TinkerFund: Kick-start Caltech Crowdfunding

William Ko
California Institute of Technology
1200 E. California Blvd.
Pasadena, California 91125, USA
wko@caltech.edu

ABSTRACT

Crowdfunding has rapidly become a mainstream method used by individuals and groups to raise money for various projects and ventures. Increasingly, organizations that chiefly raise monies for charitable purposes have also been turning to crowdfunding as an additional funding source. Multiple higher-education institutions have done this by integrating crowdfunding as a staple of their fundraising efforts.

TinkerFund is a crowdfunding platform created and designed to help fill funding gaps for student, club, organization and community projects and proposals at Caltech. It is currently active at https://tinkerfund.com and allows users to donate monies to support campaigns run by a number of Caltech student and community organizations. The platform provides basic donor-analytics for currently running campaigns and has the ability to streamline project submissions for future campaigns. It also seeks to provide the infrastructure to increase the efficiency of future Caltech-Development fundraising efforts through data acquisition and analysis of donor social-networks.

The TinkerFund platform launched with three affiliate organizations: the Caltech Y, Engineers Without Borders (Caltech Chapter), and the Interaxon club. All three organizations submitted at least one project for consideration for inclusion on the crowdfunding platform. TinkerFund had five fundraising campaigns active at launch.

Categories and Subject Descriptors

H.5.3 [**Information Interfaces and Presentation**]: Group and Organization Interfaces—*Computer-supported cooperative work, Web-based interaction*

Keywords

Crowdfunding, Fundraising, Platform markets, Network effects

1. INTRODUCTION

New ideas, proposals, and projects are sometimes vacated by students at the California Institute of Technology (Caltech) due to a lack of resources, generally financing, for these ventures to proceed. There are many preexisting sources of monies on campus for student groups and projects, which include: the Associated Students of the California Institute of Technology (ASCIT), the Graduate Student Council (GSC), undergraduate-student house funds, the Housner Student Discovery Fund, the Moore-Hufstedler Fund, academic department discretionary funds, the Caltech Y, and the Student Investment Fund. However, even with all of these funding sources, creators, those individuals or organizations who seek resources, may not have their funding needs met due to specific limitations in applying for and receiving funding.

1.1 Funding Gaps at Caltech

There are multiple, key funding-gaps for student and organization ideas and projects at Caltech. These gaps were determined over the course of the project by meeting with all of the existing funding sources to discuss their funding scope and applications process. During these discussions, it became clear that although significant amounts of monies were available to students and organizations around Caltech, there were many types of projects that would struggle to get adequate resources.

Firstly, projects that require large single-expenditures that do not have institute-wide scope. This includes clubs or organizations inviting well-known speakers to campus or other larger purchases, like expensive equipment, that do not affect the entire Caltech community. Secondly, those organizations that have high per-capita needs. This generally occurs when there are high fixed-costs for the organization, but low membership numbers. This might also include situations where a particular group may want to plan an extravagant function or activity. The third major funding gap is in covering recurring expenses. It is very difficult for individuals, clubs, or organizations to get funding for activities that they will hold annually, unless it already fits within their base budget. And lastly, very little funding exists for individual or small-group "pet" projects that have no academic focus and are enjoyed by small subsets of the Caltech community.

Currently, the funding gap for pet projects is generally financed through word-of-mouth by alumni friends who have

entered the workforce and can afford to provide financial support. This particular funding method, alumni charitable gifts, could be used to address many of the previously mentioned funding gaps, as well. However, many creators have limited access to this type of funding. Current Caltech students tend to have small alumni-social-networks and have little ability to move outside their network to get financial support. Ideally, any Caltech-affiliated creator could gain access to alumni gifts, if needed.

1.2 Development and Institute Relations

Caltech Development and Institute Relations (DIR) is the department of Caltech that is responsible for fundraising efforts across the Institute. DIR is responsible for securing annual, capital, planned and endowed gifts from alumni and the greater Caltech community in order to match financial resources with Institute aspirations [1]. In order to do this, DIR is always actively looking for ways to improve operational efficiency and address outstanding issues.

One such issue relates to the alumni charitable gifts used for pet projects, mentioned before, that are normally given directly to creators. These contributions are generally made outside of the normal gifting process that DIR has established for donor use. One problem this causes is the loss of tax deductibility for the donor. Another problem is Caltech being unaware of alumni contributions toward improving student life. More importantly, Caltech misses the opportunity to count the alumni gift in DIR statistics. Regardless of the size of a gift, as long as alumni give the gift directly to Caltech they are considered an active donor for the year and count toward donor participation metrics. These donor statistics are used to fundraise and solicit the large gifts that are critical to meeting budgetary needs at Caltech. Therefore, it is essential that every alumni contribution be made through some official, Caltech platform.

In addition to basic, donor-participation statistics, DIR would like to have other more advanced metrics to evaluate and improve their fundraising efforts. These could help to increase efficiency in donor targeting, the method or approach used to engage a donor, and donor conversion, getting a non-donor to make a gift. A platform that could integrate any of these features would be valuable to DIR fundraising.

1.3 Crowdfunding

One way to address the funding gaps at Caltech, and utilize alumni charitable-gifts, is through a novel fundraising method that has recently gained popularity called crowdfunding. Crowdfunding finances projects and ventures by collecting a large number of small contributions from many different entities through an online platform. Due to the low cost-of-entry, many people who would otherwise be unwilling or unable to provide larger monetary contributions are able to show their support for a given project. This process tends to utilize social media heavily in order leverage the organic social networks of supporters, people who contribute resources to campaigns, to maximize fundraising efforts. These supporters are able to collectively meet the funding goals of a fundraising campaign that might otherwise struggle to get financing from normal sources on Caltech campus.

1.3.1 Models of Crowdfunding

There are primarily two models for crowdfunding platforms: donation-based and investment. These platforms cater to different market demands through various incentive structures with donation-based funding generally giving perks, products, or rewards and investment-based funding generally giving an equity stake in a project or venture. There are two subcategories within donation-based crowdfunding aptly named charitable and non-charitable giving.

Non-charitable, donation-based crowdfunding is the model that has received the most media-coverage and is the one people are most familiar with. Examples of this type of platform includes sites like Kickstarter and Indiegogo. These sites have campaigns that tend to focus on developing and producing new products or services and almost always include material perks and rewards for donors.

Although better known as a means to jump-start a startup or fund a new product-line, crowdfunding has also become important for maximizing charitable giving for many organizations. Charitable, donation-based crowdfunding is a more recent innovation that has gotten less attention due to the general lack of tangible, material benefits given in exchange for financial contributions. More often than not, supporters receive nothing but a thank-you email in return for their contribution, and sometimes not even that. GoFundMe is a site that specializes in charitable crowdfunding. Many of the campaigns on GoFundMe are individuals or families looking to raise money for college scholarships, medical bills, or other large/unexpected expenses [3].

1.3.2 Higher-education Crowdfunding

Based on the successes of various charitable crowdfunding sites, higher-education institutions have started to evaluate the benefits and viability of using crowdfunding to meet fundraising needs [5]. There have been a number of institutions that have attempted to create crowdfunding platforms for student and institute use. The first were the University of Utah (UUT), University of Vermont (UVM), and University of Virginia (UVA) in 2012 [8, 2]. UUT and UVA decided to leverage preexisting platforms to fund projects using RocketHub, a donation-based crowdfunding platform, and USEED, a whitelabel crowdfunding platform service, respectively, while UVM attempted to create their own platform, UVM Start. As more universities embrace crowdfunding, there is a trend toward platform creation instead of utilizing whitelabel services, though this does not seem to be correlated with crowdfunding success for the school. Most importantly, a university must make sure that their crowdfunding platform is tackling a specific need in order to be successful [6].

Higher education institutions require a different approach to crowdfunding than the generic donation-based platforms due to the additional intricacies of being associated with an academic name-brand. Generally, these universities require greater oversight of projects and wish to have complete control over both the green-lighting and funding process [5]. The types of projects funded by universities are almost exclusively donation-based and seek to address a broad range of student and institute needs. These include: student-group fundraising, class projects, art/student-project installations,

scholarships, core research, and many others [7, 9, 8, 4].

Another key difference in higher-education crowdfunding is the average background of the supporters who help to fund various projects. At donation-based sites like Kickstarter, Indiegogo, and GoFundMe, the supporters are very diverse and the projects they fund span a wide range of interests and goals. At investment-based Crowdfunder and AngelList, supporters look to make investments in companies in return for an equity stake in the venture. Nothing specific ties these supporters together other than the inherent interest in a particular product, idea, or business that they collectively finance. However, higher-education crowdfunding is able to tap into a preselected, predisposed network of supporters: institute alumni.

This network of alumni serve as the core audience for any institution-affiliated fundraising. Alumni are more likely to financially support student and university needs, based on their school affiliation, than almost any random individual who happens to find a project or idea interesting. Therefore, determining a way to consistently tap into this vast, preselected audience would be greatly beneficial to any crowdfunding effort.

1.3.3 Caltech's Need

Like other higher-education institutions, Caltech is also interested in evaluating crowdfunding as an additional means of fundraising. Though the Institute might be inclined to focus on its overall Development goals, this type of platform would also address general funding gaps for student and organization projects. More importantly, the platform would also serve to generate important donor data for DIR use, especially if many alumni choose to support projects on the platform. This data might include updated address information for alumni that forget to inform Caltech of a move or include information about alumni gifting preferences in relation to project-type interests and funding amounts. The data generated by such a platform might be much more valuable than the funds raised by the platform itself if it could significantly increase the efficiency of DIR fundraising efforts. For all of these reason, there is a demonstrated need for a crowdfunding platform at Caltech.

2. THE CROWDFUNDING PLATFORM

The development of the Caltech crowdfunding platform had two, distinct sets of implementation action-items. The first dealt with the actual web-development of the platform itself. The second focused on the administrative tasks necessary to launch this type of project at a higher-education institution. Before any web-development could occur, significant design decisions, based on administrative input, would need to be made.

2.1 Initial DIR Administrative Meetings

The Caltech Fund, a part of Caltech Development and Institute Relations, is responsible for raising support from "alumni, students, parents, and friends" in order to help supplement the costs of running the Institute. They are always looking to increase charitable giving for Caltech and rely on their fundraising metrics in order to campaign for larger donations.

There were multiple contacts within the DIR office, and the Caltech Fund in particular, that were instrumental in determining the correct scope and timeline for the platform. Important information pertaining to Caltech's fundraising practices and approaches helped to drive design decisions regarding the platform.

Caltech has generally lagged behind its peer institutions (eg Harvard, MIT, Yale, Stanford) in charitable alumni-giving. Young-alumni engagement (ie giving rates) at Caltech have also been particularly low. The crowdfunding platform should have design elements that help to address these low metrics.

With this in mind, the platform will easily provide a payment-processing method to increase the alumni giving rate at Caltech by making each contribution count toward donor participation numbers. This is done by having payments processed directly by Caltech. Assuming that contributions on the platform primarily come from alumni, this approach should help to bolster metrics. Additionally, by allowing annual projects to be listed on the platform, donors would be incentivized to give every year to the same projects, which would increase donor retention numbers, another important fundraising metric. The platform would also naturally address the issue of young-alumni engagement, since those donors most likely to gift on a crowdfunding website are likely younger alumni who are comfortable with social media and these types of platforms.

2.2 Crowdfunding Task-force

Fortunately, this project coincided with the final meeting of a crowdfunding task-force that was convened by Caltech to explore how crowdfunding would benefit the Institute and the barriers and costs to implementing such a platform. During discussions, a primary concerns for Caltech was control over the entire funding process. Ideally, Caltech would like to have a student, professor, and stewardship advisor evaluate each funding proposal and oversee the campaign creation process. This would guarantee that the various interests of the Institute were represented on the committee and would ensure that only those projects that had reasonable community-wide scope would move forward.

After a campaign had been vetted and created on the platform, there were questions regarding stewardship. The Institute was apprehensive of the ability for such an online platform to address stewardship in an effective manner. Caltech prides itself on proper stewardship of gifts and resources and attempts to embody that ethic with visible and memorable action beginning with the charitable donation and on through the life of the donation. This ethic required that once a campaign was fully funded there had to be a transparent means of updating donors on the current progress of the project throughout its lifetime.

2.3 Design Decisions

After examining the funding needs of the Caltech community, the Development needs of DIR, and the discussions from the crowdfunding task-force, a list of features were identified for a prototype crowdfunding platform at Caltech. These features are listed in Table 1. This table breaks the features apart into those that are basic and required for plat-

Table 1: Caltech Crowdfunding Platform: Features

Basic Features
Web-based platform
General information about platform and legalese
Informational pages for campaigns and creators
Ability to fund campaigns

Additional Features
User profiles with optional detailed info
Administrative review of campaign proposals
Social media integration to share campaigns
Campaign and donor metrics
Mailing list or other contact methods for stewardship
Allow for perks or rewards based on gift amount
User interface design and aesthetics

Figure 1: The logo for TinkerFund, the Caltech crowdfunding platform.

form functionality and those that would extend platform usability and ergonomics.

The platform was to be web-based, instead of a smartphone app, in order to maximize creator and supporter accessibility. There were only two core functions needed. The first was to be able to display campaign details so supporters would know what type of project they were funding. And the second was the ability to accept and process payments. All other features were deemed to be secondary, non-essential features. These additional features would address the more interesting aspects of the platform in the form of rich donor-data generation and advanced donor-metrics, but would only be implemented after core functionality of the platform was achieved.

2.4 Main Administrative Tasks

Before beginning any of the web-development, it was important to establish if there were any launch-worthy projects to fund that would be easy to vet and easy to advertise for support. Without this, there would be no reason to develop the platform. Secondly, it was important to establish how funds would be processed and disbursed for both donor and website safety. Lastly, legal counsel had to be consulted and retained in order to address all legal questions regarding sensitive personal information during user sign-up and payment processing.

The first task involved contacting all of the major student clubs and organizations on Caltech campus. This resulted in a number of organizations who were potentially interested in having a campaign on the crowdfunding platform. Although these organizations seemed very interested at first, about half of them failed to maintain contact throughout platform development and were not included as affiliates during platform launch.

The second task required numerous meetings with various Caltech Student Affairs, Advancement, and Information Management Systems and Services (IMSS) personnel. The main stumbling block involved obtaining accounts that could be used to collect and disburse funds. Payment processing

could be handled by a third-party systems without requiring the crowdfunding platform to ever store sensitive, donor credit-card information. The IMSS department required a security audit of the finalized website if any Caltech accounts or information were to be used in conjunction with the platform.

The legal issues surrounding the collection of personal information and the ability to pass on collected information back to Caltech became complex enough that an executive decision was made to only use collected data for internal platform analytics and donor-network analysis. This drastically reduced the amount of clauses required to be present in the Terms of Use (ToU) and Privacy Policy (PP) for the platform. The PP details what personal information the platform collects and what kinds of things that data would be used for. The ToU discusses all aspects of user interaction with the platform and generally indemnifies the operators of the platform from most legal action. The ToU also addresses copyright issues and possible Digital Millennium Copyright Act takedown notices if copyrighted content were to appear on the platform without the rights holder's consent. The process to get these legal documents in a workable condition required almost the entire project lifetime.

Although initial meetings and work on these tasks commenced early on in the project, many additional meetings were required in order to fully address the administrative tasks mentioned. The legal and website security components took especially long to get completed.

2.5 Beginning Web-Development

The crowdfunding platform had to be implemented using tools that would easy-to-use and extensible for future needs. There were two platforms that were considered: Ruby-on-rails (RoR) with a PostgreSQL database backend and Joomla, a content management system, with a standard Linux, Apache, MySQL, PHP (LAMP) backend. Based on all of the feedback received from experienced web-developers, RoR tallied the most support. Although the RoR was more complicated to get setup and running correctly at first, it was supposed to provide a significantly better website deployment experience in the long run.

Unfortunately, the open-source RoR crowdfunding package that was to serve as the template turned out to be incredibly buggy and riddled with security holes. Without the technical ability to quickly fix these issues, the RoR method had to be abandoned in favor of the Joomla setup. The poor RoR experience turned out to be for the best as the Joomla open-source crowdfunding template was significantly easier to understand, get running, and do basic customization.

2.6 Branding the Platform

One of the most difficult aspects of the project was branding the platform with a name and logo. Generating a reasonable and catchy name and designing a good logo took a long time. The platform name was particularly difficult to come up with and was eventually inspired by the three nicknames of the founding fathers of Caltech: astronomer George Ellery Hale, physicist Robert Andrews Millikan, and chemist Arthur Amos Noyes. These three were given the nicknames "Tinker, Thinker, Stinker." After trying a number of permutations and polling friends, TinkerFund won out.

The logo, shown in Figure 1, was the winner from a large number of color and design incarnations.

3. THE TINKERFUND PLATFORM

TinkerFund launched on May 29, 2015, with the platform accessible at https://tinkerfund.com. The Caltech Y served as a primary launch affiliate, while Engineers Without Borders (Caltech Chapter) and the Interaxon Club also served as launch affiliates. The campaigns on TinkerFund at launch are summarized in Table 2. The projects are quite varied and should interest a wide-range of different people.

3.1 Aesthetics

The platform uses the Twitter Bootstrap framework to organize and place elements on the webpage. It has a responsive design in order to accommodate various screen sizes, from mobile phones to desktop monitors. The platform uses search-engine friendly (SEF) URLs and search-engine optimized (SEO) text snippets and keywords in order to optimize search engine rankings and provide user readable tab names. SEO optimizations were targeted at the primary landing pages of the website.

3.2 Navigation

On the main homepage, a summary of multiple campaigns will appear on desktop devices (Figure 2), up to three campaigns per row, or a single campaign at a time on mobile phone devices (Figure 6). After clicking on a campaign, the user will be brought to the details page for the selected campaign (Figure 3).

The homepage also has drop-down menus for easy access to individual campaigns or the details page for campaign creators. There is also a link to the FAQ for answers to most questions regarding the TinkerFund crowdfunding platform.

The TinkerFund Terms of Use, Privacy Policy, and Cookie Policy links are located at the bottom of every page.

3.3 Campaign Details

The details page for a campaign starts with the campaign title and an image or video to visually grab a donor's attention.

3.3.1 Campaign Summary

On the left side of the campaign details, possibly in the center of your screen depending on screen size and orientation, there is a campaign progress box in gray. This box summarizes the campaign's fundraising efforts so far. This includes
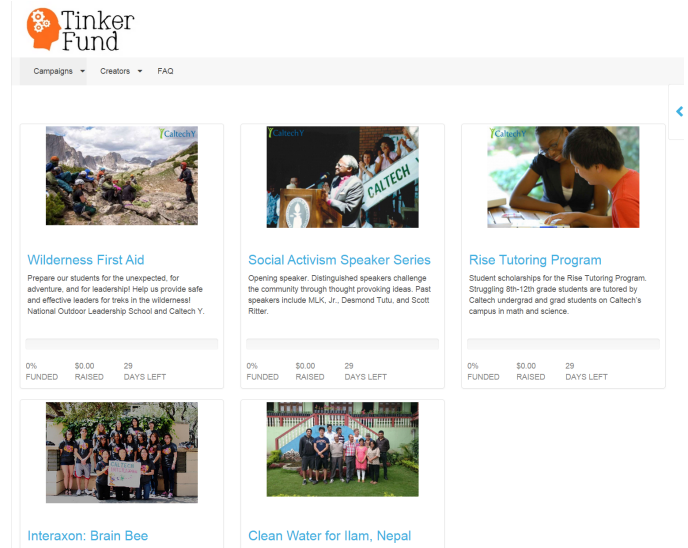

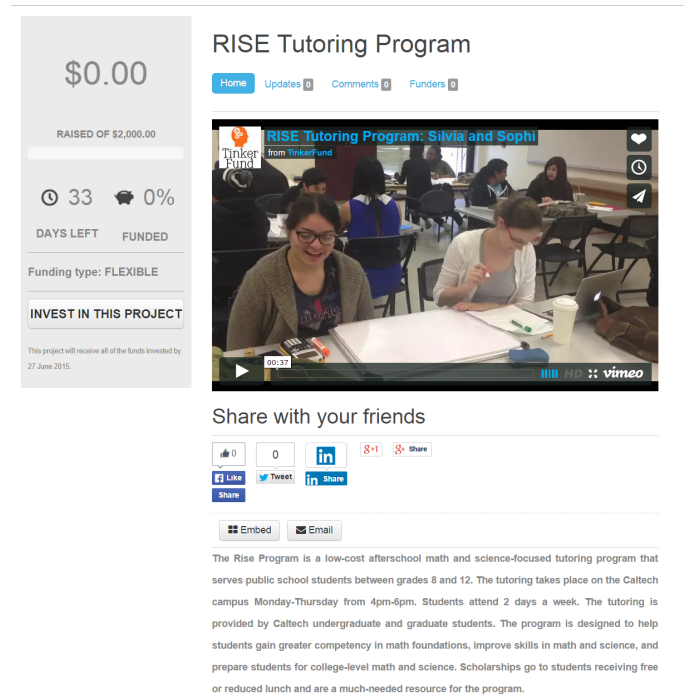Figure 2: The TinkerFund crowdfunding homepage viewed on a desktop computer.

Figure 3: The details page for a campaign on the TinkerFund crowdfunding platform viewed on a desktop computer.

Table 2: TinkerFund Launch Campaigns

Organization	Campaign Name	Funding Goal
Caltech Y	Social Activism Speaker Series	$3,500
Caltech Y	Rise Tutoring Program	$2,000
Caltech Y	Wilderness First Aid	$5,000
Engineers Without Borders	Clean Water for Ilam, Nepal	$2,000
Interaxon Club	Brain Bee	$2,000
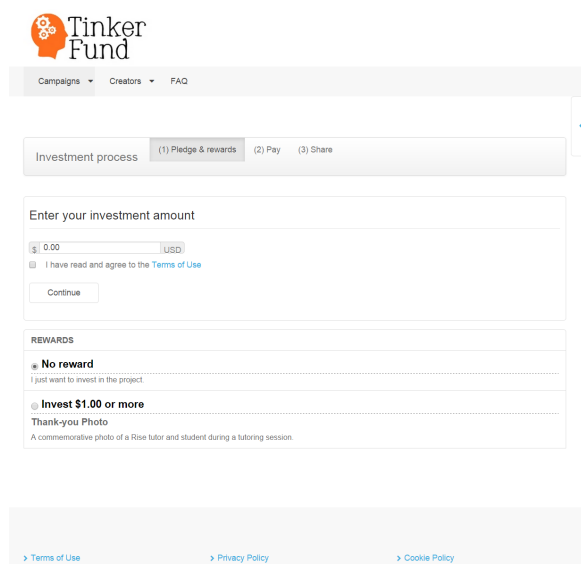
Figure 4: Step 1 in funding a campaign on Tinker-Fund. Choose your donation amount and reward.

Figure 5: Step 2 in funding a campaign on Tinker-Fund. Input credit card information to complete donation.
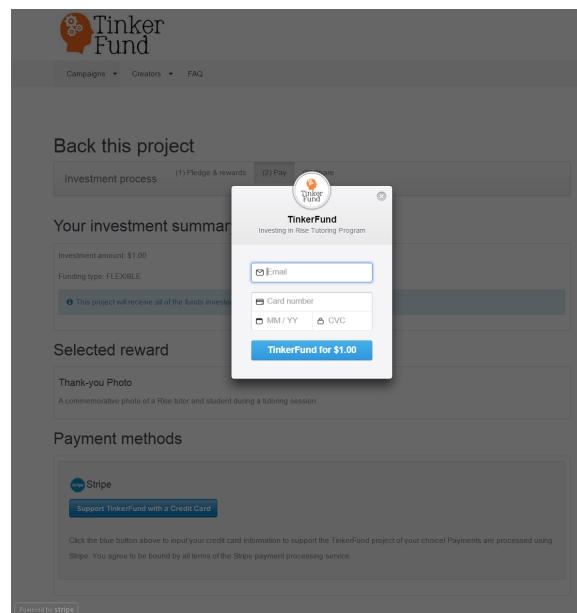
the number of days remaining until the campaign ends, the amount of money the campaign has raised, as well as what fraction of the total funding goal the campaign has reached. The link at the bottom of this box to "invest in this project" allows a user to donate in order to support the campaign.

3.3.2 Donating on TinkerFund

Supporting a campaign only requires a few steps. The first step in funding has the user choose the amount to invest, shown in Figure 4. If the campaign has any rewards, they can be seen and selected to designate funding amount. The user is allowed to submit any amount with a minimum donation of $1. After choosing the funding amount, the user is then prompted for a payment method. Figure 5 shows the screen that allows users to submit credit card information to complete their donation to the campaign. After completing a donation, the user is given the option to share on social media the fact that they just donated to a project on TinkerFund.

3.3.3 Other Features

Underneath the campaign title, there are links to areas to get updates on progress of the project, a forum to post and chat with other users, and a list of supporters who want to be recognized–users can always opt to support anonymously. When updates are posted to a campaign's page an automatic mailing will be sent out to notify all registered supporters of that campaign. This auto-notification feature requires that

the user created an account on TinkerFund before making a payment. Any user can always browse directly to the campaign's progress page to manually check for updates.

After the main picture or video, there are a number of social media sharing links to help promote the campaign. These can be used to easily post on LinkedIn, Twitter, Facebook, and Google. There are also links to quickly email a friend and embed the progress box for the campaign on a blog.

The very bottom of the campaign details page contains the detailed text description of the campaign along with the identity of the creator of the campaign.

3.4 Security

All traffic to and from the TinkerFund platform is always encrypted. If the user is using a supported browser, then the website will default to using TLS1.2 with DHE RSA for the key exchange and AES 128bit GCM for all other traffic. This is the most up-to-date version of TLS that allows access to advanced cipher suites that support elliptical curve cryptography, for huge efficiency gains, and AEAD block cipher modes. This is the newest standard for highly secure websites.

All users who visit the website should see the secure lock
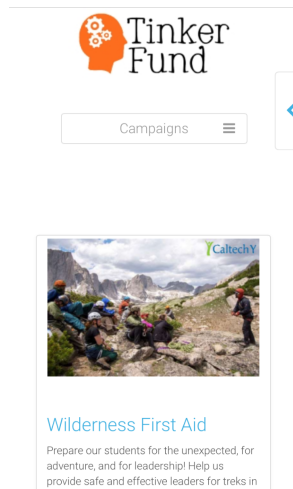
Figure 6: The TinkerFund crowdfunding homepage viewed on a mobile device.

next to the URL in their web browser. Clicking on this will bring up details about the type of connection that was established with the TinkerFund server. If anything other than TLS1.2 or 1.1 is being used, it is highly recommended that the user upgrade their browser before making a donation in order to ensure proper information privacy and security.

The security certificate should be registered to tinkerfund.com and was issued by PositiveSSL.

3.4.1 Joomla Security

All Joomla related folders and files have the proper read/write permissions in order to ensure that unauthorized users will not be able to maliciously make changes to critical system files. The administrators panel and all links to system critical areas have been secured. The system has been hardened against various exploits, though there may still be unknown vulnerabilities.

3.4.2 VPS Security

The VPS hosting the TinkerFund platform has had all unused ports and services closed in order to decrease possible attack vectors. Super user access is secured by a 2048bit key and IP restricted.

4. TINKERFUND PLATFORM SUMMARY

The TinkerFund platform is currently running and has all of the required features of a basic crowdfunding platform. The platform allows users to anonymously browse all of the content on the website, however making donations requires that users register an account on the website. Spam and robot registrations are defeated by the Google ReCaptcha system. Registration information is automatically mailed to the user at the registered email address after successful account creation. The site includes features to recover lost passwords and usernames.

The platform can display campaigns created by users or the admin, including detailed pages that allow a user to donate to a campaign, share the campaign through social media,

and get the most up-to-date information from the campaign creator. Users can make donations using all major credit cards, currently being processed through Stripe, though this will become Authorize.net in the near future.

Social media linking has internal tracking metrics to determine which users have shared links using social media and if users use shortened URLs to access the website there are additional usage metrics available.

Search-engine optimized links and keywords have been populated on the major platform landing pages to improve search rankings.

The platform already has functionality to allow registered users to submit new campaigns complete with images, detailed text, rewards, and funding goals. Campaigns submitted through the system will notify the TinkerFund admin for review. After successful review by the admin, the user who submitted the campaign is allowed to make the campaign active and begin fundraising.

Basic campaign metrics can be accessed by campaign owners. These metrics include a standard 5-number summary as well as the ability to filter contributions by various attributes included in user profiles, like age, sex, and location. A rudimentary algorithm using linear regression has been implemented to help predict contribution numbers and amounts based on user-defined time scales.

If needed, the platform also has the ability to allow users to fund campaigns directly into normal checking accounts using the Stripe and PayPal payments systems. This feature would only be useful if fundraising efforts were not for a Caltech-affiliated individual or group.

5. FUTURE WORK

The TinkerFund platform has the potential to generate very useful data for Caltech DIR use. If a significant number of Caltech alumni use the platform to make contributions, the data generated would include information like user address, zipcode, email, site visit frequency, campaign visit frequency, campaigns visited, campaigns supported, social sharing of links, and social media sites used. Integrating social media logins, instead of requiring user account creation locally on the server, may improve the acquisition of useful data. A Facebook login would provide friends and other miscellaneous data that might otherwise not be accessible. All of this data could help to build accurate models predicting donor affinities and campaign engagement.

If enough alumni were making contributions on the platform and sharing links using the social media buttons, a loose network of friends might be able to be inferred. At the very least, user propensity to make a donation to a given campaign or user likelihood to seed their own personal social network with a campaign link would still be very useful information given enough data points from enough users. Donor data could be analyzed to identify those influential nodes in organic social networks that have significantly higher probabilities of causing large information cascades.

The most interesting platform advances would require im-

plementing various machine learning algorithms. A recommender system for donors that suggests interesting projects that are similar to previously funded campaigns. Maybe, develop a usable model that integrates donor gifting behavior, social media behaviour, and total gift amounts. Integrating visualizations for campaigners and donors to improve usability and provide easy to understand statistics about active campaigns.

6. CONCLUSION

The TinkerFund platform launched successfully and will provide Caltech students and organizations a new funding source for unfunded or underfunded projects. Just the ability to get these types of projects funding will enrich student life and benefit the Caltech community.

The platform can serve as a proof of concept for Caltech DIR to show the type of valuable additional data that could be generated by a system that was directly affiliated with Caltech and that had access to donor data from previous fundraising campaigns. By itself, the ability to better interface with young-alumni and help to update out-of-date alumni address records would already be worthwhile for DIR. However, when combined with the possibilities for donor social network analysis and other more advanced donor metrics, the platform should easily prove useful to help DIR more efficiently continue its fundraising efforts.

Design and implementation of the platform took much more work than expected. All aspects of the project had various roadblocks that had to be overcome. Most importantly, there were two important facets of the project that needed to be tackled concurrently: the administrative discussions and meetings and the actual web-development and platform design. If these two facets were tackled in a serial fashion, there would not have been any possibility of completing the project in the requisite time.

Future extension of the TinkerFund platform should see interesting benefits for donor targeting and donor engagement.

7. ACKNOWLEDGMENTS

This project would not have been possible without the help of so many different groups and individuals. Thank you for all of the emails, meetings, and discussions. They were very helpful and were greatly appreciated!

Special thanks goes to those individuals who provided special assistance and were absolutely critical to TinkerFund. Without them TinkerFund would not exist!

Adam Wierman, CS145, Professor and Advisor; Athena Castro, Caltech Y, Executive Director; Portia Harris, Caltech Y, Director of Marketing and Development; Greg Fletcher, Caltech Y, Student Activities Director; Perry Radford, The Caltech Fund, Asst. Director of Annual Giving Programs, Young Alumni and Student Philanthropy; Mark Longo, DIR, Director of Strategic Initiatives; Joe Boeke, DIR, Executive Director for Advancement Information Services; Ruth Ann Bevier, IMSS, Chief Information Security Officer; Dimitris Sakellariou, Student Affairs Admin., Chief Business Administrator-Student Affairs.

Thank you to everyone who made this project possible!

8. REFERENCES

[1] Caltech. Development and institute relations | caltech.
[2] J. Craven. Universities explore crowdfunding, social media to raise money.
[3] GoFundMe.com. Common questions.
[4] Jessica Raymond. USC launches pilot crowdfunding platform.
[5] L. Johnson, S. Becker, V. Estrada, and A. Freeman. Horizon report: 2014 higher education.
[6] Jonathan Sandlund. Why universities need to get smart on crowdfunding.
[7] M. Miller-Huey and R. Johnson. CU-boulder launches new crowdfunding platform to support student, faculty and staff projects.
[8] Taylor Bench and Thad Kelling. University of utah embraces âĂIJcrowdfundingâĂİ to develop technologies.
[9] University of Texas Austin. Students roll out projects on HornRaiser - UTs first crowdfunding platform.