simulates the early phase of concept development, in a competitive format that is similar to open-innovation style tournaments, and provides catalyzed activities and student reflection so that implicit learning can be better controlled and monitored.

What is the value of this course to industry? Industry benefits when students have practical experience. Our course binds a real business requirement to an industry-defined challenge. We further simulate the compressed and often difficult early stages of ideation, team building, and execution to accomplish this goal. This creates an experiential approach inductively teaching the students through a catalyzing format. Students are driven to compete through teams, and possibly against other teams, while responding to an industry challenge.

The Challenge Lab builds on the instructional format by providing requirements and constraints to the students based on actual use cases. Using the challenge format, students are given objective goals much like an investor or business partner would in industry. Students have to decompose the requirements into working ideas that shape the entire semester and define the outcome. Students compete determining the best business plan, product management plan, or prototype product(s) with a chance to earn rewards. Rewards are designed to enhance the challenger partner's needs-- presenting the winning idea to C-level executives, meeting remote engineering teams, or critical stakeholders.

Team dynamics are established throughout the process; starting with the ideation marketplace. Students present ideas in an open format working to persuade others to join. As others join, a core team is formed called "Founders". These core founders are eligible for the industry prize at the end of course. Later in the course, we allow students to align and augment the founding team. This creates the natural tension in startups of Founders vs. early employees. As teams develop, some teams are cut midway through, while others are cut near the end. The first cut is 100% employment. Founding teams must hire / absorb all students in the labor pool. This hiring is staged early enough in class that it's imperative to develop solid team skills that both maintain the core founders integrity while transmitting the vision / mission to new members effectively. The last cut leaves a pool of students that can be hired, left as consultants, or remain free agents until the end of class. Free agents become judges for the final selection at the end of class. This simulates the standard business practices found in most large business, and almost all startups. Students often come to the class in a consensus-based style of management, but leave with a role based execution.

Students are shown they can fail. The core method of cutting students groups during the course reinforces the sometimes-ruthless necessity to manage resources. Demonstrating that even good ideas get eliminated due to budgetary or time constraints. This "failure" is reinforced as a win. Brief lectures discuss the management or investment reasoning for maximizing returns or minimizing losses. Discussions around how to manage success are easy, discussions around failure and damaged moral is a key learning from this segment. In the end, all groups pivot or find themselves locked out by the competition.

Students learn to pivot. No idea is born complete. Market conditions change. Investors lose interested in a solution. When these things happen, a good group knows how to shift and make

success out of failure. Not losing what your core mission is, but knowing how to deliver it in an environment of constant change is critical. It's this fundamental tool that allows us to generate a "Curve ball" in the course. This curve ball is in addition to the team cuts and other shifts that occur in class. This curve ball is designed to influence the students like any market does. We can highlight or leverage a group to pivot through real or imagined forces that instructors can apply. These challenges can be team, product, or market related. As in business, when conditions change, teams need to be flexible and responsive. All too often, Industry is saddled with project managers that are devoted to an idea and won't deviate. Our class instills the experience though a catalytic event.

Presenting skills are refined by building up student confidence. They start with 1 min rushes and work their way up to 5-minute technical formats. Each section ends in a "board meeting". This drives the students to face an objective audience. In addition to the basic presentation skills there is a unique Question and Answer lesson provided. The last presentation is focused on selecting the "winner" addressing all the key points of the challenge and learning of the class.

As the students face these challenges while each instructive session reinforces how the class event tie back into a real world business events. This cause and effect training reinforces our strategy of Catalytic and experiential learning.

Bibliography

1. http://www.whitehouse.gov/issues/economy/innovation

2. http://www.forbes.com/sites/ciocentral/2011/01/20/danger-america-is-losing-its-edge-in-innovation/

3. T. Byers, T. Seelig, S. Sheppard, and P. Weilerstein, "Entrepreneurship: Its Role in Engineering Education," The Bridge, 43(2), 2013 pp. 35-40.

4. T.J. Kriewell and K. Makemson. "Instilling the Entrepreneurial Mindset into Engineering Undergraduates", *J. of Eng. Entrepreneurship*, 1(1) 2010 pp. 5-19.

5. http://epicenter.stanford.edu/

6. E. Ries, *The Lean Startup*, Crown Business, 2011.

7. J. Morgan and R. Wang. "Tournaments for ideas." *California Management Review* 52 (2) , 2010

Wk	Dates	Lecture/Speaker	In-class Actviity	Meetings	Surprises	Assignments
1	1/22	Introduction/expectations				
2	1/29	Teambuilding		Wireframes		Wireframes
3	2/5	None	Stakeholder meetings	Lesson Learned from Stakeholders		Q&A for stakeholders
4	2/12	Design	Coding test; Stakeholders mtg	None	Stakeholders mtg; Working Prototype; Project Plan	Working Prototype; Project Plan
5	2/19	None	Project Work	Informal Meetings, incuding Ken	Prototype of Cet Certificate	Working Prototype of CET Certficate
6	2/26	None	Project Work	Present New Deliverable Schedule	Weekly Deliverable Plan	First Weekly Deliverable Application; Survey
7	3/5	Infrastructure Setup	None	Demo, Q&A with Eric	None	Weekly Deliverable
8	3/12	Hiring:	Hiring Exercise	None	None	Hiring Module: Analysis of videos
9	3/19	Emotion and Web Design:	Videos and student discussion	None	None	MVP^0
10	3/26	**SPRING RECESS**				
11	4/2	Stakeholder Persons	Persona Profile	Mostly Q&A	New 3-7-10 Deliverable Schedule	Front end for all static content
12	4/9	Design Thinking	Empathy Exercise	Status report relative to Non-negotiables	Non-negotiables; Updated 3-7-10 Deliverable Schedule	MVP^1
13	4/16	None	Project Work	Review with instructor; Demos for Chief Scientist	None	MVP^2
14	4/23	LEMON Leadership, et al, Cindy Chien	Ad hoc discussion re: course learning objectives	Pitch to visitors	Pitch to visitors Reflection Paper	None
15	4/30	Tips on Pitching; Reflection on Learning	Pitch to class; Reflection Paper	None	Pitch to class Tsinghua student visit/participation	Final Product

Figure 1: Syllabus and schedule for initial pilot test of Challenge Lab course model, Spring 2013.

Wk	Date	1st Hour	2nd Hour	Activities	Assignments for following week
1	29-Aug	Intro to industry challenge	Platform intro an ideation	Ice Breakers; Ideation	Ideation
2	5-Sep	Lean Startup intro	Choosing ideas	Team selection	Action Plan
3	12-Sep	Team dynamics and leadership	Action Plans	Roles assignment	Prepare presentation: customer & value offered
4	19-Sep	Solution Proposal	Solution Proposal	Present & critique proposals	Prepare presentation for board based on feedback
5	26-Sep	Board Meetings (OPEN format)	Board Meetings (OPEN format)	Presentations & Board review	Strategic alignment document (BOD input)
6	3-Oct	Project Management and Execution	Curve Ball	Brainstorm on curve-ball	Develop pivot strategy
7	10-Oct	Curve Ball debrief	Curve ball pivots	Present pivots	Develop Product Prototype
8	17-Oct	Art and Science of presenting	Product presentations	Product Presentations	Constraints review (e.g. Platform)
9	24-Oct	Presentation Q&A or how to think on your feet	First Cut, team reassignment	Open market for team reassignment; CEO side bar with Gap Analysis	Rules for re-hire 100% employment
10	31-Oct	Marketing	Marketing	Gap Analysis	Create solution deployment plan
11	7-Nov	Board Meetings (OPEN format)	Board Meetings (OPEN format)	Board Presentations	Reflection essay and Team video
12	14-Nov	Reflection- learning outcomes	Reflection- learning outcomes	Learning outcome discusssion; team videos	Prepare presentation for board
13	21-Nov	Board Meetings (CLOSED format)	Board Meetings (CLOSED format)	Presentations & Board review	Prepare presentation
	28-Nov	HOLIDAY			
14	5-Dec	Lecture-- how to integrate team members	Class Party		
14	7-Dec	Presentations	Choose finalists Reconfigire teams	Presentations; Open market for reassignment	Finalists prepare final presentations
15	13-Dec	Final Presentations	Final Presentations	Presentations	

Figure 2: Syllabus and schedule for Big Data Challenge for Fall 2013 semester.

Wk	Date	1st Hour	2nd Hour	Activities	Assignments for following week
1	29-Aug	Intro to industry challenge	Engineers…Meet Social Entrepreneurship	Intro To Thailand; Videos; Project Brief Handouts	Project Review & Election (2 weeks to finalize)
2	5-Sep	Lean Startup Method	Intro to Voice of the Customer Calls	Call Planning & Timing	Customer Introduction call (open to all students)
3	12-Sep	Team dynamics and leadership	Team Selection; Ideation	Review Project Calls & Ideate in teams	Draft Proposed Solutions incl. Wireframes / Flows
4	19-Sep	Draft Solution Proposals	Working with Thais (David Law on Skype)	Preview & critique proposals	Finalize Proposed Solutions incl. Wireframes / Flows
5	26-Sep	Solution Proposal	Solution Proposal	Preview & critique proposals	Customer call; Incorporate Feedback in Solution
6	3-Oct	Project Management and Execution	Voice of the Customer (Call Review)	Call Review in teams	Project Plan; Start Developing Prototype
7	10-Oct	Effective Prototypes & Project Plans (PRESENTATION)	Project Plan & Prototype Review	Project & Prototype Planning in teams	Develop Prototypes
8	17-Oct	Art and Science of presenting	Working in Remote teams; Adapting toTechnology & Environmental Constraints		Develop Prototypes
9	24-Oct	Presentation Q&A or how to think on your feet	Voice of the Customer (Call Review)	Call Review in teams	Develop Prototypes
10	31-Oct	Marketing)	Marketing		Create solution deployment plan; Develop Prototypes
11	7-Nov	Mentoring & Coaching	Mentoring & Coaching	Review Progress; Coach Teams	Customer call + Reflection essay/blog post (50% teams)
12	14-Nov	Voice of the Customer	Reflection- learning outcomes	Review Calls, Students present reflections (informal)	Customer call + Reflection essay/blog post (50% teams)
13	21-Nov	Voice of the Customer	Reflection- learning outcomes	Review Calls, Students present reflections (informal)	Prepare presentation
14	28-Nov	HOLIDAY			(Teams may continue to develop prototype till 12/5)
15	7-Dec	Final Presentations	Final Presentations		

Figure 3: Syllabus and schedule for Social Entrepreneurship Challenge for Fall 2013 semester.

Initial Idea	Notable Pivots	Final Idea	Tournament Outcome
Predict available parking spots in city.	Connect drivers seeking parking spots to those leaving parking spots.	Connect drivers seeking parking spots to those leaving parking spots	Winner
Predict outcome of legal proceedings.	Identify best-qualified lawyer to assign to cases.	Patent search for patent lawyers	Semi-finalist
Connect companies with potential customers through social media	None	Connect companies with potential customers through social media	Semi-finalist
Help companies choose best locations for new storefronts.	None	Help companies choose best locations for new storefronts.	Finalist
Help individuals choose the best place to meet	Event Planner for University events	None	First cut

Figure 4: Initial ideas and final solutions for Big Data Challenge, Fall 2013.

B. Market Opportunity	Probably Inadequate	Probably equal to the competition	Probably better than most competition	Potentially outstanding	I cannot tell
Using the check-off scale (3), please give this venture a rough ranking for each of the listed factors.					
Evaluate the company's belief that is has a significant and credible market opportunity (i.e., is the product or service or business system distinctive or an order of magnitude better in performance?).					
Assess the company's market approach including strategies for dealing effectively with customer indifference (or lack of knowledge), differentiation strategies, competitive offerings, and other economic forces.					
Evaluate the company's ability, as a new entrant in this market niche, to survive long enough to succeed.					

Figure 5: VC type checklist used for Gap Analysis. Only one of 5 categories is shown for illustration.