Basepaws’ Moonshot Idea for Creating DNA Database to Eradicate Disease in Pets Will Also Help Humans

THE CHALLENGE
Using cats and dogs as genetic models for humans to help eradicate genetic disease in both.

THE RESULT
Successful two-year-old startup launched the first genetic test for felines, pioneering a new way of using pet DNA data across many channels. Their feline database will help owners, veterinarians, breeders, rescue organizations, and pet food companies understand the link between a pet’s DNA and its traits, nutritional needs, and likelihood for common disorders and diseases.

COMPANY: Basepaws
FOUNDED: 2016
INDUSTRY: Biotech

RESULTS, OUTCOMES, AND ACHIEVEMENTS
- First cat care company built around genetics.
- Raised $350K in pre-seed funding.
- From idea to first product in five months, 3x faster than typical biotech startups.
- 2,000 paying customers in the first 12 months; month-over-month business growth of 20-50%.
“I was tired of founding companies that just cared about the bottom line. I needed to put my skills toward something else, something more positive and impactful.”

— Anna Skaya, Co-founder and CEO at Basepaws

A woman born in Ukraine to scientist parents moves to the U.S. as a kid. At age 26, she helps found her first company in London, which she sells a year later to Groupon. She then builds another startup that developed a patented technology and methodology enabling advertisers to better reach relevant customers. Another startup used big data algorithms to help people across the world build credit scores and apply for credit. Then came BreakupBuddy, designed to be a lifestyle guide, online community, and a support hub to help people recover from romantic breakups.

But to her, she'd spent years developing startups that got people to click on ads, raise their credit consumption levels, and another dating site. These attempts—and, in her mind, failures—to make a difference led her to Singularity University (SU), where she hoped to finally build a successful startup that would create meaningful change in the world.

“I love being a founder. I love hustling and getting things done,” said Anna Skaya, Co-founder and CEO of biotech startup Basepaws. “I’ve lived all around the world and had companies in Russia and the U.K., but I’d become disillusioned. The work I’d done was really deflating. I was tired of founding companies that just cared about the bottom line. I needed to put my skills toward something else, something more positive and impactful.”

In the midst of her first three startups, Skaya had made a personal discovery that further shaped her thinking about her next endeavor. While living in Russia in 2013, she learned about genomic testing and about 23andMe. Having a Jewish mother and a Russian father, she had always heard discussions at home about mixed backgrounds, but she was suspicious of the insights that DNA testing could deliver. That winter she visited the U.S. and decided to try it. The results she received were alarming but hooked her forever on the benefits of genomic testing.

What rocked her world was the finding that she had a much higher chance of getting a certain type of cancer. She'd had no idea it was a problem in her family. She recalled, “I hadn’t asked the question and it turns out it was in my family’s past but no one talked about it. My grandmother had died from that particular cancer when I was a kid and no one had ever mentioned it.” With this new information, she
knew she had to have higher awareness much earlier than other people without that family history. She talked to her doctor and is now much more cautious about her health.

“Here’s a place where you take smart people and have them create companies for impact, not for profit.”
— Anna Skaya

“I was in awe that I was armed with this knowledge and able to do something proactive to protect myself,” Skaya said. “I offered to my friends to get them 23andMe kits for anyone who wanted one. I ended up getting 20+ responses and bringing the kits back into Russia. The empowerment I felt as a result of the testing was completely new and magical. I’d opened a door to something I had no idea existed. It was like someone could see inside of me.”

In the winter of 2015, after her initial startups and personal discovery of genomic testing, Skaya read about Singularity University (SU) and its mission to use exponential technology to solve global challenges. And she thought, “Here’s a place where you take smart people and have them create companies for impact, not for profit.”

“I had just spent five years creating things that didn’t do much for the world,” she said. “SU was looking for two types of people, those with core technology skills and founders that they could put together to come up with unique new ideas for companies. So I applied to the Global Solutions Program (now known as the Global Startup Program) in 2016 and was accepted. At this point, I knew I wanted to do something in health that would be impactful. It ended up that I was at SU for the next five and a half months because I met my co-founder, refined our health idea around the cat genome, and was invited to attend the SU Incubator to turn it into a business.”

“We grew out of SU organically because they have been with us from the beginning.”
— Anna Skaya

How a 23andMe Experience Became a Moonshot Idea

SU’s Global Startup Program (GSP), previously known as the Global Solutions Program, invites talented entrepreneurs from around the world to its campus in Silicon Valley to refine their ideas into moonshots, which are defined as having the real potential to impact a billion people within the next ten years. During the GSP, Skaya met her co-founder, Shan Zhao, who had a background in genetics and bioinformatics which complemented her own background in consumer products and branding. The offices for 23andMe were just down the street from the SU campus, prompting their discussion about genomic expression and what they could do with it.

As they brainstormed, the idea of combining pets and genetics came out of the discussion. Two-thirds of American families have a pet and household pets carry up to 90 percent of the same genes as their owners, making the connection between human and animal genetics key to improving human medicine. They also began to think about how they might move beyond pets in the long term. What if they could also improve drug targeting in people by using pets as genetic models for human disease? Cats, which carry most of the same genes as humans, also develop disease in a very similar way. Could studying pets help us understand humans better? Well, for that they’d need a database of cat genetics. Bingo.
As they worked with their advisor, Raymond McCauley, SU’s Chair of Biotechnology and BioInformatics, Skaya and Zhao refined their original idea of a “23andMe for pets” and began working on R&D at SU Labs. “We grew out of SU organically because they have been with us from the beginning,” noted Skaya. “We’re very ingrained at SU. They advised us, were there to help troubleshoot problems, and gave us the offices and lab space we needed to develop our company. I come back to campus from our headquarters in L.A. often and consider SU our home base in the Bay Area.”

At the GSP, Skaya and Zhao learned about the latest developments in biotechnology from McCauley and other experts in the 170,000-strong global SU community. They knew they wanted to build a company around pet genomics, starting with cats, but they weren’t sure how to turn their idea into a moonshot that could have a 10x impact on the world. Working with McCauley they began to see that if they put together a database of the genomic results from millions of cats and dogs, a database on a scale far beyond anything that exists for humans, that would be the way to become exponential and be able to apply their findings to humans.

Incubating an Idea into a Successful Business

The Basepaws founders were next invited to attend SU’s 10-week Incubator, where they would validate their idea and new ways of applying technology. At the Incubator, Skaya and Zhao further defined the market need, collected customer feedback, prototyped their solution to the minimum viable product (MVP) stage, and learned the skills as well as the tools to start building a business plan.

“We had an interesting idea, but weren’t sure how it was going to work in the real world,” said Skaya. “So we spent a month talking to 200 people from a list of mentors that SU maintains from around the world. We spoke with professional people—executives—who are alumni of SU programs and have indicated that they are open to mentoring startups. We specifically looked for pharma executives on that list and those who had worked with animals. We even came across a veterinarian who has since become a long-term mentor for us.”

Skaya would spend an hour with each of these mentors to tell them about her venture and see whether they’d buy her product, and if so how much they’d pay. “We had all these amazing tools, including voice recognition software that would let prospects call and ask questions, and then all of the data would be dumped into a spreadsheet. This provided the know-how we needed to get to the MVP. By the end of the Incubator, I had a product that was ready for the market and I knew who I was going to sell it to and how I was going to sell it.

“Understanding our customer was the first and most important thing. The second was understanding how to find them.” — Anna Skaya

“Before we study tumors in humans, we have to study animals. This is the way the FDA works,” noted Skaya. “Today we get mice and inject them with tumors and watch the way they respond to treatment. But this is not a naturally occurring disease, and research results can so easily go wrong. So we did a lot of non-linear or exponential thinking and tinkering. We thought, these companion animals live with us and share our environment. They develop cancers the same way we do, so we may be able to see how nutrition, the environment, and genetics impact the onset and progression of the disease. If we had a large database of companion animals and observed that 10 percent had naturally occurring cancers, we’d have a much better base for R&D than we’d get by injecting mice with cancer.”
She compares the experience with SU mentors to speed dating. “They’d ask, ‘What is the problem you are solving for and what is your idea?’ Then we’d meet with pharma executives we’d never have had a chance to meet otherwise, but who were here at SU talking to all the healthcare startups really early in their development—companies like Pfizer.”

Skaya and Zhao spent most of their time at the Incubator in the lab, working with biotechnology experts to develop the technology behind their product. When people they talked to said how difficult it would be to get a cheek swab from a cat, they developed a tape to get the cat’s hair to do a DNA sample. Roy Natian, a Senior Maker in SU’s iLab, was Basepaws’ first designer, even helping them design their logo.

“It was all about iteration,” remembers Skaya. “We’d put the call out to anyone at SU who had a cat to ask if we could come to take hair samples. There are feral cats that live on the NASA campus where SU is headquartered and we’d try and find them. We’d be in the lab working with the lab staff for hours every day, developing the technology and our first cat kits.”

“Basepaws’ Business Plan

The company’s five-year business plan called for initially selling cat DNA kits at $100 each to consumers, who they found in the SU community and by word of mouth—an effective strategy since people love talking about their pets. By 2018, Basepaws’ product was almost a year old and the team had already sold kits to 2,000 customers and had made enough money to cover their expenses. Their business is growing at an astonishing rate: 20 percent, 30 percent, and, in some months, even 50 percent month-over-month.

According to Skaya, “We found people and offered discounts at first or sometimes we had free trials if people would talk about us and share Basepaws with their friends. Understanding our customer was the first and most important thing. The second was understanding how to find them. We started by working directly with pet owners, and we’re now starting to work with veterinarians.”

“I need to show investors how well we can sell this product and how interesting what we are doing is to the larger world.”

— Anna Skaya

Year two of the Basepaws business plan is focused on scaling the business to build that database of five million records. How will the company go from selling 400 kits a month to 4000? They plan to scale by securing $2 million in funding; introducing kits for dogs; broadening their promotion and channels beyond owners to enlist veterinarians, breeders, and shelters to help them sell; and using their data to help pet food researchers and owners learn how to feed pets better. Work is already underway to partner with a large pet food brand that may become an investor and help Basepaws conduct R&D around pet food.

“If we can feed our pets better, there are fewer cat hairballs, fewer upset stomachs, and less food wasted. And we’ve found that pet care companies are really open to bringing innovation to their brands,” said Skaya.

Also on the Basepaws roadmap is a plan to bring to market a mobile application that will be paired with a wearable pet device to send critical data in real time to the pet’s veterinarian. Pet owners who share biologically similar pets will also be able to connect with each other in communities based on genotype to share information.

As Skaya says, “I need to show investors how well we can sell this product and how interesting what we are doing is to the larger world. For Basepaws, the next four to five years are going to be about how we use this amazing database that we’ve created in R&D to develop drugs for pets and people.”
Using Exponential Science to Differentlytiate (and Make the World a Better Place)

By Anna Skaya, Co-founder and CEO of Basepaws

“SU is the place where we went from an idea we posted on the board as ‘23andMe for cats,’ to ‘pet genetics that can impact human drug discovery,’ an idea for a company that will impact a billion people in 10 years. The pitch I make to investors is that we have this great company that is already making money from a product we developed 3x faster than other biotech firms because, thanks to SU and what we learned there, our R&D process is really, really fast. More than that impressive fact, we also have a vision for how this technology will change the way that drugs are created for people, as well as for pets.

Investors want to see that this is going to be a billion-dollar business and the only way it will be is if we move beyond the ‘Hey, we’re a cute pet company’ concept and instead use this database for something much, much bigger.

And we are on track to deliver against our claims. By Q1 2019, we’ll have enough samples collected to start working on personalization of pet products for healthcare, therapeutics, drugs, and nutrition. We’ll be able to provide better nutrition sources for your pets based on their actual science versus the one-size-fits-all formulations and cutesy packaging on the shelf today. Personalized nutrition will match their metabolic activity and genetics.

Just as important as getting the millions of samples we need is finding the right samples. We’re looking for cats that have certain diseases or indications for those diseases in their DNA. We have a list of diseases and breeds that we’re interested in exploring and are fast-tracking them through our system.

Today there are three companies exploring DNA and disease in pets. Two are devoted to dogs and we are the only one looking at cats. But sooner rather than later we’ll all be in the same arena, and so from the very beginning we looked at how we could compete effectively against our bigger competitors. Our advantage for today and the future is in the technology we developed and our approach to sequencing.

Instead of using microarrays as our competitors do to analyze samples, we use a more advanced technique called sequencing. The difference is significant and in the long term our database will be stronger than those of our competitors. The good news is that by following others into the market, we were able to see and take advantage of what they were doing right and wrong, and where we could improve the process.”
Our advisor Raymond McCauley, the head of biotechnology at SU, was particularly helpful in understanding and developing the new technology. He worked with us using a competitor’s kit on his own dog. We laid everything out and, with his guidance, saw how we were going to be different. Even when we move to expanding our kits to the dog genome, we’ll continue to have a competitive advantage with sequencing.

The Difference Between Sequencing and Microarray

Most of today’s genomic testing is done by microarray technology, which generates data on tens of thousands of known markers on the genome. The disadvantages of microarrays are that the genomic regions need to be known beforehand and only specific known variants can be tested for, preventing data to be used to discover novel variants linked to diseases or traits. Since microarrays are designed based on available genomic information, as more data presents a clearer picture of the genomic landscape, microarrays must be continually updated and redesigned, making it a costly endeavor.

DNA sequencing can generate data on millions of markers at a similar price point with the added benefit of discovering new markers for traits and disease. The advantage of DNA sequencing is that we are directly generating data on what the sequence of the DNA is, allowing us to match to known variants or discover unknown supplemental variants. DNA sequencing is inherently more information-rich and yields a high-resolution picture of the genomic region of interest. Basepaws uses a variation of sequencing that keeps the cost down and ensures results are accurate and relevant.

Our sequencing method combines low-coverage sequencing with target-specific sequencing to maximize the value of the data. As a result, we can perform breed identifications and also test for known disease or trait markers at a much lower cost than microarray-based methods.

The way we prepare the sample for sequencing is also different. We utilize the whole genome amplification along with gene specific amplification and integrate both of these reactions within the dual-index Illumina sequencing library preparation. As a result, we can prepare samples for sequencing with less labor and reagent use, ultimately reducing operational complexity and cost.

The cross-species database of genotypic and pheno-typic data we are building at Basepaws is the first of its kind and will positively affect the health of all members of a family.”
SU and Basepaws At-a-Glance

SU PROGRAMS
GSP 2016
SU Incubator 2017

EXPONENTIAL TECHNOLOGIES
Digital Biology - Genomics
Bioinformatics

TRANSFORMATIVE PRACTICES
Design Thinking
Prototyping
Entrepreneurship

GLOBAL GRAND CHALLENGE
Health

About Singularity University
Singularity University (SU) is a global learning and innovation community using exponential technologies to tackle the world’s biggest challenges and build an abundant future for all. SU’s collaborative platform empowers individuals and organizations across the globe to learn, connect, and innovate breakthrough solutions using accelerating technologies like artificial intelligence, robotics, and digital biology. A certified benefit corporation headquartered at NASA Research Park in Silicon Valley, SU was founded in 2008 by renowned innovators Ray Kurzweil and Peter H. Diamandis with program funding from leading organizations including Google, Deloitte, and UNICEF. To learn more, visit SU.org, join us on Facebook, follow us on Twitter @SingularityU, and download the SU App.