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Faculty of Management – The Leon Recanati Graduate School of
Business Administration
The Eli Hurvitz Institute of Strategic Management

ANGEL

Crowdfunding Wearable Technology

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Crowdfunding Wearable Technology

Introduction

Based in Tel Aviv, Israel, Seraphim Sense Ltd is the creator of the Angel sensor, a wearable wristband with the capacity to track the user's vital signs. Founded by Eugene Jorov and Amir Schlomovich, the Angel device is the company's first product and has been under development for the past two years. In 2013, Seraphim Sense launched a crowdfunding campaign on the web-based platform www.Indiegogo.com, where it raised \$334,521 from 1873 donors worldwide. The company estimates that the first Angel sensor will hit the market in April of 2015. The organization has intimated its intention to seek FDA approval for the Angel sensor, which would make the sensor a medical grade device. Additionally, the sensor will be supported by iOS and Android, and will be accessible by web API.

New Frontiers in Funding: Crowdfunding and Biotechnology

The Biotechnology Market

The state of the biotech market in 2014 can perhaps best be summed up by this statement made by Peter Boockvar, Managing Director of the Lindsey Group: "There is no other sector that can provide the enormous potential upside but also with the greatest amount of risk. The group is thus a perfect testing ground in measuring the appetite for speculation."ⁱ This perspective appears to be typical among



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traditional investors. According to RBC Capital analysts, as market volatility increased in 2014, investors lost confidence.ⁱⁱ

Many individuals labor under the false notion that biotech and drug discovery companies are cash-rich businesses and have plenty of access to funding. This is a misconception. Early growth biotech companies were hit hard by the recession because they are high-risk, expensive to fund, and go through long, drawn-out regulatory processes. According to former National Institute of Health Director, Elias Zerhouni, "The bubble mentality, where every good idea gets funding, is over."ⁱⁱⁱ There are four main sources of income for the healthcare and biotech sector: strategic investors (namely large pharmaceutical and medical device manufacturers), financial investors (venture capital companies and angel investors), philanthropic investors (foundations and venture philanthropy) and public investors (government agencies).

By the late 1990's, emerging growth biotechnologies began looking for funding mechanisms beyond big pharma. Venture capital was the answer, and for a time, like large pharmaceutical companies, venture capitalists were flooding early biotech companies with funding. Early stage companies were able to secure millions of dollars in capital through venture capitalists for initial funding, and even more money from public offerings. According to Venture Source, venture capital biotech investment peaked in 2007, with a total of \$6.17 billion invested in biotech startups.

As a result of the 2008 economic recession and poor stock offerings, venture financing for biotech has been on the decline. The number of active biotech venture capital companies dwindled to 462 by 2010 from a high of 1,022 in 2000. For many venture capitalists, the high costs and long life cycle of development (paired with small markets, particularly for rare disease treatment research) prompted many firms to steer clear from risky and expensive bets in biotech. In the



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first three quarters of 2013, ventures in biotechnology hit a 17 year low, according to a Burrill Report on the state of funding in the life sciences industry.^{iv}

Overview of Crowdfunding

Crowdfunding is one of the most novel funding mechanisms to emerge in the past decade and has since established itself as one of the most viable methods of sourcing early-stage and seed capital. Crowdfunding finds its origins from the concept of crowdsourcing, where the "crowd" is used to obtain ideas, solutions, and feedback for the development of activities or initiatives.

The crowdfunding model brings together any number of individuals, generally via the internet, to pool their funds to support efforts initiated by other people or organizations. Crowdfunded projects span a wide range of fields, including disaster relief, funding of startup companies, filmmaking, gaming, and for the purposes of this paper, disease and healthcare research and development. There are four main crowdfunding models: equity-based, lending-based, donation-based, and reward-based. Most crowdfunding platforms require the entrepreneur to meet a certain funding goal within an allotted timeframe; if the designated goal is not pledged by the funders, the funds are then returned to the funders and the project's fundraising campaign on the website is terminated.

Where traditional funding routes like bank loans or venture capital center on investments of large dollar amounts, crowdfunding solicits small contributions from large numbers of people, making the social connections of contributors extremely important for successful campaigns, as it increases the chances of the campaign going "viral", thus reaching as many people as possible.^v Moreover, crowdfunding espouses access to the minds of the donors and crowd, allowing entrepreneurs and project owners to test their idea on and market it



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to a group before bringing it to market.^{vi}

It is estimated that, in 2011, crowdfunding raised \$1.5 billion for projects and businesses in need of funds. According to Massolution, a crowd-oriented research and consulting firm, \$2.7 billion was raised via crowdfunding in 2012, with 450 platforms active worldwide.^{vii} According to a report commissioned by the World Bank, the global crowdfunding market is expected to reach \$93 billion by 2025.^{viii}

While reward-based crowdfunding is currently the most popular model, equity and lending based crowdfunding, are expected to transform the way businesses raise capital. In contrast to rewards-based and donation-based crowdfunding, in which the contributor has no expectation of material gain or profit, equity-based and lending-based crowdfunding, sometimes referred to as investment crowdfunding, confer legally enforceable and potentially profitable rights to the investors. The signing of the Jumpstart Our Business Startups Act (JOBS Act) in April 2012 laid down the legal groundwork for equity-based crowdfunding in the US, in an attempt to help startups raise early stage equity-based financing, and reduce the amount of restrictions on equity-based crowdfunding that were present in state and federal securities laws.^{ix}

Crowdfunding & Biotech

For venture capitalists, early stage growth companies are high risk and are defined by their high attrition rates, high costs of drug development, regulatory and reimbursement unpredictability, and long development lifecycles. This is a major contrast from internet startups, viewed by venture capitalists as more profitable, cheaper to fund, and less dependent on unpredictable regulatory environments. Crowdfunding is an opportunity to provide both primary and supplemental funding to venture philanthropy, strategic and financial investments and suggest new hybrid mechanisms that can



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breathe new life into medical innovation.

One of the main reasons crowdfunding has become so successful, is because traditional funding mechanisms like banks, venture capital, and angel investors have become increasingly scarce for early-stage capital. As such, the difficult economic climate calls for a reassessment of the ways we support entrepreneurship and innovation. Traditional mechanisms are of central importance and are not to be replaced, but they need revitalizing. Crowdfunding will propel the industry forward and usher in a new era of shared investment, growth, and medical innovation.

However, as crowdfunding edges into the finance market it isn't quite pushing out the traditional modes of finance, nor does it eliminate the need for them. Businesses, big and small, still rely on the institutional investors for scaling and nothing in the rise of crowdfunding suggests that this is likely to change. In fact, crowdfunding is doing much to support its would be competitors. By providing a mechanism that involves retail investors in relatively low investment amounts, crowdfunding is able to spread the risk of investment in early-stage ventures, effectively bridging the gap in finance between self-funding and the stage at which the company has developed to where it becomes a viable investment for the institutional investors.

Digital health is particularly well-suited to crowdfunding because it is not constricted by the same regulatory challenges and long process to market that new medical devices and new drugs face. The age of the internet and digitization are transforming the manner in which doctors, patients, healthcare institutions, and insurance companies communicate, store data, and access information. There is a wealth of opportunities in this field for entrepreneurs.

Establishing communication concerning the progress of the research



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and campaign is one of the biggest benefits of crowdfunding in the life sciences sector. Often times, large foundations and non-profits do not tell their donors how their money is being spent. Most crowdfunding campaigns include a video presentation, with which entrepreneurs are encouraged to discuss their background, how the project came to be, and to relate other information designed to familiarize the potential contributor with the goal of the campaign.

Since crowdfunding platforms are web-based, individual donors can both familiarize themselves with the company founders and team via their website, and also conduct additional research via the web searches and social networks, in order to gain more background information that may assist the donor in deciding whether or not the company is worthy of investment. For the entrepreneur, creating these large, virtual communities can be beneficial in the long term, providing the company with publicity, access to new customers, knowledge about potential markets, and access to new funding sources.^x

The virtual communities created by a crowdfunding website, not only connect like-minded users, but by also connecting with social media websites like Twitter, Facebook, Mashable and the rest of the blogosphere, donors and potential donors can get a thorough understanding of the progress of the initiative from a product perspective. Additionally, some studies show that the larger the number of social networking connections the entrepreneur has, the likelier the project is to reach its funding goal.^{xi}

This is particularly important when it comes to crowdfunding in the healthcare sector, and building a community that is based on the patients' social networks. For instance, a donor who has a personal connection to a potential beneficiary of a particular idea or startup may in turn mention it to said person, or to a family member, after reading about it online on social networks and/or on a non-profit or



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public service website. Considering the nature of the crowdfunding model, which relies heavily on getting large numbers of contributors through social networks and word-of-mouth, not only can a project raise funds in this way, but it may also find volunteers for clinical trials, get valuable suggestions and information from other researchers and scientists, and gain many other non-monetary benefits.

Advantages and Disadvantages of Crowdfunding for Early Stage Companies

While crowdfunding may seem like an ideal solution for early stage companies, especially rewards-based and donation-based crowdfunding which do not require any consideration in exchange for the funding, success is as much a matter of timing as it is execution.

In 2012, the success rate for crowdfunding campaigns was a staggering 50%. On popular crowdfunding platform, Kickstarter, however the rate was only 44% and on Indiegogo, another popular crowdfunding platform, the success rate was only 34%.^{xiii} This may seem like great odds compared to a meeting with a VC or a Silicon Valley investor, however, the time effort and financial commitment that go into the preparation for a crowdfunding campaign make it harder to simply repeat if it is unsuccessful the first time. In contrast, when raising funding through traditional channels much less is required in the way of an *ad hoc* production.

One of the main differences between crowdfunding and traditional funding is the target audience. This, however, can be an advantage or a disadvantage depending on the circumstances. For instance, crowdfunding campaigns tend to focus on an emotional message and viral marketing techniques, whereas professional investors are more



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likely to be swayed by qualities such as a strong business plan, a strong team, proven traction, pending patents, etc.

The risk factor may also play an important part in determining which funding mechanism to go with. Early stage companies with unproven products are a much higher risk for institutional investors, which have become more risk-averse in recent years. However, the crowdfunding mechanism, as stated above, spreads the risk of investment across the crowd, making it a much more viable option in some cases.

Another thing to consider is the option for reinvestment. While it may be easier in some cases to raise money for an unproven idea from an excitable crowd, once the idea goes into production complications may arise that require further funding. At this point it may be easier to re-approach a heavily invested partner that understands the nature of business investments, rather than tell a fickle crowd that you can't deliver on what you promised.

However, in the modern business world it is becoming clearer that a business partner must deliver more than just money in order to compete for investment opportunities. Factors such as business connections, expertise and additional resources may play a huge part in determining whether a potential investor can be more than just "the money". This is where crowdfunding has perhaps its greatest advantage, namely the crowd asset. A successful crowdfunding campaign, and even an unsuccessful one at times, provides hundreds of backers who are emotionally, as well as financially, invested in the success of the company. In addition to their money, each one of these supporters is a potential advisor and ambassador, bringing their cumulative knowledge, experience and networking to bear. Often times this can have a much greater effect at snowballing a project than a VC or an angel investor would.

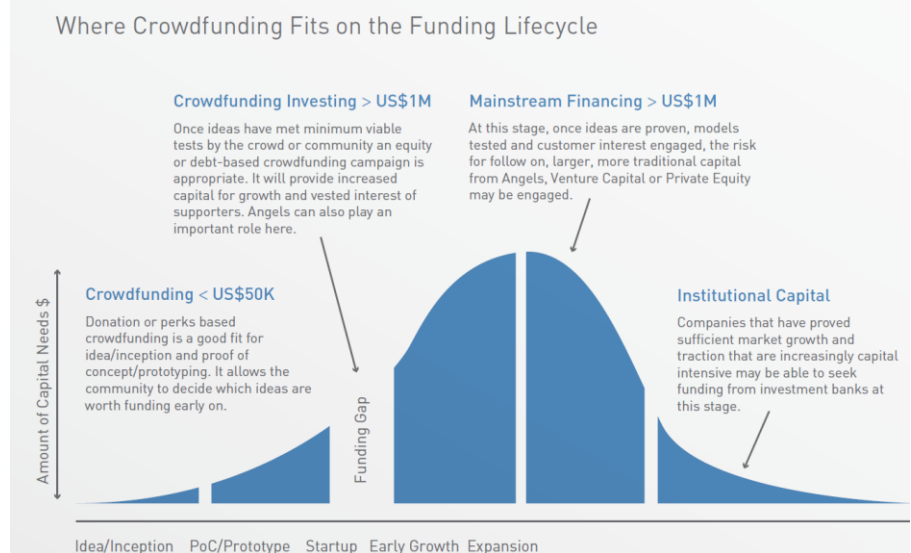


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At the end of the day it all comes down to timing. While crowdfunding provides an alternative source of funding, it is not in direct competition with institutional investors. On the contrary, companies that have successfully crowdfunded may find it easier to acquire additional funding through traditional mechanisms as the process itself provides proof-of-concept for the company. The best option for funding depends on the circumstances as well as the company's stage of development. Crowdfunding provides a solution to the gap in funding for early growth companies helping them to reach the next level (see figure below).

FIGURE 1.1. CROWDFUNDING ADOPTION CURVE



Crowdfunding's Potential for the Developing World. 2013. infoDev, Finance and Private Sector Development Department. Washington, DC: World Bank.

Reward-based Crowdfunding in Biotech and Healthcare

The failure of traditional funding mechanisms to meet the needs of early-stage companies gave rise to crowdfunding as a viable alternative for companies wishing to raise non-dilutive capital. While



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the more traditional funding mechanisms are not obsolete, their decline during times of economic instability has paved the way for a risk-sharing, cost-sharing, idea-sharing mechanism that is a standard bearer for an ever-growing sharing economy. That isn't to say that crowdfunding will replace the more traditional fundraising mechanisms, but rather that it may evolve to supplement them while carving out a niche for itself in the entrepreneurial finance landscape. Let's take a look at the success stories of reward-based, donation-based, and equity-based crowdfunding.

The UK based crowdfunding campaign iCancer has raised over 2 million pounds so far via donation-based crowdfunding. iCancer aims to raise money to cure "the same cancer as Steve Jobs" (neuroendocrine cancers) and actively appeals to potential backers by appealing to their emotions. The rhetoric is designed to elicit emotion with regard to several points: a) that the therapy is life-saving; b) the memory of a beloved cultural icon like Steve Jobs; and c) the lack of funding and resources behind the team. The website cleverly appeals to people's ingrained feelings of personal responsibility. This type of fundraising is very appealing for many individuals because the money goes directly into finding a cure whereas donating to a charity or foundation makes it harder to know how much of the donation money goes towards funding the oft times bureaucratic fundraising mechanism. The iCancer platform, however, describes exactly how that money will be spent, and donors are made to feel as though they had a real, tangible impact on the discovery of a potential cure for cancer.

Reward-based crowdfunding platforms Medstartr and Healthtechhatch make use of emotional motivation in the rewards and perks they offer their donors. For example, the Medstartr project, "Together", which aims to enable personalized medicine through big data, raised \$7,817 from 18 backers. Donors received rewards like t-shirts, lapels and shout-outs on the Together website and social



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media. Scanadu Scout is a piece of hardware that measures an individual's vital signs from a simple forehead scan. The project reached its goal of \$100,000 in two hours and then went on to raise \$1.5 million dollars, ultimately becoming Indiegogo's most funded campaign yet. In the United Kingdom, Flossonic Limited raised £126,850 against 12.70% equity for a toothbrush that flosses your teeth while brushing.

As is evident in Flossonic, Scanadu Scout, and Together, many of these projects are more technology focused than biology focused, meaning healthcare technologies and devices may be the most viable and approachable types of investments for donors insofar as the donors do not need a technical understanding or knowledge of the research.

Wearable Wristbands

According to research from Canalys, 17 million wearable wristbands are projected to ship in 2014. The company predicts the wearable market segments will reach 8 million on an annual basis, with 23 million devices projected by 2015 and 45 million by 2017.^{xiii} In a similar vein, smart, wearable wristbands such as Samsung's Galaxy SmartWatch, the Pebble Watch, and the expected Apple iWatch are being heavily marketed by their respective companies to garner consumer interest. While the wearable bands from Samsung and Pebble differ in both form and function from the basic bands like Angel and Fitbit, the markets are expected to converge in the coming years.

According to Canalys, the basic bands will assume some of the functionalities of the smart watches. Canalys also predicts large opportunities in the health and wellness space, stating "The wearable



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band market is really about the consumerization of health”, added Canals Analyst Daniel Matte in a statement. “There will be exciting innovations that disrupt the medical industry this year, and with the increased awareness about personal wellbeing they will bring to users, having a computer on your wrist will become increasingly common.”^{xiv}

Crowdfunding & the Wearable Wristband Market

Among the most successful Kickstarter projects is the Pebble Watch, a watch that displays messages from a smartphone via Bluetooth 4.0. While Pebble Technology founder Eric Migicovsky raised \$375,000 through venture capital, the company was unable to secure additional funding and turned to Kickstarter to run a crowdfunding campaign. Utilizing the reward-based crowdfunding model, Pebble Technology set a goal of \$100,000 for a five-week campaign where individuals who pledge \$115 receive a Pebble Watch when they become available. Donors are essentially pre-ordering the watch at a discounted price of \$115 rather than waiting for the watch to become commercially available at the retail price of \$150. At the end of the five week campaign, the Pebble Watch had raised \$10,266,844 from 68,928 people.^{xv}

The success of the Pebble Watch offers important lessons about the non-monetary benefits of crowdfunding for Angel – crowd wisdom and feedback. The crowdfunding model creates a platform of communication between the funders and the company, whereby the funders can offer feedback and suggestions for the product. Based on feedback from funders, Pebble Technology altered the watch to make it water-resistant, an important feature that came from the virtual community of Pebble donors and potential buyers rather than Pebble employees.



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The difficulties in raising funds in the healthcare industry also apply to those seeking to raise funds in the consumer goods industry. Like many founders of early growth companies in the healthcare sector, Migicovsky of Pebble Technology was qualified and knowledgeable in his field, experiencing earlier success with a Blackberry-compatible smart watch called the inPulse. Despite the acclaim he received for the inPulse, venture capitalists and angel investors in Silicon Valley rejected the Pebble. In an interview with the Los Angeles times, Migicovsky stated "I wasn't extremely surprised," Migicovsky told The Times. "Hardware is much harder to raise money for. We were hoping we could convince some people to our vision, but it didn't work out."^{xvi}

What is compelling about the Pebble Watch is that the rejection of funding from traditional sources was by no means a reflection on the experience or quality of either the business idea or the entrepreneurs. It's an issue of perceived risk. With that in mind, the real potential crowdfunding has for revolutionizing fundraising stems from the fact that it hones in on the emotional quotient, whereby individual donors choose to fund initiatives that hold intrinsic and emotional values for them. To the supporters of the Pebble Watch, the watch is new, cool and geeky. They also get to own one before the product goes to market, and for many people the perceived social value of being an "early adopter" is worth the investment. The impetus for donors in crowdfunding is largely intrinsic to the product and based on personal taste, social norms and emotional values. Whereas banks, venture capitalists and angel investors are tied to inherently risk-averse business models.

Angel

Background

Seraphim Sense Ltd is a startup based in Tel Aviv, Israel. Founded



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by Eugene Jorov and Amir Schlomovich, the company's first product is the Angel sensor, a smart wristband with the ability to track the user's vital signs. The Angel device has been under development for the past two years. In 2013, Seraphim Sense launched a crowdfunding campaign on the web-based platform www.Indiegogo.com, where it raised \$334,521 globally from 1873 donors. The company estimates that the first Angel sensor will hit the market in April of 2014. The organization has intimated its intention to seek FDA approval for the Angel sensor, which would make the sensor a medical grade device. Additionally, the sensor will support apps for both iOS and Android and will be accessible by web API.

“My passion here is noninvasive monitoring[of] blood pressure, cardiac output, blood-sugar levels,” Mr. Jorov said. “Chemical sensors are going to be the new rage. Patch electronics combined with chemical sensing—I don't know what is going to come out, but it is going to be really incredible.”^{xvii}

Product Overview: Angel

The Angel campaign on Indiegogo identifies their product as the first open source sensor for health and fitness. The device on display is a wristband with an integrated optical and acoustical sensor aimed at monitoring the user's heart rate. The built in sensors utilize noise filtration and artificial intelligence algorithms that measure the wearer's vital signs and movements.

Angel has the ability to monitor vital signs of the wearer, including heart rate, blood oxygen, physical activity and body temperature. This allows the open source sensor to work in conjunction with a number of fitness and health applications to enable smarter fitness and advanced medical diagnostics. The data that is collected from the



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sensor can then be used for research and processing by developers.

Through use of Bluetooth Low Energy (BLE), Angel can transmit health metrics, allowing for real-time access to the wearer's data and metrics, allowing apps to get the sensor's data directly through BLE without the need to synchronize over the web.

By creating a device that is open and supports iOS, Android and anything that supports Bluetooth 4.0 through a web API, the Angel essentially becomes a versatile tool, providing malleable data a potential plethora of platforms. According to Eugene Jorov, “the first goal is to break the monopoly of hospitals and experts in research to allow people to innovate in this space.” “We want to spur a wave of innovation in health. That is why Angel is open.”^{xviii} With that in mind Angel is aiding developers by providing a SDK and open source code template, in addition to real-time, raw data, which will allow them to design more efficiently and accurately.

Angel comes equipped with a number of different features geared to give developers better access to data that will create a wide range of possible apps and features for the wearer. In terms of health metrics, the Angel measures heart rate, blood oxygen levels, body temperature, and the wearer's motion. Raw waveform data is available for heart sounds, optical blood flow, and 3D acceleration. For the user interface (UI) and user experience (UX), the Angel can set toggle LEDs blinking, play predefined sound effects, and enable a vibration motor. The Angel can also detect basic gestures, including wrist rotation, vertical/horizontal arm movement, as well as the speed with which the gestures are made.

In terms of collecting and aggregating data, the Angel can be configured for recording mode for every type of data, and supports storage of up to 7 days of vital signs history. Raw waveform data



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recording is also available for up to several hours. According to Jorov, “It is not that easy to get heart rate and blood-oxygen readings—especially when you are in motion,” Mr. Jorov went on. “It is about the combination of optical and acoustic sensing and a couple of sophisticated algorithms that are responsible for providing a robust reading.

“The most important metric comes from combined acoustic and optical sensors. We take a look at your blood flow and we listen to your blood flow. We combine the two to get your pulse.”^{xix}

Target Audience

The Angel wristband is an open source platform and encourages a wide range of app development. As a result, the device can be worn by essentially anyone who is interested in tracking their fitness, activity, or medical condition. For individuals suffering from certain medical conditions, the Angel can track those vital signs which may indicate whether or not someone needs to visit a hospital or doctor. Parents who have a child and want to monitor their temperature can do so through the Angel.

For people interested in losing weight or training for a specific sport, the Angel can aggregate and track data over long periods that will help the wearer understand their progress. Ultimately, the openness of the data allows developers to create applications for virtually anyone, whether an athlete is using it to analyze a training regimen, a medical patient using it as an early warning system, or just a person using it to track everyday activity and the occasional morning run.

For the end users (wearers), the Angel wristband appeals to a customer's emotions on a number of levels. One is the primary feeling of security, whereby parents and family members can track the vital signs of other family members in case they are in need of



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medical care. The Angel will allow 24-hour access to their vital signs which can, presumably, help the caregiver make informed decisions about the subject's wellbeing and health.

For users who use the wristband for athletic and recreational pursuits, the Angel gives the user a sense of control because it provides tangible, trackable and quantifiable data that can lend insight into the user's trends and patterns over time. This may prove incredibly useful for athletes, people who wish to lose weight or transition into a healthier lifestyle, and even for users who are just interested in better understanding their own habits.

In terms of function, the flexibility and open source qualities of the product make it incredibly attractive, both to developers and consumers. Competitors of Angel, such as Jawbone UP or Nike FuelBand, offer specific, predesigned applications and functionalities. While they do connect with other applications (such as weight-loss app LoseIt or RunKeeper), the company which makes these devices often limits their use to applications which must be purchased by the user, or ones that are not developed by competitors, drastically limiting the user's choice in software. By creating an open platform for developers, the Angel will presumably be able to transcend that particular issue, allowing users to access a variety of applications for the device, and choose the one better suited to their needs.

Online Crowdfunding Campaign

From a strictly financial perspective, donation-based crowdfunding in biotech ventures is a win-win situation; the emerging growth company receives non-dilutive capital and the donor has a more precise understanding of how their money is being spent. Donation-based and reward-based crowdfunding will also offer biotech companies a number of critical non-monetary benefits that



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traditional funding mechanisms cannot. We will explore those benefits below.

Indiegogo

Launched through the Indiegogo website on September 16, 2013, the Angel crowdfunding campaign aimed to raise \$100,000 through a reward-based crowdfunding model. Running from September 16, 2013 through November 1, 2013, Angel raised \$334,521 from 1873 global donors.

The Indiegogo website offers entrepreneurs a platform to pitch and showcase the product through multimedia, including video, photos and press coverage, as well as to present a tiered system of rewards in exchange for funding. The platform also provides a forum for users to discuss and comment on the campaign (see appendix).

The Angel video pitch offers a brief history of the product from founder, Eugene Jorov, who passionately describes his mission to make healthcare more accessible through technology. Jorov immediately creates both credibility and emotional buy-in from the user by describing his own personal experience of his father having a fatal heart attack. As a result of that experience, Jorov created Angel to help users utilize the data and metrics from the wristband in order to help save lives. Jorov describes the way parents can monitor the fever of their child, how marathon runners can be forewarned of heatstroke, or how a user can work with a virtual tennis instructor.

The video is designed to engage different audiences, such as those who would be more inclined to purchase the band to track their physical activity (athletes, fitness enthusiasts, etc.), medical patients who need continual access to data on their vital signs, and even app developers, able to capitalize on the open-source nature of the product to create dynamic applications for the various needs of



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potential users. The pitch emphasizes the importance of the open platform, underscoring some of the shortcomings of their competitors, some of whom only offer platforms than run proprietary software and are not open to developers, such as the Nike FuelBand, which only runs software for the iOS system on mobile platforms.

The Angel campaign offered a tiered system of rewards for the contributions from donors.

Below is an overview of their perks system:

\$3,000 USD

VIP HACKATHON (2 Angels)

We will be flying you to our home base in Tel Aviv, the city that never stops, for a week of coding and some serious fun. We'll create the perfect environment to help you build your first Angel app. You'll get office space and exclusive access to our engineers. We'll provide both technical support and pizza! We'll also help you discover the secrets of the Holy Land, by day and by night. If you have an app idea you wish to see fulfilled - this is the perk for you! All inclusive!

\$1,100 USD

PATRON SAINT (12 Angels)

Angel was made to promote health innovation. Donate 12 Angel health sensors to a research institution, hospital, or university for this very special price. We'll contact you before shipping so you can choose from the available colors and let us know which organization should receive 12 Angel sensors. NON-PROFITS only.

\$479 USD

PROTECTOR (4 Angels)

Keep your entire family healthy and fit. You will receive four Angel health sensors. We'll contact you before shipping so you can choose from the available colors.



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\$249 USD

MAKER SPECIAL (2 Angels)

We are counting on Quantified-Selfers and developers to help us revolutionize health. You, the makers, will get exclusive access to experimental features and new Angel firmware releases for 12 months following our official product launch. You will receive two Angel health sensors.

\$249 USD

NIGHT AND DAY (2 Angels)

Get two Angels, for work and for play, or simply share one with somebody close. You will receive two Angel health sensors. We'll contact you before shipping so you can choose from the available colors. The shipping is free!

\$135 USD

PERSONAL ANGEL

Get your own Angel to watch over you! Our Indiegogo contributors get to save \$24 of \$159 expected retail price. You will receive one Angel health sensor. We'll contact you before shipping so you can choose from the available colors.

\$99 USD

ANGEL OF DAWN (200 available)

Greet the new dawn in health! Are you one of the pioneers, the first to dare? Help us make the first steps and get your Angel for this amazing price. You will receive one Angel health sensor.

\$10 USD

GOOD KARMA

You are awesome! With your support, Team Angel will keep fighting the good fight for better health technologies. Once the campaign is over, as a token of our special appreciation, we'll get your name listed on the Good Karma page on our website.



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Multi-Channel Media Campaign

In addition to coverage on the Indiegogo website, Angel launched a multi-channel media campaign to garner support and interest in the product.

Shortly before the campaign ended, Eugene Jorov and the Angel campaign were featured in the Wall Street Journal's Tech blog. The article, which featured an interview with the entrepreneur, provides both an overview of the Angel technology and a human-interest story about Eugene Jorov's background (including his father's death, an event which sparked his interest in medical technology). The campaign received attention from a variety of media outlets, including TechCrunch, Crunchwear, Crowdfunder, mHealthnews and many others.

The Angel team also established a Twitter page, which they used as an outlet to thank donors, share attention they received from the media and events they would be attending, propose app ideas for developers and promote their product with clever content pieces (Exhibit 1).

The Angel campaign also utilized Facebook, regularly sharing photos, tips about fitness and healthy lifestyle, progress regarding the campaign funding, app ideas and requests for contributions through creative photos (Exhibit 2).

The Angel team also utilized content from experts in the field, calling upon an emergency room doctor to describe the benefits of the product and its life-saving potential through a short video on Vimeo.



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Campaign Results

Angel received contributions from people all over the world. The majority of donors came from the United States of America, with a total of \$170,775 from 967 contributors. The second largest group of donors came from Europe, with a total of \$97,912 coming from backers in Germany, the United Kingdom, Sweden, France and other European nations. The majority of contributions came through the Indiegogo website, with 1,116 people contributing \$195,856, whereas other contributors visited the campaign portal through Facebook (33 donors, contributing \$4,746), Angelsensor.com (79 donors, contributing \$15,348), and direct email and personal contact (407 donors, contributing \$68,511).

Yet the data shows that people were redirected from a plethora of websites, including social media sites like Pinterest, Reddit and Google Plus, tech news outlets like TechCrunch and Techdirt, news outlets like the Huffington Post and ABC, and even the Pebble Watch user community.

In terms of the most popular rewards, 1,046 donors opted for the “Personal Angel” perk, 419 donors selected the “Maker Special,” 200 users selected the “Angel of Dawn,” 135 users selected the “Night and Day,” 35 users selected the “Protector,” six users selected the “Patron Saint,” and three donors selected the “VIP Hackathon”. 29 individuals chose the “Good Karma” option which carried no tangible consideration other than goodwill and gratitude.

For Angel, the tiered rewards system catered to the different desires of different donors, as well as to their spending ability. While the ultimate aim of a crowdfunding campaign is to reach the funding goal, most individual donors do not have the disposable income to afford the \$3,000 hackathon perk. For that reason, the rewards system for Angel focuses on the sentimental motivations people



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might have for contributing.

The campaign elicits emotional buy-in from potential donors by highlighting the importance of lifesaving technology. For example, the Angel site states that “many life threatening situations can be avoided with the right information. The technology to predict heart attacks, heat strokes and other health issues is coming. Our aim is to enable this by making health metrics accessible and actionable.”

For individuals with friends or family who suffer from the aforementioned medical conditions (and of course, those individuals who may, themselves, suffer from these medical conditions), the Angel campaign positively reinforces the notion of the wristband's ability to help save lives, thereby emphasizing the intrinsic personal value that the product holds for these individuals. Additionally, donors also get to own an Angel before the product even goes to market. And for many people, the perceived value to their social status of being an "early adopter" is worth the investment.

Non-monetary Benefits of Crowdfunding - Angel

Reward-based crowdfunding allows various groups – medical patients (and friends and family thereof), researchers, and entrepreneurs, medical and healthcare professionals –to directly impact fitness and healthcare innovation. While the non-dilutive funding part of the mechanism certainly satisfies a particular need, funding the new venture is not enough to create a sustainable model for the company. In this case, the crowdfunding mechanism provides Angel unfettered access to the thousands of new perspectives and insights on a global scale, which are no limited by the inherent restrictions of an in-house R&D department. While individuals and organizations have been using the power and wisdom of the crowd for hundreds of years, the rise of the internet gave us the tools to grow that power by orders of magnitude; to facilitate communication



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and discourse in a global, virtual community, pooling the knowledge and resources of millions of people and focusing them, *ad hoc*, on individual goals.

Access to the crowd and virtual communities will be particularly beneficial to Angel because of the open platform. The Angel website affirms its commitment to this concept, stating “The data Angel collects combined with its rich API can be used by developers, health experts and researchers. Together we hope to push health treatment and prevention forward in ways we haven’t even dreamt of yet.”

By leveraging the combined resources of members of the virtual community, Angel not only received funding for the production of the product, but it also opened the door to new relationships with developers, researchers, and health experts who will be responsible for the incremental product innovation that occurs after the wristband has gone to market. In other words, the crowdfunding model and the manner in which it expands the networks of the company's executives will ultimately be responsible for new innovation and growth opportunities.

While Angel’s competitors, including Fitbit and Jawbone, are funded largely by VC investment, Angel’s open platform is positioned to reap the benefits of ideas communities of developers and users, including medical patients, fitness enthusiasts and countless other individuals and organizations who may have a vested interest in preventative healthcare, fitness, and healthy living.

According to the American Heart Association, 23.9 million children in the United States between the ages of 2-19, and 154.7 million adults over the age of 20, are either overweight or obese. The healthcare costs from diseases linked to obesity, including diabetes and heart disease, is estimated to be \$254 billion and, by 2030, could reach \$861-\$957 billion, which would account for 16-18% of US health spending.^{xx}



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These trends and the increasing prevalence of obesity, diabetes, and heart disease, pose a major challenge and concern. Technologies like Angel that not only track the vital signs of the patient, but can also assist in helping patients lose weight through fitness tracking and monitoring of caloric intake, provide a myriad of opportunities, not only for sales of the such devices, but for the development of applications that can address the challenges faced by different people on a daily basis. As crowdfunding platforms provide an interface between the donors and the developers, the product has the capacity to be molded by the customers through a process of co-creation. This intrinsic process of the crowdfunding model, is not an inherent part of venture capital fundraising, or debt and equity financing. As such, the crowdfunding model has the potential to build better products by engaging customers and capitalizing on their feedback through product implementation.

Aftermath

Though initially scheduled to be released in early 2014, the company has not yet completed production on the first batch of the Angel sensors. Citing problems with the molds for the silicon wristbands, the Angel sensor is currently in its third iteration of testing, and as of March 2015 has not yet been released to market.^{xxi}

As a result of this delay in production, Angel is seeking additional funding and may be raising funding in this round from sources other than crowdfunding. This illustrates the importance of crowdfunding as a synergizing tool that is meant to lift a company to its next stage of development, rather than provide a solution to all business financing in the world.



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Appendix

Exhibit 1 - Twitter Campaign

Angel @AngelSensor Sep 27

#AngelSensor app idea: ladies, give the wristband to your date and see if you can make his pulse go above 90 :)

Angel @AngelSensor Oct 13

Angel App Idea: Keep an eye on your patients once they have been discharged from the hospital.

Angel @AngelSensor Oct 11

Angel app idea: use Angel's temperature sensor to track your ovulation cycle for the best chance of getting pregnant

Exhibit 2 - Competitive Overview

	Angel	Fitbit Flex™	Jawbone Up™	Nike+ Fuelband™
Motion sensor	✓	✓	✓	✓
Heart rate sensor	✓			
Blood oxygen sensor	✓			
Temperature sensor	✓			
Sync	Wireless	Wireless	Manual	Wireless
Web API	✓	✓	✓	✓
Real-time API	✓			
Raw data access	✓			
Web service provider	Open to all vendors	Fitbit only	Jawbone only	Nike only
Price	\$135.00	\$99.95	\$129.99	\$149.00



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Exhibit 3 - Social Media Campaign



Exhibit 4 - Social Media Campaign

"Angel is potentially infinitely malleable, becoming a heart attack sensor for one developer and a sports band for another."

TC TechCrunch

"Power to the developers! An open body sensor platform is on the way"

MEDCITY News



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Exhibit 5 - Social Media Campaign

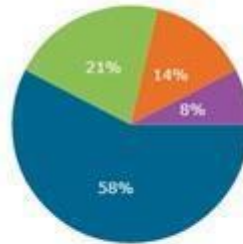
"...as an early warning system the Angel will very likely save lives"

Geektime

Exhibit 6 - Wearable Band Landscape, 2013

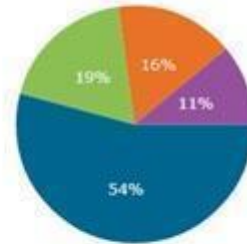


Basic wearable bands, worldwide, H2 2013



■ Fitbit ■ Jawbone ■ Nike ■ Others

Smart wearable bands, worldwide, H2 2013



■ Samsung ■ Sony ■ Pebble ■ Others



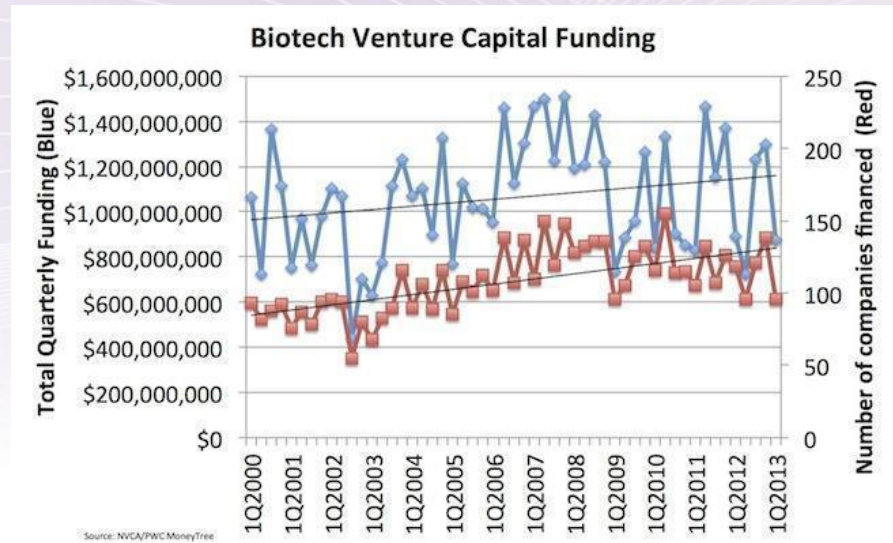
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Exhibit 7 - Venture Capital Funding in Biotechnology



Source:

<http://www.forbes.com/sites/brucebooth/2013/05/22/debunking-myths-about-biotech-venture-capital/>

Exhibit 8 - Angel sensor





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Exhibit 9 - Scanadu Scout Perks

\$10	Stay informed		
\$149	Early Birds		+ SOLD OUT
\$199	First Responders	+	
\$269	Quantified Selfers		+ SOLD OUT
\$529	Makers		+ SOLD OUT
\$756	Family & Friends	+	
\$1500	Bio Trekkies	+ +	
\$4225	Company Pack	x25 +	
\$4500	Citizen Doctors		SOLD OUT
\$4470	Early Bird Bundle	x3	SOLD OUT

DOM



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Exhibit 10 – Competitive Landscape

Fitness bands are currently big ticket items in the technology world. The main competitors to Angel are the UP wristband from Jawbone, Fitbit and the Nike FuelBand. While all wristbands are made of rubber and have the ability to sense motion, they have different functions and goals.

Nike FuelBand

First released by Nike in February 2012, the Nike FuelBand is a basic wristband that tracks the user's daily physical activity. This can include activities such as running, basketball or walking, and it processes the data through measuring either steps, calories or “Fuel Points” (a universal way to measure movement for all kinds of activities, according to Nike).

By collecting this data, the FuelBand is able to track the level of activity of the user and enable sleep tracking to better monitor sleep patterns. Like Angel, the FuelBand operates on the Bluetooth 4.0 platform. However, the FuelBand is only available to mobile users sporting an iOS system. For non-iOS users, individuals can access the Nike+ online community, where they can create a personal profile to showcase their progress, connect with other users, see their activity breakdowns and track their data through the web dashboard. The Nike+ dashboard also offers its users ways to improve their statistics and maintain a healthier lifestyle.

The newer model of the FuelBand, the FuelBand SE (released in November 2013), incorporated sleep tracking, a feature which the earlier models did not include but their competitors (the Jawbone UP and Fitbit devices) did.

The FuelBand retails at \$149. In the second half of 2013, the



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FuelBand had 13.6% of the global market for wearable wristbands.

Jawbone UP

Founded in 1999, Jawbone is privately held company that has accrued \$275 million in venture capital funding from powerhouse VC firms including Andreessen Horowitz, Khosla Ventures, Kleiner Perkins Caulfield and Byers and Sequoia Capital. The company also received \$100 million in debt and equity financing. Jawbone's product portfolio includes the Jambox bluetooth wireless speaker and the Jawbone UP, a wristband fitness and activity tracker.

The Jawbone UP tracks sleep, steps, active time and idle time, and allows the user to monitor larger patterns over time. In addition to the aforementioned core functions, UP alerts the user to instances when they've been idle for too long, has smart alarms that wake you up after your body has experienced the ideal amount of sleep, and tracks the different moods of the wearer.

Users must download the UP mobile application, which allows them to view their usage data, track trends, access helpful information about living a healthier lifestyle, and gauge the level of their activity for the day. Users are able to set goals for themselves in terms of hours of sleep they aim to accrue each night and number of steps they aim to take each day. The progress is shown on the app each time it is synced, allowing the user to see the percentage of activity or sleep in relation to the goal. The device is also water resistant, allowing the user to wear it in the shower.

The Jawbone UP retails at \$149.99. In the second half of 2013, according to research from Canalys, Jawbone UP had 21.1% share in the global market for wearable wristband.

Fitbit Flex and Fitbit Force



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Fitbit was founded in 2007 with \$68.1 million in VC funding from Foundry Group, True Ventures and SoftTech VC. Designed to encourage customers to live a more active and healthy lifestyle, the Fitbit Flex is a wristband that tracks the number of steps taken, calories burned, hours of sleep, and distance the user has traveled in one day. The data is wirelessly transmitted to the user's computer and smartphone through Bluetooth 4.0. Users are able to set goals for themselves and track their progress through the interface on the smart phone and through the LED lights on the band. For example, if the goal of a user is to take 15,000 steps per day, the LED lights on the band will light up to indicate each 20th percentile of said goal. In addition to movement, the Fitbit tracks your sleep patterns, not only in terms of hours slept, but the sleep cycle itself, including how many times the user woke up over the course of the night versus how much time was spent sleeping.

Once hooked up to the users' computer, the interface displays long term trends based on the transmitted data so the users are able to understand their behaviors and habits. The users are also able to input information relating to their food intakes and exercise regimens.

In late February of 2014, Fitbit issued a recall of the Fitbit Force due to users' complaints of skin rashes after wearing the band for a sustained period of time. Before issuing the recall, Fitbit offered to reimburse users or to replace their device with another tracker. However, after working with independent labs to assess the situation, the company issued a full voluntary recall of the Force and stopped selling the device.

According to research from Canalys, Fitbit had a 57.6% share of the global wearable wristband market in the second half of 2013.



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Exhibit 11 – Scanadu Scout Campaign

Product Overview

Scanadu Scout is a crowdfunded, biotechnology product that raised \$1,664,574 on Indiegogo. The disc-shaped device is designed to measure the users heart rate, skin/core body temperature, blood pressure, ECG, respiratory rate, emotional stress and SPO₂ (oximetry) by scanning the surface of the body. The product supports both Android and iOS applications, as well as Bluetooth 4.0 Smart Low Energy (BLE), allowing the data to sync with the user's smart phone. It takes less than an hour to become fully charged and can last up to a week while being used several times a day.

The developers of Scanadu Scout believe the product will be useful in preventive medicine, helping users detect illnesses earlier on and increasing efficiency of treatment by physicians by giving doctors easier access to information about the patient. The developers emphasize the ease of use of the device promising on the website to “check your health as easily as your email.”^{xxii}

Target Audience

At present, the device is not FDA approved, which prevents it from being classified as an over-the-counter diagnostic tool for the consumer market. Until the device receives FDA approval, it can still be utilized by medical professionals, parents, educators, medical students and regular consumers, but is not considered a “medical device” until such approval is granted. According to Scanadu Scout’s crowdfunding campaign on Indiegogo, the company is seeking users who will supply them with data, which will then be used in a clinical trial:

“By helping us collect data, we can support our FDA application for market clearance as an over-the-counter consumer-grade diagnostic



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tool. Our study protocol will be reviewed and approved by an IRB prior to initiating the study. The product will not pose any significant risk to users and can be used to collect, store and display all your information, but without making specific disease diagnosis. By contributing to our campaign and participating in our study, you will help us refine the Scanadu Scout™ and get us ready for a formal clinical study.

"We are creating a medical-grade device, which is not yet fully accurate and not cleared by FDA. Hence this is not a medical device. Via this campaign, you may contribute and your input may affect the final design and characteristics of this revolutionary tool.

"The exploratory version of the Scanadu Scout™ is not a medical device and makes no medical claims. It is still in development and can only be used as part of an investigation. As an investigational product, it can be used to collect certain data and must be used in accordance with the study's protocol."^{xxiii}

Online Crowdfunding Campaign

Through the web-based crowdfunding platform www.Indiegogo.com, Scanadu Scout raised \$1,664,575 between May 2, 2013 and July 20, 2013 (just under two months) out of a goal of \$100,000, surpassing their target by a margin of more than 1500%. Below is an overview of the campaign's tiered perk system (also see Exhibit 9 in this Appendix):

"- \$10 USD Stay informed Every contribution helps to bring to fruition the vision of the first medical tricorder. Be part of the movement to make this the last generation to know so little about their health. You get FREE ACCESS to the Scanadu app and will receive our newsletter with updates along the journey of bringing the first medical tricorder into existence.

"- \$199 USD First Responders GET YOUR Scanadu Scout™ and a



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free app before it gets to the stores (Free shipping in the USA, \$15 for Canada, \$25 everywhere else.)

"-\$389 USD Black & White GET TWO Scanadu Scout™ devices (1 white and 1 black) and a free app before they get to the stores. Why choose, get both and save \$9. (Free shipping in the USA, \$15 for Canada, \$25 everywhere else)

"-\$756 USD Family and Friends You get 4 Scanadu Scouts™ with the free app, you want your family and friends to get the Scanadu Scout too! Share and trend with your closest circle! Your Scanadu Scout™ costs \$189 instead of \$199 (Free shipping in the USA, \$15 for Canada, \$25 everywhere else.)

"-\$1,500 USD Bio Trekkies You get 2 Scanadu Scouts™ and a day as a Citizen astronaut for 2, featuring an interactive day, with an elite one-on-one coaching by an operational expert who will finely tune your personally customized space-age fitness session using modalities currently under evaluation by NASA for long duration missions. No shipping costs.

"-\$4,225 USD Company Pack 25 Scanadu Scouts™ for your company staff, because you care about their health. So \$169 instead of \$199! (Free shipping in the USA, \$20 for Canada, \$30 everywhere else.)"

Media Campaign

The campaign's video on the Indiegogo website describes the challenge for consumers in getting real-time access to their own medical data. By focusing on the ease of use and immediate access to the user's vital signs, the company appeals to parents, medical professionals and patients, outlining the benefits of the product, but also the larger paradigm shift towards personalized medicine and products. The developers cite a relationship with NASA, which signals credibility to potential funders (particularly educated medical professionals) and solidifies the idea that the Scout has been well researched by a reputable organization.



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The relationship is mentioned again in the text of the website, stating “Scanadu Inc. is a Singularity University startup based at NASA Research Park in Moffett Field (CA-USA) comprised of MDs, data scientists, mathematicians, coders, molecular biologists, mechanical, electrical engineers and biophysicists. Don’t worry; we gave the artistic imagination to Yves Behar, the designer of Jawbone, one of the best designers in the world.”^{xxiv}

Scanadu Scout’s Indiegogo page links to several complimentary editorials and news stories about the product, including content in Forbes, Fast Company, Time Magazine, TechCrunch, The Wall Street Journal and USA Today.

Campaign Results

The Indiegogo crowdfunding campaign raised \$1,664,574 from 8,523 donors in 100 countries. The results made Scanadu the highest funded campaign in Indiegogo’s history, overtaking the previous record of \$1,370,461 record set by Let’s Build a Goddamn Tesla Museum.^{xxv} The Scanadu Scout met its goal of \$100,000 in less than two hours, ultimately doubling that figure in five hours.

The campaign results indicate a level of market validation the company was hoping to get through the Indiegogo campaign. According to Scanadu Scout creator, Walter de Brouer, in an interview with TechCrunch, the Scout had been created almost entirely in a vacuum and crowdfunding was the best way for the organization to test consumer interest in the product.^{xxvi}

Looking beyond Scanadu and Angel, many startup companies are looking to crowdfunding, angel investors, and venture philanthropists as alternatives funding mechanisms. According to Stephanie Marris, Director of UCSF’s Entrepreneurship Center, “Early-stage life science is just in poor shape in terms of having a variety of funding sources. Everyone should keep their eyes on



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[crowdfunding]. Looking at the global trends, it's definitely become a source of capital. If it becomes appropriated adaptively to health care, maybe we have a new avenue to go down.”^{xxvii} Crowdfunding platforms like Medstartr, VentureHealth and Rockethub are attracting venture scientists

Yet while Angel and Scanadu show the potential of crowdfunding, other crowdfunded products in the biotech field have failed. The QuantuMDx, the world's “first handheld DNA lab,” raised \$18,600 of its \$50,000 goal. The product, which provides users with immediate DNA diagnostic information allowing them to diagnose diseases like cancer, flu, tuberculosis, and sexually transmitted infections, hoped to make major headway in the battle against malaria. According to QuantuMDx's page on the Indiegogo website: “by contributing to this campaign, you are furthering development of our device and readying it for mass manufacture. Most importantly, you are providing malaria tests for hundreds if not thousands of children in Africa as part of a large clinical trial. We're also giving you an opportunity to leave a legacy by helping to name our device, and design the look and feel of it.”^{xxviii}

The small rectangular device allows a user to insert a blood sample, press a button, and within fifteen minutes, diagnose a disease and upload the results to the user's smartphone. Using a reward-based crowdfunding model, the QuantuMDx offered perks such as a mosquito net, the opportunity to fund malaria tests for a group of schoolchildren in Africa, and for a donor to fund a satellite clinical trial of the QuantuMDx in Africa. The perks did not include the option for a donor to receive the QuantuMDx device itself.

Despite media coverage in high-readership media outlets including the Huffington Post, BBC, VentureBeat and The Guardian, and management team that was composed of molecular biologists, chemists and biosensor experts, the QuantuMDX only received 18% of their goal of \$50,000 from 2,014 contributors.



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Exhibit 12 – Teaching Notes

1. What are the main factors early-stage companies should consider when looking at crowdfunding vs. raising funds from friends and family vs. venture capital? What are the advantages and disadvantages of each option?
2. How do entrepreneurs create momentum through crowdfunding without a strong benefactor or well-connected ambassador?
3. Considering one of the goals of a crowdfunding campaign is to raise money for the development of a business and/or product, how can entrepreneurs execute such a campaign at a high level without access to the kind of resources and marketing budget of a multi-million dollar business?
4. Following the campaign, what are the best practices and strategies for keeping contributors engaged? How can entrepreneurs leverage their success in the campaign going forward?
5. What types of products or markets lend themselves naturally to crowdfunding?
6. How can the principles of crowdfunding be adapted for use in areas other than fundraising?
7. What advantages does crowdfunding have over traditional fundraising *vis-à-vis* principles of free trade?
8. What makes venture capitalists and angel investors shy away from the biotechnology market? What advantage does crowdfunding have in this area?
9. Is crowdfunding in direct competition with traditional fundraising mechanisms? Why (or why not)?
10. During what stage of development in the life of a business is crowdfunding a viable option?
11. Based on this case study, what importance is there to the geographical location of the campaign contributors? How would this influence your campaign?
12. You are planning a crowdfunding campaign with a goal of \$150,000 for development of a wearable tech product with a retail



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value of \$250. Design a tiered rewards system for your campaign.

13. Based on the previous exercise and the results of this case study, how many individual contributors would you need in order to reach your goal?

14. Suggest at least two ways the Angel campaign could have increased their campaign's success.

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About the Authors

Dan Marom (PhD) is an acclaimed author and prominent thought leader in the crowdfunding field. In 2010, he co-authored a pioneering book on crowdfunding titled *The Crowdfunding Revolution* (with Kevin Lawton). A second edition was published by McGraw-Hill in 2012. Dan received his PhD in Finance from the Hebrew University of Jerusalem. Dan's research focuses on crowdfunding and entrepreneurial finance. Drawing on over ten years of experience with Israeli startups, Dan has engaged in various R&D and management projects for several years as a technologist and Founder/CEO of a startup company. Living in Tel Aviv, Israel, Dan also holds a Master in Business Administration (Cum Laude), and a Bachelor of Science in Electrical Engineering.

Orly Sade (PhD) is an Associate Professor at the Department of Finance within the School of Business Administration at Hebrew University in Jerusalem. She is a Visiting Associate Professor at NYU's Stern School of Business and NYU Shanghai. She serves on the board of directors of the Israeli Securities Authority and was a member of the advisory board of the Israeli Ministry of Finance's Capital Market Division. She was a visiting Associate Professor at other top universities around the world, such as IE Madrid and NES, Moscow, and has received letters of recognition for her excellent teaching. Her research has been published in leading international academic journals and has been presented at important academic conferences. Prof. Sade served as director of the BA program at The Hebrew University and received the Abe Gray award from the President of the Hebrew University. She has been awarded several research grants, including from the Israel Science Foundation. She co-authored a novel for kids, "How Ella Grew an Electric Guitar", that promoted financial literacy and gender equality. Prof. Sade was a member of the Ministry of Finance's committee which selected a company that cites non-tradable assets. She also served as a member



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of the investment committee for the "Hadassah" pension fund (part of the Israeli pension reform), the pension fund and welfare fund for Hebrew University's employees, as well as a member of the investment committee that is responsible for investing funds of the Hebrew University's Academic Staff Union. She has advised financial institutions and companies in the fields of finance, debt offerings and tenders, and worked in the banking sector and the Banking Supervision Department of the Bank of Israel.

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