HARVARD | BUSINESS | SCHOOL

9-811-064

REV: NOVEMBER 8, 2012

THOMAS EISENMANN

ALISON BERKLEY WAGONFELD

LAUREN BARLEY

Aardvark

In January 2010, Aardvark cofounders Max Ventilla and Damon Horowitz scanned through a recent Aardvark blog post by their colleague Anna in operations. Anna had blogged about her experiences using Aardvark to plan her move to a new apartment, and the cofounders were pleased to learn how the social search service had helped. (See **Exhibit 1** for Anna's post.) Aardvark allowed users to ask questions via the Aardvark website, e-mail, iPhone application, text message, or instant messenger (IM) services. San Francisco, California–based Aardvark found people within the asker's extended online social network who could answer the question within minutes, and then facilitated a text exchange (via IM, e-mail, etc.) between the asker and respondent.

Anna had used Aardvark to ask questions such as "How do I assess the quality of a property management company?" "Where do I donate used furniture?" and "What do I do about black stuff coming out of my pipes?" She received many thoughtful answers from friends of friends for each of her questions. CEO Ventilla and Chief Technology Officer Horowitz had envisioned high-quality responses like this when they started the company two years ago. The detailed and personalized answers highlighted how their social search service differed from traditional search engines such as Google and Bing.

When creating Aardvark, Ventilla and Horowitz had sought user input at every stage of the product development process, and had recruited an engineering team nimble enough to adapt quickly to the feedback. This user-centric design process had helped the company attract a passionate base of early adopters. But Aardvark still had a long way to go to reach the critical mass of users required to answer any possible question within minutes. To drive more users to Aardvark, the founders increasingly considered whether to pursue business development deals with companies that controlled distribution platforms—for example, traditional search services, online social networks, or smartphone makers.

Background

Aardvark was cofounded by Ventilla and Horowitz, along with two other friends of theirs, Rob Spiro and Nathan Stoll. While working toward his undergraduate degrees in physics and mathematics at Yale, Ventilla had founded an enterprise software firm. He and some college

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Professor Thomas Eisenmann, Alison Berkley Wagonfeld, Executive Director of the HBS California Research Center, and Senior Researcher Lauren Barley prepared this case. HBS cases are developed solely as the basis for class discussion. Cases are not intended to serve as endorsements, sources of primary data, or illustrations of effective or ineffective management.

classmates built a knowledge management tool that sifted through e-mails on a corporate server to identify employees with expertise in a given area. Ventilla elaborated:

> The software could answer questions such as "Who within this consulting firm knows about Latin American tax laws?" We built the product during the summer of 2000 as the NASDAQ cratered. Everyone counseled us to go after the enterprise market because that was where we could still make money. But we weren't prepared for the long, complex enterprise sales cycle. We were 20-year-olds who hadn't worked in companies before. Nevertheless, we raised $750,000 in venture capital, built the product, and rolled it out to a couple of beta customers.

Ventilla knew he didn't have enough experience to run the start-up, so he eventually transitioned from the CEO role and went back to school. He and his teammates ultimately sold the business during his junior year. After Ventilla graduated from Yale College in 2002, he entered Yale School of Management's three-year Silver Scholars program. Students admitted directly from college completed the MBA curriculum in their first and last years in the program and spent their middle year in a full-time internship. Ventilla's internship turned into a two-and-a-half year stint working for the CEO of Trader Classified Media, a $2 billion classified advertising business in Europe. After completing his MBA, Ventilla joined Google's internal strategic consulting team. He enjoyed working on a diverse set of projects, but missed being able to "sink his teeth deep into anything."

In early 2007, Ventilla discussed doing a start-up with his older sister's friend, Damon Horowitz, who was completing a PhD in philosophy and linguistics at Stanford University. Prior to Stanford, Horowitz had earned a BA in computer science from Columbia University and a MS from MIT's Media Lab, and had built businesses that leveraged artificial intelligence (AI) and natural language processing technologies. When Ventilla approached him, Horowitz was initially reluctant to embark on another start-up. He recalled, "I had learned from several efforts that a great AI algorithm was not enough to overcome shortcomings in problem definition and product development. I didn't want to build another product with cool software that nobody cared about. I was ambivalent about sinking lots of time into another start-up, so I told Max that I'd come along as an adviser."

Ventilla also worried that his timing was premature. He explained, "I thought that it might be hard to raise capital without more experience. But a friend who'd made a lot of money in securities trading convinced me it would be easier to go full-throttle on a start-up when I was younger and said he'd invest $300,000 in my start-up, even though Damon and I didn't have an idea yet." Horowitz eventually agreed to shed his adviser role to be a cofounder, and Ventilla convinced a Google colleague, Stoll, as well as Spiro, a friend from Yale, to also join as cofounders. (See **Exhibit 2** for founder biographies.)

Idea Search

With seed funding secured, Ventilla left Google in July 2007, and started meeting with Horowitz, Stoll, and Spiro to brainstorm ideas. Ventilla commented, "We committed to waiting six months before we started building a product. It takes real discipline to say, 'I won't latch onto an idea for half a year, no matter how promising it seems.' But several of us had been previously burned by jumping too quickly into product development."

The team identified the broad space in which they would search for a product idea. They wanted to leverage the Internet to help make decisions that required human judgment. Ventilla explained:[1]

> Web applications had tremendous amounts of data, functionality, and engagement, but it was still difficult to make everyday decisions using the Internet. We were interested in that big problem. But, within that arena, we weren't committed to any particular concept. We were wary of relying too much on vision and intuition in developing a product, so we wanted to create something that could be tested with users. We also wanted to evaluate ideas quickly, so we needed concepts that required relatively little programming before we could test them.
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> This meant restricting ourselves to a consumer product without a low latency requirement. We couldn't pursue a concept that needed to deliver results within one one-hundredth of a second, because that would take too much upfront engineering. Likewise, the product's success couldn't hinge on user-experience design in the form of a visually appealing, easy-to-use, and intuitive interface. Again, that type of product would take too long to develop. Our goal for any idea was to have a prototype that could be user tested within a month. After we saw what users thought, we could make corrections or discard the idea. We were trying to shoot down ideas quickly, and most of them got shot down before the prototype stage.

Ventilla typically came up with concepts, Stoll and Spiro built prototypes, and Horowitz served as sounding board and executioner. Ventilla said, "Our goal was to convince Damon that an idea was worth spending time on, which was a pretty high bar." To clear this bar, an idea had to (1) represent a large market opportunity, (2) leverage multiple online platforms—in particular, smartphones, which were rapidly penetrating mainstream markets, and (3) elicit an emotional response from users ("Oh, I love that!"). With respect to the last criterion, Horowitz said, "We didn't want to mine knowledge on the Web—Google is good at that. We wanted to mine knowledge in people's heads. And how do we get into their heads? Through sentiment; people are going to participate because people want to help other people."

The team explored many ideas and built five prototypes before coming up with a concept for a social search engine, which eventually became Aardvark. (See **Exhibit 3** for a list of the other five prototyped ideas.) Building and evaluating each prototype entailed two to four weeks of effort, including tests with 100 to 200 friends. Ventilla recalled:

> We used "smoke tests" to see whether consumers would respond to an invitation for a product that we hadn't yet built. If they didn't click through an invite, there was no point in building a prototype. We also would fake functionality by substituting humans for backend systems; these "mechanical turks"[a] pretended to be the product. We would see if our early users—who didn't know that they were using a turked product—kept coming back.
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> We were coming to the end of our six-month concept gestation period and we were getting nervous about not having a product. It felt terrible, killing baby after baby. Our results were unambiguously negative for all our ideas until we tested the prototype that became Aardvark. That prototype showed users' extreme willingness to answer questions without any kind of extrinsic reward.

Horowitz added, "We got a great user response for the prototype despite its crude design, but what really clinched it for me was that this product fit Max's personality perfectly. He's hypersocial; he loves to delegate; and he has a huge network. It would be a product he loved, and that's important, because as CEO he'd have to sell the idea to employees, investors, and partners."

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[a] The original Mechanical Turk, built in 1770, was a chess-playing machine that purported to be fully automated, but actually hid a human grandmaster inside.

Product Concept

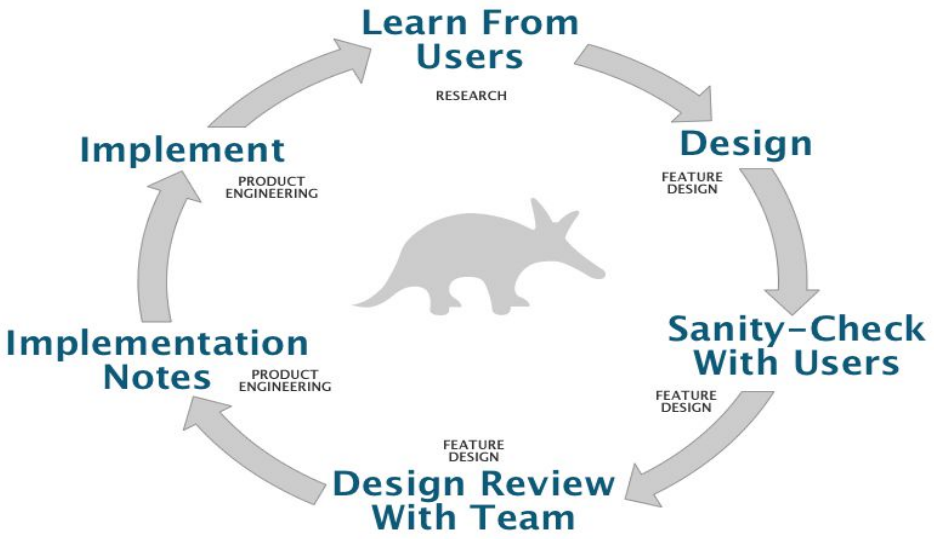
The cofounders believed that traditional web search engines like Google's were useful for answering questions with objective answers, such as "What is Einstein's birthday?" but less effective with questions that required subjective responses, such as "What's a good book to read about Romantic poets?" (See **Exhibit 4** for an Aardvark slide about subjective and objective questions.) They noted that subjective questions accounted for the lion's share of search revenues. The team also speculated that a satisfactory answer to a subjective question benefited from some level of trust between the asker and respondent. Individuals tended to rely on their immediate network of friends and family for answers, but this approach had drawbacks: only a fraction of one's contacts might be available at a given time; it was often difficult to determine who in one's network knew what; and requesting help might incur a social cost.

As more individuals embraced online social media such as Twitter and Facebook, the cofounders reasoned that they could design a product that could do a better job of delivering subjective information from trusted sources. Their social search engine prototype would be a new type of search service that identified people with relevant information within users' existing online social networks. Ideally, the service would be able to determine (1) who in the users' extended online network had expertise in a given area; (2) the strength of the connection between the asker and respondent—a proxy for the level of trust; and (3) whether the respondent was likely to answer, and if so, how quickly.

The cofounders chose the name "Aardvark" because it ensured high visibility in alphabetical listings (e.g., IM buddy lists). They also saw brand benefits from naming their product after this persistent, fast-digging animal. They used the URL "vark.com" to avoid misspellings of "aardvark" and to reinforce the brandable action verb "vark."

Product Development Process

Next, the cofounders established two product design principles. First, they agreed to seek user validation at every step of the development process. As Spiro explained, "We wanted to be user-driven—that is, we wanted to be informed by the interests and needs of people who were actually using Aardvark."[2] Second, the team "wanted to stay nimble with engineering by being highly collaborative and adaptive."[3] The cofounders conveyed these design principles in the following diagram:



In addition to running frequent A/B tests and soliciting user feedback by e-mail (with 50% response rates, on average), Aardvark's product designers regularly showed prototypes to potential users and interviewed them face-to-face to understand their needs and to solicit ideas about solutions. Horowitz explained, "We had people in every week. We asked our friends to come in; we grabbed people off the street; and we put listings on Craigslist offering a $15 Starbucks card to look at our mock-ups." He added:

> You have to be careful when interpreting user feedback. For a long time, we didn't have strong visual design skills on our team. Sometimes we'd test an idea and people's first reaction would be, "Wow, that's a funny looking page." We learned how to get past that first reaction by using talk-out-loud protocols. We'd get users to narrate their needs to determine if there was real value in an idea.

The designers would quickly design or revise product features in response to these interviews and then immediately seek feedback on the improvements. If it would be time consuming to build the actual feature, then the team would use a paper prototype (for features involving the user interface) or turk the feature (for those involving backend systems). Horowitz explained:

> We had a concept but no specific product attributes. What would be its form-factor: IM, text message, e-mail, website, all of the above? How exactly would you pose a question: in a search box? By just typing text into your IM or SMS client, or by pressing a button first? Should we have an audio interface with recorded responses? What should be the target time frames for different interactions? Did users want near-real-time answers, or would they wait a day? How much should the asker know about what was going on, for example, if we couldn't find anyone to answer? What about the respondent: how much should they know about who was asking the question? We had a huge space to explore.

Building on their earlier experience with turk testing, Ventilla and Horowitz made a commitment to a "Wizard of Oz"[b] infrastructure to learn about user behavior before the engineering team built an automated question-and-response service. The company retained a consulting firm to build software tools to be used by turk operators, and then asked the firm to build early product components. Horowitz said, "It didn't make sense to hire our own engineers to build these tools and components. Until we conceived and tested the product, we couldn't know what engineering skills we'd ultimately need. Hiring engineers is time consuming and mistakes are very costly, so this was the perfect way to use contractors." Ventilla recalled:

> Damon correctly predicted that it would take about a year to design and build the software platform that automatically routed questions to the right people. We believed one year was the ideal timeframe—one month would make our service too easy to copy, and if it took 10 years, the lights would be off before we finished. During that year, we hired humans who hid behind the curtain—just like in the Wizard of Oz—categorizing and routing questions. This way, we were able to learn things that informed our work on both the user interface and the backend systems.
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> We ran the service in Oz mode for nine months. As we learned more, we automated portions of the work of classifying and routing queries, and we gradually constrained the turks, so they did less and less of the work. The product has three main components: one is the gateway that interacts with various communication channels such as e-mail and IM; the second is the conversation manager that controls the flow of an exchange and understands the difference between a command to Aardvark and a user-to-user comment; the third is the matching engine that identifies topics in a question and determines to whom the question should go. Each of these components was run 100% by turks initially, but was gradually automated.
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> Our hypotheses about how people would use this product often turned out to be way off the mark. Things that we thought would be peripheral to the product were actually fundamental. One example was the ability to carry on multiple, simultaneous conversations within Aardvark. Our instinct had been to keep things simple by allowing conversations on only one topic at a time. But we learned quickly that people had a strong need to work on several topics simultaneously; they asked questions in bursts, without waiting for answers to earlier questions they'd posed.

On a weekly basis, the entire team reviewed design changes that had been tested with users and decided as a group how to proceed. The team prioritized the following week's work using agile software development methods. They assigned points to "stories" (i.e., specific software functions to be developed) based on the group's assessment of the work required to complete the story. They used Pivotal Tracker (a project management tool for agile developers) to estimate, based on past performance, how many points worth of projects they would try to complete during the coming week.

The company's blog provided transparency about product decisions. The founders and other employees posted questions to the user community and announced new features. Readers were encouraged to post responses or send e-mails to feedback@vark.com. The Aardvark team actively cultivated and managed the user community, designating 5% of their most active members as "Aardvocates" and sending them t-shirts and requests to vote on features.

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[b] In the movie *The Wizard of Oz*, the human wizard operates an imposing avatar from behind a curtain, invisible to Dorothy and her companions.

Ventilla said, "The goal of our product development process was to ensure eventual product-market fit. The goal for most entrepreneurs is to build the best possible product, without spending too much or missing target launch dates. That's the wrong goal. Your goal should be to get better and better at learning. The focus should be on the rate of acceleration of learning—on the second derivative."

Horowitz elaborated:

Rapid Iteration Added time in schedules to confront opposing viewpoints

> The duration of our development cycles—that is, the amount of time between major releases—got shorter over time. That's unusual for complex software: cycles often stretch out as the interdependencies between modules slow things down. After every cycle we had a big retrospective. Everybody would get together and we'd ask, "OK, what worked and what didn't?" This hyper-communication and the rapid iteration within the cycles allowed us to move quickly. We would actually build into our schedule times for doing nothing but confronting opposing viewpoints. In the long run, it paid off—though in the short term, it created a lot of headaches.
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> Hiring people who thrived with this type of process was absolutely crucial, and it wasn't easy. We needed team players, not developers who would go off and build their own dream and expect everybody to applaud.
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> I'm 10 years older than Max and we have very different interests and personalities. Different goals, too. He wanted to make a big splash with this start-up. I wanted to build a product that reflects my sensibilities about the role of technology in the world. Max is plugged into the Silicon Valley culture: he knows everyone in that world, which start-ups are hot, and how to dazzle investors and the press. Since I've been down the start-up path several times, sometimes I find it hard to drink that Kool-Aid. Due to these differences, we're not like a lot of start-ups, where the founders create a strong reality distortion field and the path forward seems crystal clear. At Aardvark, one cofounder's new ideas often sound preposterous to another. That skepticism is very helpful. But the most valuable thing we have isn't our process or this skepticism; it is the tight bond of trust between Max and me.

The cofounders raised venture funding before Aardvark completed its end-to-end system. Ventilla recalled, "We raised $2 million in seed financing from high-profile angels and then a $5.1 million A round led by August Capital—all while we still had turks running our backend." Given their stage, the founders pursued investment from sources that would allow the company to evolve gradually. Horowitz added, "This was not the kind of start-up in which investors closely controlled strategy, personnel, and operating decisions. Both our early angels and our VC pretty much let us do our own thing—though having them available for advice at crucial points was invaluable."

Product Launch

Aardvark finished a fully automated version of the product in September 2008. Still, the team recognized that the product was rough around the edges, so they delayed its public release to coincide with the South by Southwest (SXSW) Interactive Festival in March 2009. In the meantime, the company expanded its user base by allowing beta users to invite others to participate. The version launched at SXSW operated through IM services and certain e-mail clients; the vark.com website was added later in 2009. Horowitz commented on the decision to focus initially on IM, "We wanted users to feel like they were engaging in a conversation with someone. We didn't want Aardvark to look like a Q&A website with public information, like Yahoo! Answers."

Version 1.0 required registrants to provide an e-mail or IM address. Users were also asked to list at least three topics in which they had expertise (e.g., Australia, snowboarding, digital photography). Aardvark then requested permission to access a registrant's Facebook profile to find friends who were also registered with Aardvark. These friends formed the core of a user's Aardvark network. When a user asked a question, Aardvark searched the expertise of the user's friends and *their* friends to find a potential respondent. A typical question was routed to between five and ten potential respondents, often friends of friends, with the goal of providing the user with two or three answers.

Upon public launch at SXSW in March 2009, there were "thousands of people in the system,"[4] but the product had lingering performance issues. Consequently, Aardvark employees were still overseeing elements of question routing. Ventilla explained, "We needed to launch at some point, and we were getting antsy. We wanted to claim the social search space before a rival stepped in."

The Aardvark team managed its own public relations. Ventilla commented, "We considered PR a core competence: crafting your brand is as difficult as crafting your product. Our brand image helped us hire great engineers and expanded our community. It's important that Aardvark users feel like they're part of something that really matters, and being part of a hot start-up fuels that perception."

Product Evolution

By the end of 2009, the cofounders were comfortable relying on automated algorithms to route questions. However, the algorithms were being constantly refined. Ventilla explained, "There are tons of variables to consider, and you learn as you gain experience with a bigger user base. We have to figure out how much weight to give in our algorithms to variables such as average response time, or the value of geographic versus demographic versus social proximity."

An iPhone launch increased registrations, and by October 2009 Aardvark had reached 100,000 users. (See **Exhibit 5** for user data.) Users still allowed Aardvark to access their friends through Facebook, but specifying areas of expertise became an optional step. The team believed that users would opt to answer questions after they experienced the community's generosity.

Aardvark continued to rely heavily on user feedback to fine-tune its product, bringing in a dozen or so existing and potential users weekly for one-on-one interviews. Ventilla commented:

> The interviews were separated by 45 minutes. Developers would sit in, and then spend the next 45 minutes coding a fix to issues they had just heard about. The next test subject would interact with the revised version.
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> User-centered development helps us attract better engineers; they want to build products that users love. Ultimately, this user-centric approach is a tax. It takes us about twice as long to build the product this way. However, as long as I can raise money, attract good people, and create buzz, in the end it is worth it because we'll create a much better product.

Horowitz commented on the team's decision not to build the two features most frequently requested by users: a searchable database of past questions and answers, and a list of all relevant questions that a user might answer at any point in time. He said: "In terms of archiving questions, we didn't want to recycle stale content. There are already plenty of places online to find that type of content. In terms of providing a list of questions that a user could answer, that was at odds with our desire to make Aardvark feel like a one-on-one conversation. In confronting these decisions, we listened to customers, but we also had very strong principles and we stuck to them."

The team also had to figure out how to handle objectionable content. Ventilla recalled, "When we launched our iPhone app, we saw a big spike in penis-themed questions and answers from teenage boys. In response, we came up with a principle: "Don't be paternalistic, but match like with like." This meant we'd allow people to ask whatever they like, but we'd only match questions to respondents who indicated expertise in an area.

By January 2010, users could ask questions through five channels: IM, e-mail, mobile applications (including SMS), Twitter, and the Vark.com website. (See **Exhibit 6** for images of each channel.) Aardvark found that of the asker experiences, 40% took place on the website, 35% on iPhone, 34% over IM, and 9% over e-mail (17% were multi-channel). Of the respondent experiences, 40% took place over IM, 24% on iPhone, 21% on the web, and 15% over e-mail. The company believed the product was sticky: 40% of users were still actively asking and answering questions five months after registration.

Monetization

Aardvark's cofounders believed that their product had considerable potential to generate advertising revenue. In late 2009, an analysis of 1,000 sample questions with 2,400 answers indicated that 14% of questions were suitable for generating leads (e.g., "Is motorcycle insurance required in the state of Florida?" "What is the best way to apply for a credit card?" "What military branches can you join if you have a DWI on your record?") and 26% were suitable for inserting affiliate links (e.g., "Which movie projector under $1,500 do you recommend?" "What are the best sites for playing poker on the Internet?" "What gift can I get my boyfriend that will be memorable and meaningful?"). The company believed that half of Aardvark queries had commercial intent, as compared to about one-third for traditional search engines. (See **Exhibit 7** for a breakdown of high commercial potential queries.)

Aardvark planned to create advertising inventory in two ways. Sponsored links could be shown to users when they submitted queries. In addition, Aardvark could add links to responses and could receive compensation if a user clicked on the link or purchased an item based on the Aardvark suggestion. The company intended to rely on third parties to manage advertising inventory in the first year or two, and then planned to develop its own ad sales team.

In late 2009 the company forecast revenues of less than $1 million in 2010, assuming CPM (cost-per-thousand impressions) advertising rates of $13 and millions of users by year-end. To become a breakout success, the founders projected that Aardvark would have to reach users in the tens of millions with $35 CPMs in 2012. At those rates, with 60 million users, they estimated they could reach $5 million of operating income that year on revenues exceeding $30 million. (See **Exhibit 8** for aggressive-case financial projections.) As of early 2010, the company had 30 employees, 22 of whom worked in engineering functions; the balance were in product management, operations, or support roles.

Challenges

To achieve its financial goals, Aardvark needed many more new users. The cofounders had learned they could only pose so many questions to users over a given time period without burning them out. They also wanted users who both asked and answered questions, in contrast to many other answer sites where a small fraction of users answered most questions. Aardvark extensively tested the ideal number of people to contact for each question. Its goal was to provide at least one answer to 90% of questions, with half of the questions answered in less than five minutes. Aardvark found that it needed to contact an average of seven people to generate a single answer, and that 56% of

Aardvark's requests for answers yielded a reply (though not always an answer). Surges of new users proved difficult to handle. Ventilla explained, "New users ask questions when they arrive; initially, they are less inclined to answer questions. With rapid growth, this creates a challenge in keeping the right question and answer balance."

While Aardvark's growth had accelerated in late 2009, it was unclear whether the service was sufficiently viral to sustain this momentum. Horowitz commented, "We get word-of-mouth referrals, and users have tools for inviting their friends to the service. However, people are fatigued with such invitations, which makes users reluctant to send them. We tried user meetups and encouraging referrals by designating Aardvocates. We also made it easy for users to broadcast the answers they received. But none of this really moved the needle in terms of driving growth."

The team considered routing questions to users' Facebook friends who were not Aardvark users, but decided against that tactic. Horowitz recalled, "We experimented with sending questions to people who had not heard of Aardvark. We never got beyond experimental phases because we knew these people wouldn't understand the context."

The team also considered awarding points or badges for answering questions. But, Horowitz explained, "We don't want to be a game where you're accumulating points; we want Aardvark to feel like a village where you run into somebody and you exchange information. We don't want to excite people to win a game; we want to empower them to help each other."

As Ventilla thought about the company's growth, he reflected:

> Aardvark is not a form factor that people readily understand, because it's not really a product—it's more like a contact. You "friend" it; you talk to it like an IM buddy. But your interaction with it is different depending on the platform you are using. It benefits tremendously from existing applications; that was part of the original vision. We wanted to latch onto the IM services, e-mail programs, and mobile devices that people already use all day. We let them interact with Aardvark in ways that are natural for those platforms.
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> One way to drive more traffic to the service would be to do business development deals that would allow deeper integration with some of these platforms. We're an attractive partner. We have a killer team, and we've got an incredibly current idea—social Q&A—that's at the intersection of social networks and search: an extremely hot spot.

Horowitz added:

> We can attach Aardvark to distribution platforms, so we are talking to search companies, social networks, you name it. . . . But it remains unclear how far along the idea is in terms of going mainstream: are we half of the way there or 1/100th of the way there? As we think about the timing for distribution deals, there is always the fear that the online giants are going to enter our space. It's not obvious that they'd do a good job with social search. They might spoil things for everyone by making users afraid of these services.

Ventilla thought about these challenges and ways to increase the number of Aardvark users as he walked down the hall to hear more about Anna's relocation. He found her in a conference room, watching a user test a new feature. He was pleased that the team was still meeting with users, getting feedback every step of the way. Ventilla knew it would be challenging to grow Aardvark into the service the cofounders envisioned, but he had faith that as long as they stayed focused on the user experience, they would get there.

Exhibit 1 Aardvark Blog

How Aardvark helped me move

By Anna, Spider Pig | Published: January 13, 2010

Hi everyone! I'm Anna, and I work in Operations at Aardvark.

The last few weeks have been crazy for me as I passed through a young-adulthood rite of passage: getting my first apartment on my own. I'd been living with roommates, and there was definitely a lot I didn't know about finding a place, dealing with landlords, and diagnosing those oh-so-mysterious home repair issues that come up.

Lucky for me, I had the Aardvark community to call on for help every step of the way. I wanted to share some of my experiences since I think they're a great illustration of the diversity of experts out there on Aardvark.

Step 1: Choosing a place! I found a place I really loved, but the property management company had a sketchy reputation. Aardvark users came to my aid (http://vark.com/t/70166f) and I got a good list of questions to vet the company with. I also got a great suggestion to ask them for references, and talked to a nice tenant in the same building who put my mind at ease.

Step 2: Packing! After being in the same place for 3 years, I had a ton of extra stuff. I turned to Aardvark and had a great pointer in 2 minutes to a local thrift store that would come to my house and pick stuff up: http://vark.com/t/cde5c3

Step 3: Moving my cat! My cat hates moving — last time she wedged herself in a tiny hole in the laundry room and wouldn't come out for ages. Aardvark's cat lovers gave me great advice on how to make things go more smoothly: http://vark.com/t/d38452

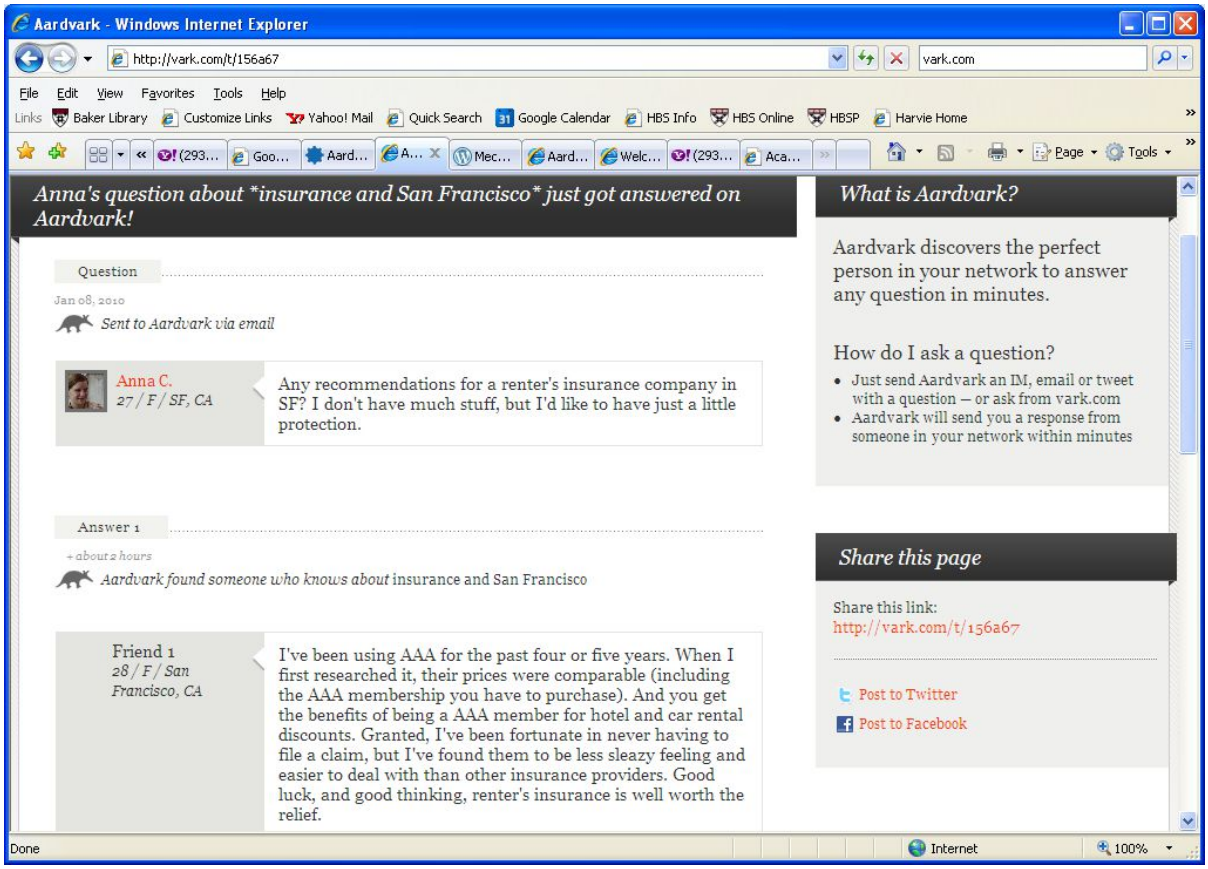
Step 4: Oh no, the water coming out of the faucets had a ton of weird black stuff in it! Lots of plumbing experts gave me ideas about what might be going on: http://vark.com/t/afa1d0. And then there was this other problem with the stove — again, Aardvark users offered a variety of helpful perspectives: http://vark.com/t/b04110.

Step 5: Wow, that old college futon I broke out of storage for my new place is really uncomfortable. Aardvark users gave me helpful suggestions on how to get a good night's sleep without investing in a whole new bed: http://vark.com/t/9a7f95

Step 6: Hmm, maybe I should have renter's insurance. Other San Francisco renters let me know what companies/coverage had worked for them: http://vark.com/t/156a67

Thanks to everyone in the community for helping me out! If any of you have had great experiences using Aardvark to help you with life's larger problems, I'd love to hear about them (or post about them on our Facebook Page!)

Renter's Insurance:



Source: Company blog.

Exhibit 2 Founder Biographies

Max Ventilla, Zoo Director, drives Aardvark's strategy and business development. Max came from Google where he focused on strategy for Google's marketing and monetization initiatives around Adsense and Web applications. Previously, he was VP of Business Development for Trader Classified Media and founded Krypteian Systems (acquired by Corporate Smarts), an enterprise e-mail datamining tool powering expertise and contact directories. Max has a BS in Math and Physics and a MBA from Yale.

Damon Horowitz, Lion Tamer, oversees product development and research strategy. Since working under Marvin Minsky in the 1990s, Damon has built numerous companies around applications of intelligent language processing. Damon cofounded Perspecta (acquired by Excite), served as Senior Architect for Novation Biosciences (acquired by Agilent), and cofounded NewsDB (now Daylife). He has a BA in Computer Science from Columbia, a MS from MIT Media Lab, and a PhD from Stanford.

Nathan Stoll, Keeper of Insectivores, leads all infrastructure and release initiatives. Nathan came from Google, where he headed Google News for three years, overseeing its rapid expansion to more than 40 countries and growth into one of the top global news sites. In his first few years at Google, Nathan launched Google Suggest and helped develop the Adwords system and Adsense pricing models. Nathan holds a BS in Computer Science and a BA in Political Science from Stanford.

Rob Spiro, Assistant Curator of Birds, leads Aardvark's quantitative and qualitative user research initiatives. Rob's constant focus is making sure that Aardvark is easy to understand and intuitive to use—and solves real user needs. Previously, Rob cofounded Mifly, a mobile software start-up, and Reelblogs, a new media company, after working in consulting. Rob holds a BA in History from Yale.

Source: Company.

Exhibit 3 Product Ideas Tested by Aardvark Cofounders

Rekkit - A service to collect your ratings from across the web and give better recommendations to you.

Ninjapa - A way that you could open accounts in various applications through a single website and manage your data across multiple sites.

The Webb - A central number that you could call and talk to a person who could do anything for you that you could do online.

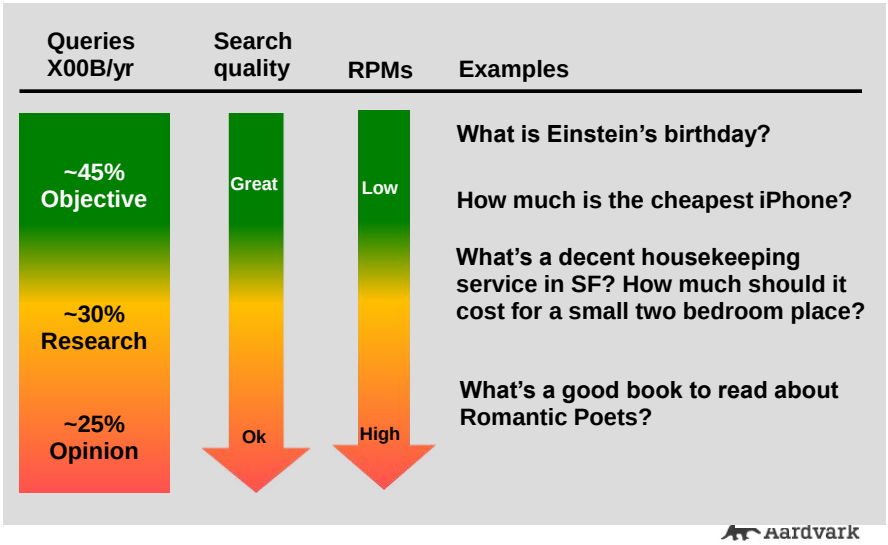
Web Macros - A way to record sequences of steps on websites so that you could repeat common actions, even across sites, and share "recipes" for how you accomplished online tasks.

Internet Button Company - A way to package steps taken on a website and smart form-fill functionality. People could encode buttons and share buttons a la social bookmarking.

Aardvark

Source: Company.

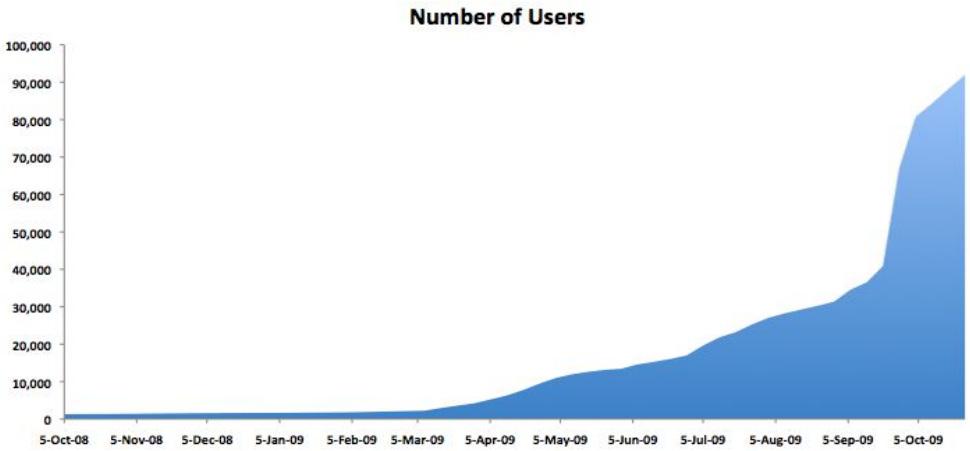
Exhibit 4 Aardvark Slide about Using Search for Objective and Subjective Questions



Note: RPM= revenue per 1,000 impressions

Source: Company.

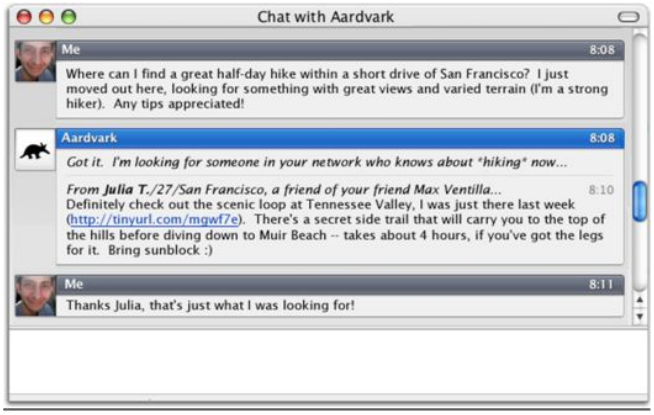
Exhibit 5 Aardvark User Data



Source: Company data.

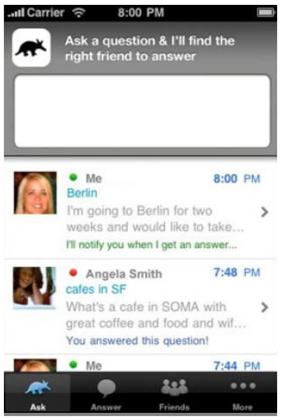
Exhibit 6 Images of Aardvark Conversations on Multiple Channels

Instant Messenger

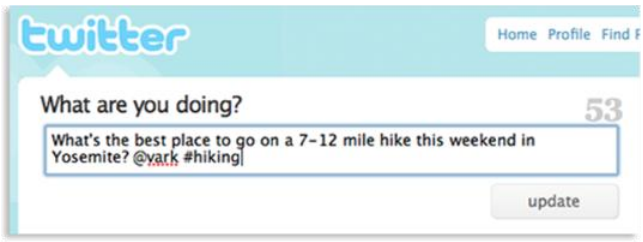


E-mail

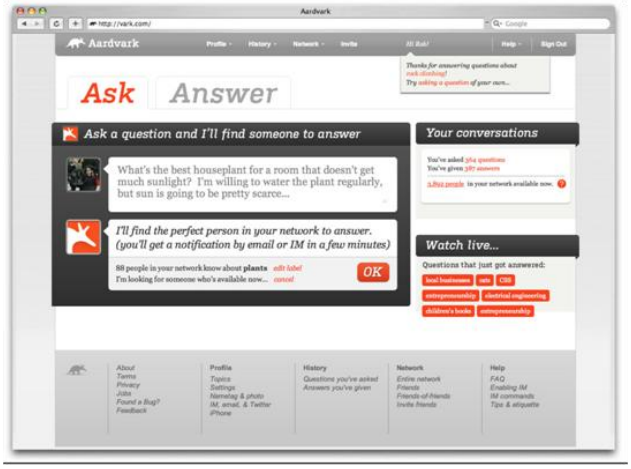
Mobile



Twitter

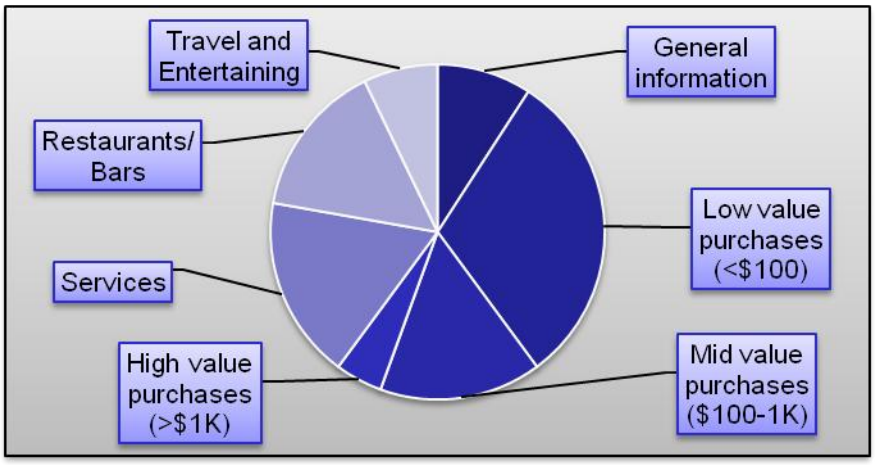


Website



Source: Company.

Exhibit 7 Category Breakdown for High Commercial Potential Queries



Source: Company.

Exhibit 8 Stretch-Case Business Model (as of November 2009)

Key Assumptions	CY '08 A	CY '09	Q1 '10	Q2 '10	Q3 '10	Q4 '10	CY '10	CY '11	CY '12	CY '13
Registered Users (000s)	2	181	529	1,475	3,881	9,177	9,177	24,839	60,245	126,992
Total Queries / Day (000s)	-	6	18	53	146	375	375	1,123	2,913	6,417
CPM (Actual)	$0.00	$0.48	$2.06	$4.82	$9.61	$16.30	$13.29	$32.25	$38.48	$43.09
P&L ($000s)										
Revenue (net)	$0	$0	$2	$15	$85	$383	$486	$10,884	$33,805	$82,861
Cost of Revenue*		$1	$2	$7	$23	$70	$103	$854	$2,308	$5,598
Gross Profit	$0	($1)	($0)	$8	$62	$313	$383	$10,029	$31,497	$77,262
GP Margin				51%	73%	82%	79%	92%	93%	93%
Operating Expenses										
Sales, Marketing, and Operations**	$275	$264	$99	$139	$207	$327	$771	$3,728	$9,761	$23,471
Product Development	$916	$1,833	$737	$901	$1,123	$1,330	$4,091	$6,722	$10,082	$14,488
General & Admin.	$181	$965	$464	$551	$664	$767	$2,443	$3,994	$6,123	$9,949
Total OpEx	$1,372	$3,062	$1,300	$1,592	$1,995	$2,425	$7,312	$14,445	$25,967	$47,909
Operating Income / (Loss)	($1,372)	($3,063)	($1,300)	($1,585)	($1,933)	($2,112)	($6,930)	($4,415)	$5,530	$29,353
OI Margin									16%	35%
Cash ($000s)	$4,750	$1,687	$387	($1,197)	($3,131)	($5,242)	($5,242)	($9,658)	($4,128)	$25,225
Headcount	14	32	39	47	57	65	65	96	143	217

* Cost of Revenues includes Serving Costs, Traffic Acquisition Costs, and Transaction Costs (i.e., billing expenses, credit card fees, and fraud).
** Sales, Marketing, and Operations includes Salary and Headcount Related Expenses and Sales Commissions.

Notes and Assumptions
Registered Users assumes viral growth picking up in 2009 and then continuing but slowing from rates enjoyed during 2010 to 2011 during 2012 to 2013.
We will rely on 3rd parties for ad inventory and potentially for ad selection initially. Coverage and CPM will be reduced but sales costs are also low initially as a result.
OpEx generally scales with headcount, dominated by product development until direct sales start driving revenue growth in 2012 and 2013 and sales commissions rise.

Source: Company data.

Endnotes

[1] Several quotes by Ventilla and Horowitz are adapted with their permission from comments they made at the Startup Lessons Learned Conference, April 23, 2010.

[2] Rob Spiro, "Our Approach to Design and Development Processes," post on "Aardvark Blog," http://blog.vark.com/?p=49, accessed November 2010.

[3] Ibid.

[4] Danny Sullivan, "Aardvark 'Help Engine' Open to Wider Use," March 13, 2009, http://searchengineland.com/aardvark-help-engine-opens-16919, accessed January 2011.