

Scientists experiment with crowdfunding

Interactions with the public prove as rewarding as the money.

A Harvard University postdoc in astronomy raises \$12 000 for a computer server to search for extrasolar moons. A biophysics PhD student at the University of New Mexico brings in about \$2200, enough to fund his experiments with heavy water. An undergraduate from Ohio's Miami University gets the public to pay for her field research on clouded leopards in Borneo. Seattle-based cartoonist Matthew Inman raises \$1.37 million to buy physicist Nikola Tesla's laboratory in Shoreham, New York, which he plans to turn into a museum.

Those are all examples of crowdfunding, in which people tap social media to raise funds, an approach that has become extremely popular in the arts in the past five years. Using platforms like Kickstarter and Indiegogo, people launch campaigns lasting days to months to raise anywhere from hundreds to a million or more dollars, for everything from recording music to manufacturing accessories for mobile devices to efforts to save endangered species. They do it by appealing to their own personal networks and to the wider public.

Science and scientists are newer to the fray. Brian Meece, cofounder and CEO of RocketHub, estimates that since going live in 2010, about 1000 of the more than 10 000 campaigns on his platform have been science-related. "Scientists are glad to see their projects raise \$5000, \$10 000, or \$25 000. But often they are just as excited about sharing their science with the public," he says.

So how does it work? Who are the donors? What sort of science-related projects tend to be successful? And what are the pros, cons, and limitations of crowdfunding for science?

Campaigning for science

Ryan Hamilton, an astronomy graduate student at New Mexico State University, says he turned to crowdfunding because "my adviser and I had been perpetually starved for funding." Hoping to raise money to attend a conference in Barcelona, Spain, Hamilton applied to #SciFund Challenge. The

nonprofit coordinates Web-based tutorials to help scientists create the best possible appeals, and then groups of participants run their campaigns in concert on RocketHub. Among other things, the participants critique each other's campaigns. "It was a good experience," says Hamilton, whose campaign ended up covering three-quarters of his airfare, "but it was a heck of a lot of work. Cataclysmic variables are hard to pitch."

Another crowdfunding example is the Intergalactic Travel Bureau, an outreach project that mixes astronomy and theater. Visitors are asked what kind of vacation they would like to take, and a "travel agent" then recommends an extraterrestrial trip. For a sporty vacation, the agent might recommend Mars. "It has the highest mountains in the solar system," says Mark Rosin, a UCLA postdoc in mathematical physics and one of the project's creators. "And the 1- to 3-inch layer of dust is great for sand boarding." Trips are planned around scientific content, he says. The Intergalactic Travel Bureau garnered \$506—or about a third of its goal—on FundaGeek, a crowdfunding platform for science and technology. The money goes toward props and the actors who play the travel agent, Rosin says.

Projects that involve a product often do well with crowdfunding. An example is an energy-efficient light bulb designed by three engineers who met as students a few years ago while working on a solar car (their entry placed fifth in the 2007 World Solar Challenge). Their Kickstarter campaign ended up attracting 5746 donors to pledge \$273 278, exceeding their goal by more than a factor of 10; they plan to start delivering the NanoLight next month. "We had no other medium to promote our product on," says partner Gimmy Chu. "If we tried to approach distributors, they would want us to produce something before giving us funding. That could be a catch-22. We needed a way to prove we have a good product."

Appealing to the public

A crowdfunding campaign starts with packaging. In most cases, the fundrais-



DAVID KIPPING

With the \$12 000 pulled in through crowdfunding on the platform Petridish.org, Harvard University postdoc David Kipping bought a server to help in his search for exomoons.

ers create a brief video that explains their goals and how they will use the money they raise. Many platforms vet projects. "We make sure that no fly-by-night research gets into our catalog. That would give us a black eye," says Dan Gutierrez, cofounder and CEO of FundaGeek. With some platforms, money is collected from the donors only if the campaign goal is met; with others, the campaigners get whatever was raised even if the goal is not met. Most platforms charge around 8% of the earnings to host a campaign.

It's common to offer donor rewards tied to the amount of a pledge. The product to be manufactured may be the reward—and equity will soon be an option, thanks to the Jumpstart Our Business Startups Act, federal legislation intended to help small businesses raise capital. Other examples of rewards for science-related projects include lunch with the campaigning scientist, a refrigerator magnet with the project logo, or a souvenir from a country visited in the course of the research. "My sense is that rewards are critical to crowdfunding

success,” says Jai Ranganathan, co-founder of #SciFund, which has so far guided close to 200 science projects in crowdfunding, and whose fourth group campaign in about two years is now under way. He compares crowdfunding to the fund drives that public radio conducts: “Few listeners donate to NPR for the sole purpose of getting yet another tote bag. But the promise of that tote bag might be just the thing to get an already committed listener to pull out his or her wallet.”

Once a campaign goes live, the networking begins: Tell everyone you know about your campaign, and ask them to tell everyone they know. “The more you promote, the more you make. The amount is directly under your control,” says Gutierrez. “Two things matter, nothing else,” says Ranganathan. “The size of your crowd, and the enthusiasm of your crowd.” Whatever the topic, he adds, “To be effective, outreach must take place over time and not just within the bounds of a crowdfunding campaign. Building audience is a slow process.”

RocketHub’s Meece says that 75–80% of money raised by crowdfunding comes from people’s immediate networks and their networks’ networks. Most of the roughly \$1000 that Hamilton raised, for example, came from family and friends, with a handful of pledges from people he did not know. In the #SciFund campaign that Hamilton took part in, he says, “People with a larger number of Twitter followers and FaceBook friends did best.”

David Marlett, who founded and chairs the National Crowdfunding Association, says, “If you can get to 35% of your goal using your friends, family, and community, then your chances of

being successful jump to 80–85%. It’s psychology.” Meece says that on his platform the average donation is \$75. Ranganathan finds that the median #SciFund donation is around \$20–\$25, with a few much larger ones.

“We hope to fill holes”

“Most science is not easily defined by output, and the output of a single project may not be that exciting,” says University of Pennsylvania business professor Ethan Mollick, who has studied crowdfunding. Still, he adds, “I think there is a lot of potential, especially for relatively small projects.” Crowdfunding is “not going to replace traditional grant funding,” says FundaGeek’s Gutierrez. “We hope to fill holes, to supplement existing funding.” Money obtained through crowdfunding has no strings attached, and can be used to jump-start academic research, perhaps making it easier to get a traditional grant.

Besides the obvious barriers for scientists—the relatively small sums raised, the large effort required, and the need to ask friends and acquaintances for support—reputation can also be a concern. Sometimes other scientists question those who engage in public outreach, explains Ranganathan.

Asking for support can be intimidating. Peter Mills, an unemployed researcher in Ottawa, Ontario, Canada, whose crowdfunding campaigns to raise money for his calculations on atmospheric ozone have so far failed, says the self-promotion required for crowdfunding is “exponentially worse” than for traditional grants. “If I was good at marketing, that’s what I’d be doing.” But entrepreneurs overcome such hesitancy quickly, says Mollick. “If you are asking, it’s because you believe your project is great.”

Creating an attractive campaign is key, says Rosin. “I think the research community needs to have a stronger focus on artistic delivery and project advertising.”

Universities can also present barriers. Says Gutierrez, “I have talked to so many researchers who are excited [to try crowdfunding] but then get beaten down by their university development office. Universities and research institutes don’t know how to accept the



WWW.THENANOLIGHT.COM

The NanoLight LED light bulb is the most energy-efficient light bulb on the planet, according to its creators, who ran a hugely successful crowdfunding campaign on Kickstarter.

money. That needs to change.” When universities do go along with it, they tend to treat money raised through crowdfunding like other philanthropy and take up to 15%, much less than the overhead with a traditional grant.

Two problems, one solution?

It turns out, however, that crowdfunding gives scientists something besides money: It’s a vehicle to share their work and to get feedback from the public. Elizabeth Gerber, who is on the mechanical engineering faculty at Northwestern University, has conducted interviews with the “entire ecosystem” of crowdfunding. For scientists, she says, “it’s less about funding, and more about communicating to a larger group of people. You are engaging in a long-term relationship.” One reason people fund projects, Gerber says, “is because they want to participate vicariously in the project.”

Ranganathan makes no secret that public outreach is his overarching goal: “We started #SciFund because there are two problems. The bigger one is that the gap between science and society is huge and getting worse all the time. You have things like the state legislature in North Carolina wanting to make the reporting of sea level rise illegal. There is a problem there. Every piece of our lives has been transformed by science. But it might as well be black magic.”

The second problem, Ranganathan continues, is that obtaining funding for science is getting more and more competitive. Crowdfunding might be the solution to both problems, he says: “Maybe if we can reach out to the public with our science, they’ll support us with their dollars.”

Toni Feder

ROSE EVELETH



A travel agent at the Intergalactic Travel Bureau helps customers plan extraterrestrial getaways. This outreach project has been funded partly through crowdfunding.