# Audio file

[Planet Will Marshall and Robbie Schingler.mp3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

# [Transcript](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:00:00 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Hey really quick before we start the show, a lot of you have lots of questions about how I built this, like how do you pick guests or where do you record the show or how can I get in?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:00:09 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Touch with Howard Schultz. Spoiler.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:00:12 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Alert on that one. We can't help you, but we can try and answer any questions you might have about the show at work, or even me if you'd like to submit a question, please.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:00:21 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Is it guy raz.com and fill out the form and we'll answer some of your questions right here on the show in the coming weeks. Again, that's GUYR az.com.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:00:35 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[The first image that we got was a forested region in Oregon.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:00:40 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[I was asleep when we got our first picture in and Robbie, didn't you come and and wake me up with the picture? Since you remember. Like. Yes, here it is. And we were just like in awe because we could.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:00:53 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[See that the picture was in focus. We could see individual trees. We couldn't believe it. I mean, we're in tears and we're like, oh, my God, we've done it.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:01:05 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Like we can do this.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:01:06 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[We can do this.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:01:14 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[From NPR, it's how I built this a show about innovators, entrepreneurs, idealists and the stories behind the movements they built.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:01:25 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[I'm Guy Raz, and on the show today, how 3 scientists at NASA left their jobs to build satellites, literally in a garage and launched Planet Labs, a data company that now takes about 3 million photos of the Earth.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:01:40 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Every single day.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:01:48 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Sometimes starting a business can feel as complex as rocket science. The legal filings, the compliance letters, the accounting structure, and that's just the first few months. Now imagine doing all of that in addition to.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:02:04 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Actually doing rocket science, which is what makes the idea of Planet Labs seem almost insure.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:02:12 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Trouble because what Robbie Schindler and Will Marshall set out to do more than a decade ago was to completely reimagine the business of space satellites and to turn it into a simpler, cheaper and fundamentally more accessible tool for people to use. Robbie will and their partner.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:02:32 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Chris boss Hausen were all scientists at NASA and were way too familiar with the slow, bureaucratic and expensive process of getting a satellite launch.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:02:43 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Not to mention the size of those satellites. Some of them can be as big as a school bus. So what if the Co founders wondered? You could launch a much smaller satellite as small as a loaf of bread.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:02:57 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And do it for a.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:02:58 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Few $100,000 rather than hundreds of millions of dollars.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:03:03 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And what of those satellites? Instead of peering at distant stars?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:03:07 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Could be used to explore our own planet, to take millions of images of the Earth every day, tracking the health of crops and coral reefs, and detecting things like oil spills and forest fires. It turns out you can learn a lot about how the Earth is changing simply by photographing.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:03:27 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Every day.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:03:29 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Anyway, back when they launched Planet Labs in 2010, the three founders built their prototype satellites in a small garage in the Bay Area. They didn't have the money to work in a so-called clean room, hermetically sealed lab without any dust or particles, so they made their own version, using off the shelf items from target.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:03:50 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[The company has come a long way since then. Today it captures about 3 million images of the Earth a day.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:03:59 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And it's now simply known as planet. It also just went public on the New York Stock Exchange, raising nearly $600 million in capital. But let's start at the beginning before Will Marshall and Robbie Schindler met in 2001, they were leading sort of parallel lives on different sides of the world.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:04:20 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Will grew up in England and got a PhD in physics at Oxford. Robbie grew up in California and the Midwest. He also studied physics and both he and will spent time doing internships at NASA. The two of them finally met when they were both in their early 20s and attending a conference in Europe.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:04:38 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Yes, it was 2001 in grants in Austria where it was a a UN organized conference on basically using space to help humanity and and it gathered some really amazing people and and met Robbie. I can't remember the exact moment, but we definitely got on well.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:04:58 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Together at that forum.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:05:00 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And you you clicked right away. Robbie, what do you what do you remember about? Well, at the time.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:05:05 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[I remember what I remember of Will is outgoing, gregarious and and really.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:05:13 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[A motivator for people you know, he he really would, would always, always dream big and get people to stretch out of their comfort zone. So I remember that when I when I first met him and that it's it's so now true today than ever before. That is again one of his superpowers not only backed the envelope maths but also the ability to motivate people.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:05:31 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Yeah. And all right, so the two.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:05:32 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Of you meet at this.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:05:34 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And what what you just kind of kept in touch or or what? Like what? What did you because I know that you would begin to collaborate on different projects over the next few years. But at that conference what were you talking about that you wanted to?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:05:44 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Collaborate on. Yeah. So again, we have to remember this is 20 years ago and we were, you know, in our early 20s. And for me it was like meeting a.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:05:54 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Tribe right? People who saw the world in a similar way, and also all highly accomplished and highly motivated. So people wanted to work on.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:06:02 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Projects and at that time we had e-mail, yes. And so we'd go back home, back to our schools or grad school and. And so we would write papers together around space policy. So we would actually do around the world editing. You know, everyone would have it for like 8 hours at a time and hand it off and go around in a week. You'd, you'd have a really, really good paper and. And yeah, that was.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:06:23 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[But that was actually kind of the the Genesis really of of our.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:06:27 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Friendship and partnership was all about the art of creation, so.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:06:31 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Is it fair to say to both of you, Bill Rabbi, that at this time you guys were sort of part of this group of young kind of researchers working for, you know, space agencies and Space Research agencies, part of this group of young emerging, you know, scientists would have you.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:06:51 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Who were really wanted to.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:06:54 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[See if you could have some kind of influence over policy eventually, right? Is that? Is that fair to say that that's sort of how you?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:07:00 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[How you saw yourselves, I wouldn't say quite the the goal was policy. The the the goal was to have the effect on the world. We thought policy is 1 mechanism. I mean another is of course just in executing projects.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:07:13 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[I mean, I think it was more.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:07:15 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Towards the vision of using space to help humanity. You know, we can see that space played a big part in the Cold War and and in geopolitics, and it plays a big part in sustainability, monitoring the environment plays a big part in commerce.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:07:29 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Yes. And so much of infrastructure of our modern interconnected economy flows through space, and a lot of people just don't know about that. Yeah, we all, we all now have, you know, no GPS and and and location now. And it's just that is just back end infrastructure for society that that we actually.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:07:50 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Always expect to be there.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:07:52 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And those all come from space. And in fact if.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:07:54 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[I.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:07:54 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Mean like I don't know how deep you want to go into this stuff, but all of that started from military application and now has become a public good.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:07:59 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[MHM.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:08:02 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[I remember I mean in in 2002, I remember going to Afghanistan as a reporter, and there were a few people who had those guys.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:08:12 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And then like handheld devices that could kind of geolocate you, but they were very crude compared to what you see today on their iPhones and they were amazing.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:08:22 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And that was that was 20 years ago. Right. Like we we have to remember that that was not very far into the.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:08:29 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Past crazy, yeah.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:08:30 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And as Robbie was saying, the fact that you could navigate.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:08:32 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And the military had GPS back into the 70s or certainly by the.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:08:37 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[These and we're using it for guiding missiles, tanks, all this sort of stuff. But they they they had a very smart forethought that this would be a global good and important economically. And of course we certainly agree with that. And to Rob's point, a lot of these things started in military vector and and a lot of our focus was how can everyone else benefit from these things.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:08:58 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And again, like back to that theme, how do we use space tools to help everyone on the planet?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:09:04](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Hmm.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:09:05 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[So alright, you're you're both writing and collaborating on on various papers about about these types of things and and I guess in 2002 you got together at another space conference, but this this one was in Houston.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:09:19 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[That's right. One of the fun things that happened that that conference is we met Pete Warden. He's a good character introduce because he's relevant to our stories. So we've written one of these papers. One of them was basically about space weapons and keeping space from weaponization.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:09:37 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And then in this bar in Houston, where this conference is at a mutual friend had introduced us to General Pete Warden, who is basically running all the space weapon programs for the United States government in the Air Force. And we were like, what and our friend was like, well, this is, you know, the people that think that space weapons is a bad idea. These are people. And that runs the space weapon.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:09:58 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Programs have a go.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:09:59 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And we're in in this evening. We had this fascinating conversation about you can't build space weapons. That's bad. It's economically doesn't make sense. And it doesn't even work technically. And we were writing equations out and why it can't work technically. And then he was like ohh, you don't understand. I've got to protect US assets from threats. And you don't know what you're talking about.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:10:21 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And we got increasingly drunk, actually, because he kept on buying his drinks and.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:10:26 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[But the next day, to his credit, he wrote us an e-mail and he said, well, I've really enjoyed our conversation last night. Why don't we write a paper together? You guys write the Commons and I'll write the prose of space based weapon systems. Well, roll forward a few more years. He moved it from the Air Force to NASA to run NASA Ames Research Centre. And he basically invited us to come work with him.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:10:47 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And he was like, well, I know we disagree on this area, but this would be more about obviously science and exploration and we would love you to come and work.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:10:55 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[For me out there. So this guy, Pete. Warden, we should mention he he was the director of the Ames Research Centre.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:11:00 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Here I think until like 2015 or something for like he's kind of a a legendary figure in that world. And he was also it's interesting because I read a little bit about him. He was a real critic of the ASA. Like he was a public critic of the NASA bureaucracy and stuff like that. Right.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:11:17 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[A self licking ice cream cone, yeah.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:11:19 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Self licking ice cream cone or by NASA.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:11:22 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Yeah, he he was critical and he was also just very creative. But he was brought in to shake things up a little bit. And one of his ways of shaking things up a little bit was inviting young whippersnappers like Robbie and.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:11:33 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And others to come work for him and alongside some of the more, let's say, institutional folks that have been there for a while and let's let's see what comes up.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:11:42 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[So that was it, like he was. Basically, he ran the Games Research Center. I mean, it sounds a little bit like part of Xerox, you know, in the 70s, right where all this, I mean, he was a guy who could say, hey, he liked you guys. You challenged his thinking maybe or, you know. And he said, hey, why don't you come work for me at Ames Research Lab and and eventually you.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:12:02 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[You guys both said you both did.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:12:04 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[We jumped at the opportunity because he was very.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:12:06 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Like we, we'll sort of give you a canvas to help you to build spacecraft missions and and and we thought, wow, I mean, that's a really unique opportunity and it's very practical. We wanted to not just write the policy paper. We wanted to work on the system, whatever it was, to get there, to become a reality.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:12:25 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[All right. So you guys get to the Ames Research Center in Mountain View. At this point, I mean, you guys have known each other now for five years now you're in.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:12:35 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[The.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:12:35 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Same place and and you move in together, right? You you get, you get a house together.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:12:40 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Yes, when we flew out to NASA.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:12:41 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Names we were looking to build a community house. We like living in community. The fervor of intellectual conversations, and in fact, you've got a bit of a reputation for being a place where creative ideas happened. Uh, especially again at this intersection of space and and and Silicon Valley.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:12:59 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And and we'll get to this later. But you still both of you, still live together in a community house.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:13:05 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Which I I I was called the group House, but I guess it's a little different. So help me understand this you. There's nothing kind of different or unusual about like a group house especially for young people trying to save money. But this is not what that was you. It sounds like you very deliberately had this idea of a bunch of colleagues who worked together.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:13:26 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[At the Ames research.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:13:28 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Also, living together to continue the conversation that they were having at work.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:13:34 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Home.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:13:34 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[That's right. As if as if we weren't, we weren't full enough during the day. Yeah, no, actually. But it wasn't just NASA people. We had students who were at Stanford, people that worked at Apple, people that worked at Google, all these places. And that created a fervor of.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:13:45 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Got it.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:13:49 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Intellectual dizziness. That was always fun for us, so it was a mixture of sort of Silicon Valley and space in one house, you know, I had found it just on Craigslist happened. I just searched for the A house with more than six bedrooms, and it was the pretty much the only one.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:14:05 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Yeah.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:14:05 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[All right. So you guys moved to the Bay Area. You're living in a group house in Cupertino and be warden is your boss. And what did you guys do? What, what were your tasks to do? Help me understand. I mean, this is not everybody understands Space Research can mean a million things. Like journalism can mean a million things or finance can mean a million things. But.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:14:25 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[What? What? What? What were you actually working on?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:14:28 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[We we really wanted to what we were working on bringing small satellites to NASA, so you know will and I and and a bunch of other people.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:14:38 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Work to set up a mission design center, which is, you know when when you think about a new mission, what you can do with technology, the scientific utility, how to actually bring the team together, how much it's going to cost, how long it's going to take. That is the the very beginnings.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:14:51 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Of.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:14:52 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Articulating what a new mission could be. So we work to actually set that up with the insight.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:14:57 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[That we wanted to do satellites that were much smaller. If they're smaller, they're cheaper. If they're cheaper, you can take more risk. If you can take more risk, then you can have then and and they're cheaper. Then you can do more missions if you can do more missions and you diversify your risk and then it increases the acceleration of.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:15:12 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Knowledge and and so we we work to systematize that and and we set up the small spacecraft office there.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:15:17 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[All right, so.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:15:18 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[You were. And what were you working on, will?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:15:20 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Well, the same setting up the small spacecraft office. But then Robbie and I worked on a few different missions.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:15:26 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[When you're working for for both of you, when you're working in a place like the Ames Research Center, obviously a NASA lab is there. Is there, just, like, unlimited money to play around with, like, is it pretty straightforward? Like, hey, I have this idea and.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:15:41 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[There's just money available and not unlimited, but I mean is there kind of a big sandbox to play in and and funding for?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:15:47 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[It, I would say money is really hard to come by, but what you do have that aims in in particular, which is, you know, one of our research centers. So it's not a development center or a human Space Flight center, it's more of a Research Center.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:15:50 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Hmm.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:16:01 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[It it it's it's a really unique place. It's it's almost like being in a university as well as being in in like a a prototyping lab and capability kind of together. And so that's a perfect Petri dish. And I think that that's one of the reasons why Pete Warden wanted a a bit of a, you know, a younger generation of people to come in is to.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:16:21 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And you know, we were blind to all of the constraints because most constraints of of a large organization is is kind of.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:16:27 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Like you know.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:16:28 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Cultural and process oriented. It's we're blind to all that.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:16:32 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Stuff and and it allowed for us to just, like, take a first principles approach toward why don't we build it in this way? So we then came up with what would be like systemic projects, you know, projects that, you know, just get it done in 12 months or 24 months to then learn from that and then iterate and iterate. So then we can change.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:16:52 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[How space systems are are, are developed and and and what is the art of the possible that could be done?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:16:58 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And and meanwhile, will you and and another guy and NASA whose name is Chris Bosh Hausen.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:17:06 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[You were working on this project called Phone SAT. What exactly were you guys trying to?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:17:12 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Do. Yes. Well, it's pretty much what it says on the cover. It was putting a phone into space.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:17:17 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Putting a phone into it like in the space as a satellite.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:17:21 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Pretty much is to throw some fans in space. We actually put three and they were Google Nexus ones that we had got donated from Google.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:17:29 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Yeah, a big donation, like 250 bucks each.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:17:32 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Yeah, they gave us a box of them. But still, I agree. Yeah, and.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:17:36 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[But that was important because it was the first operating system that was open source and and really the insight that that the team had is.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:17:45 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[What's so different about a phone from a satellite?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:17:50 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And turns out like the engineering processes, the capabilities internally, all of that stuff is is very similar.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:17:58 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Robbie is exactly right. The If you like. If you look at the innards of a phone, it has GPS, it has cameras, it have radios, it has, and if you look at the list of things you need a satellite as GPS and cameras and radios and and it's actually most of the same. Remember, smartphones were very new, you know, it's only a few years after the iPhone had come out and.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:18:18 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And but but before they were just these clunky phones and now they sending out all these other things that were most of what? A spacecraft?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:18:24 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[We had to add some extra batteries and slightly Vega antenna for the radio in particular, but apart from that we literally stuck the phone into a little box and put three in the space. So actually I think I almost got fired for that project. Chris and I had started phone sat.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:18:44 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And you know, a small team on it. But we got quite a long way before, if you like, the officials at NASA knew it was happening. They were almost stuck on the.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:18:51 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Rocket by the.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:18:51 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Time they did. And they were like, what the heck are you doing putting phones into space? And we're like, come on, it's gonna be really interesting because we're gonna figure out if you.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:18:59 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[You can make satellites even cheaper and and and eventually like. OK fine. Have a go and the phones worked just fine in space and we had amateur radio astronomers around the world get these little yagi antennas. These, these little handheld antennas to, to follow the satellite. The little pictures that have been taking with the.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:19:19 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Phone, camera and e-mail them to us, and then we reconstructed these pictures and we're like, OK, it worked.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:19:27 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Alright, so this was a time where the I mean the idea was let's, let's talk. Let's kind of dump dive into satellites for a SEC.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:19:32 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Right.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:19:33 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[NASA obviously has the greatest space satellites in in human history, right? That you know, can look way out into the cosmos, but they're huge. Anybody who's been to the Air and Space Museum or, you know, one of these museums.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:19:49 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Where they've got.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:19:50 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Decommissioned spaceships can see how big some of these satellites.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:19:54 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Are they're huge or expensive? They.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:19:58 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[You know, they're not always totally reliable, so the idea was, hey, can we start to look at smaller satellites? It may not be as robust. It may not be able to do the kinds of things that like the Hubble can do, but could do pretty important things like take images of the earth. Was that the idea behind?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:20:18 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[This this NASA project.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:20:19 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[That's exactly right. That's exactly right. And and that, especially leveraging the miniaturization of electronics for phones and computers, it was a revolution. And we were like, how can we?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:20:30](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[MHM.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:20:33 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[In the space community leveraged that revolution. Historically, NASA had had to invent almost everything that its radios its microprocessors for the Apollo program, and they developed all this stuff themselves. But now the billions and billions of dollars that would be going on in the consumer electronics industry.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:20:53 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Apple and Samsung and Google and all these companies was far outpacing what NASA could spend on the development of electronics, and we were just like, OK, well, what if we learn to follow and leverage this?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:21:05 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Actually, a small phone sat like the one that we launched couldn't do what Hubble does because it doesn't have a big telescope, right? But they could do some things. They could take pictures at lower resolution, and that might be still useful for something, especially because we could put a lot of.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:21:12 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Right.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:21:20 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Them up there, right? Because there are obviously different kinds of satellites or communication satellites. I mean, some people have, yes.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:21:26 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Watch DIRECTV or, you know, watch television through satellite. SiriusXM radio channel. Is it is, it is satellite beamed from satellites.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:21:34 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Exactly right. And. And so when we briefly thought when we were thinking of leaving NASA to to do this project, we were mainly thinking about humanity.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:21:43 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[In and and commercial goals. And we were thinking about communication satellites or Earth observation, but when we looked and this is back to how Robbie and I met when we looked at what was then the Millennium Development Goals.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:21:58 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[These are the UN Millennium Development Goals, right?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:22:00 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Yes, correct, which is basically a summary of all the world's problems. We looked down that list and said how can we, as space geeks, help the biggest challenges on the Earth?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:22:09 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[It seemed to reason that if we could take more regular images of the earth, we could have a lot of them, and it's really true, like we could help stop deforestation and help people grow smarter crops. So help with their food access, we could help after disaster response after floods or fire, there were so many things that if we had more regular.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:22:30 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Symmetry.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:22:31 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Of the earth, typically before our mission, you could only get a new image of the earth maybe once every month, or sometimes every year, depending on the resolution you needed. We thought, well, why couldn't it be every day? And then that would be much more useful with disaster response and have to wait for a month for the flooding information? How about have the day before and the day afterwards?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:22:51 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[But help me understand how working on this.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:22:56 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Direct would eventually kind of inspire you guys to go off and do this on your own. What? What was it that that you saw in this technology and the possibility of it that then led you to say hey, we can actually do this and turn this into something bigger?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:23:13 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[It was very much the stars aligned moment.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:23:16 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[We realised was we had learned a little bit about how to build spacecraft at NASA and here was this list of all the world's problems.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:23:25 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And if we put up a lot of these little satellites, that would take pictures of the Earth, we could help a lot of those problems. It made most sense, especially when Silicon Valley, like we could go faster if we could just get private capital and we had just enough skills to pull that off. The world needed it. And the technology was just about ready, like, from all these consumer electronic.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:23:46 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[To make it happen.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:23:47 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And so we were like, oh, my God, it wasn't just a it wasn't. It didn't seem like an option to me at the time. It felt I was compelled because it was so obvious we should do this project. Everything lined up.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:24:04 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[When we come back in just a moment, how will Robbie and Chris start working on building a satellite the size of a bread box, and then how they managed to get that tiny satellite into orbit?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:24:18 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Stay with us. I'm Guy Raz, and you're listening to how I built.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:24:21 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[This.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:24:29 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

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[00:24:49 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

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[00:25:18 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Hey, welcome back to how I built this. I'm Guy Raz. So it's the last day of 2010. And will Robbie and another NASA scientist, Chris Bosh, Hausen, are getting together as they always do, on new.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:25:32 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Steve and as they clink their champagne glasses, the three of them are also talking about starting a business to build and launch small satellites for taking pictures of the Earth.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:25:45 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[We were there and Chris was there, we was there and they're like, we're going to do this and. And so I could tell.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:25:53 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[From Will and Chris there was that spark that the team knew they could do this and do this.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:26:00 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Quickly, and it does require throwing out a bit of the traditional processes around building aerospace systems. And so it wasn't something that we could actually do within within NASA. Well, if you guy, you started talking about, you know, the Hubble, you know it it's the size of.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:26:13 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Why not?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:26:21 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Of a school bus, it is a huge these are exquisite systems. They are amazing systems like the microprocessor was really scaled through aerospace capabilities, right? They had such hard problems to solve. They had to invent new technology and and and just like anyway.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:26:39 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Organization. When you become successful with a particular thing in the future, that could become an anchor for you.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:26:47 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Right. And so great, that's your success. You make a system out of it. You have all of these processes and then you actually do a requirements flow down. That's how you build engineering system and and that is how space systems are built.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:27:01 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[NASA and what we wanted to do was to do it the other way around. Just do good enough and and prototype it, learn from it, iterate.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:27:11 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Yeah. This so it was mainly we wanted to learn it. The Silicon Valley release, early release, often software strategy, then the requirements driven, very careful science project.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:27:22 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[NASA also the application was more like how do we help farmers? So that's a commercial application. How do we help disaster response? So that's a more humanitarian application. We wanted to help those things, whereas mass is really pretty much mandated to focus on science and exploration. This was about new.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:27:43 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Got it. OK. So you had this idea that in order to do what you wanted to do, you had.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:27:49 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[To leave NASA, So what?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:27:50 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Was the what was the first step you took? It was the three of you, right? It was. Will and Robbie, the two of you and Chris and the three of you. What? Sat down and said, hey, let's let's let's start a company together.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:28:01 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Yeah. Well, I guess we sort of slowly evolved over that next year. That was in 2010, just at the end of 2010, we we technically formed the company incorporated the company.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:28:11 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[But we slowly started moving more and more time from NASA to what became planet and Robbie and I were living in that group house called Rainbow, and we literally started building it in the garage and then eventually left NASA.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:28:25 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[All right, so now you guys decide to start a company and it's going to to be a company that that will launch small photographic satellites into space. What what that that's not the right term, not photographic satellites.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:28:39 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[What are they?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:28:40 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[We call them Earth observation satellites.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:28:42 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Earth observation. You got it. OK, earth observation.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:28:45 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[So building these things, by the way, just to build a prototype, right? How much would that cost? I'm just curious how much?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:28:52 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Money did it.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:28:53 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Cost to guess.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:28:53 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Do you recollect revenue?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:28:54 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[It was probably like on the order of like.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:28:56 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[$10,000.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:28:57 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[10,000 bucks. OK, so between the three of you, you could probably pull some money together and make it happen because you had savings from.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:29:03 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Your job.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:29:04 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[That's exactly what we did. We each put in $50,000 I.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:29:07 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Think.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:29:08 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[No, it wasn't that much. It was. It was actually three different amounts. I can't remember, but it was it was. It was.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:29:14 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Upwards to 50K.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:29:15 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Because that's still a lot.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:29:16 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Of money. Yeah, you're right. It was a lot for we were NASA type stipends. You know, this was not. We were not working for Google.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:29:26 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Well, so how did you guys?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:29:27 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Have the cash. Well, we just saved up. I guess we didn't live exactly a luxurious lifestyle. I mean, we didn't have family. We, we and and we lived in a Community house by choice.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:29:36 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And I guess one of the first things you guys did was to build a.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:29:41 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[A prototype of what your satellite would look like. I mean, you had some experience building things. So tell me about that prototype.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:29:49 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[We built a test one at Rainbow that this Community house in the garage. We added a camera system. Then we added all the other systems of radios and so on to make it a working satellite leveraging consumer electronics. Not exactly a phone like we use in phone sat, but a lot of the same underlying chips. It's actually with our own.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:30:08 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[The.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:30:08 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Boards and we'll do tests of it like radio tests across the whole of Silicon Valley across to the Lick Observatory, where we'd have some people go over there with a radio receiver, take a couple of hours to drive there. We'd stay with the satellite, and then we test the radios. Then we put the, the whole thing on the balloon and take it to 60,000 feet and really cold.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:30:30 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Atmosphere and and take the pictures and things like that very iterative approach.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:30:37 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Alright, so you have, so you've got some savings that you throw into into this company and you've got a prototype.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:30:45 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[But then what do you do? It's it's 2011, and I mean to get this off the ground. This is not like, like Tates cookies. It's been on the show or Stacy's pita chips, like, you know, or or kombucha like, you need millions and millions of dollars to start your company.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:31:03 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[You do.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:31:05 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Help me explain what you then once you have a prototype, what do you then do?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:31:09 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[You know will and I, as we were talking about when we first went to NASA Ames, one of the first things we did was set up that Mission Design Center to then design new missions and so forth. And all of this was was a new mission.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:31:21 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And so we we could, we could understand how much money we think is going to cost, what the schedule looks like and all of this stuff. But instead of asking for $100 million right, in order to actually build out the whole thing or actually at that point in time we thought 20 million would do it. We said OK, let's just get a satellite in space and just take a picture, just prove that one node.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:31:41 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And kind of.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:31:41 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Work alright, here's my question. Why did you need to prove this concept? If you had already essentially tested it when you worked for NASA?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:31:51 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Phones that didn't take exquisite imagery, remember it's just the phone camera and floating around in orbit to take quality imagery. We're really going to have to add a telescope. That was a really high quality telescope to take pictures. We're going to have to add a higher resolution camera. You know, I mentioned our missions. It was the whole earth.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:31:54 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Right.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:32:11 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[That was designed because we wanted to be able to see a tree because we thought we can't stop deforestation. If you don't see all the trees every day and see one being knocked.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:32:19 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Now and so we didn't know for sure, we could see that tree from space. The physics said it should be possible, but it wasn't completely obvious and we had to design A telescope out of a material that wouldn't expand and contract with temperature. Otherwise the the camera would go out of focus. So we had to really put it in.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:32:40 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Base because that's the only way you can really test it. Ultimately, is it going to work?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:32:44 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[So just to be clear, yeah, the idea was let's test the concept. Let's get our prototype up into space.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:32:50 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[It sounds straightforward, but we gotta get into space. How much does it cost to put something on a on a rocket ship into space?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:32:53 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Yes.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:32:58 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[At that point in time, there was the ability to hitch a ride to space.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:33:03 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Not the primary payload, but a secondary payload. That is what we used to 1st get the space all right so.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:33:09 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[You could hitch.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:33:11 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[A ride for the small satellite on a rocket.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:33:13 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[That was already going up with other cargo and I guess I should point out there's a there's like a whole industry that offers these kinds of services and and I guess you guys ended up working with two companies to get your satellites launched. There's an American company and then a a Russian company you worked with and how much was this going?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:33:32 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[To cost you.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:33:33 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Hundreds of thousands of dollars.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:33:35 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Hundreds of thousands of.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:33:36 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Dollars.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:33:36 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[I think it was $300,000 for the first one and it's about that for the second one and we decided we'd best to put one satellite on each of two.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:33:44 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[That's to give have redundancy.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:33:46 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And these better. These satellites weighed, what, 510 lbs.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:33:49 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[5 kilograms, which is about 10 lbs. Yes, just the size of a a loaf of bread.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:33:54 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Got it. OK. So you you sign up to get your satellites onto a rocket, but just to be clear, it's not like, you know our, our our arrival departure times are 98%. You know that like.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:34:09 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[If you're booking a date.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:34:11 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[On a rocket, it's not likely it's gonna go on that.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:34:13 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Date, right. That's exactly right. And that the the primary reason is because the the thing that the rocket is delivering, they set the schedule. So if they are late in building their satellite or they you know they're there's an anomaly that comes up and they need to spend more time.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:34:31 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Testing something? They'll push out that launch date us as a hitchhiking, like ride. Secondary payload. We are committed to that rocket.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:34:42 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Whenever it ends up.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:34:43 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Going so, alright, now that you had a space on a rocket, what? And and and? And you knew that it was going to happen. This is 2011. When you signed this deal.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:34:53 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Did you? Were you now able to go out and raise money? Cause it was still gonna be another what, presumably a year before you could launch this proof of concept?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:35:01 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[We had to raise a little bit to do these first couple of missions, so we decided to do the first two satellites we worked out that we'd need 2 or 3 million.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:35:10 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Tell us. But we didn't have all the capital to pay for those market riots in full. So let me rewind just a tiny bit on one of the tests of phone sat, the satellite project that we're working at NASA. We met someone there who was quite unassuming. There called Steve Jefferson who.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:35:29 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[As a venture capitalist actually became the main founder of Tesla and SpaceX and and we met him he because he likes launching rockets on the weekend and we were doing our NASA rocket and he was doing his personal rocket and.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:35:45 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[We took our test satellite.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:35:47 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And around November 2011, we planted it on his desk and we told him the back we said we're going to put a hundred of these into space and they're gonna image the whole world and it's going to have all these commercial opportunities and it's going to have all this impact on the planet. What do you give us some money? We also attracted a couple of other investors.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:36:10 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And then we had our first money in December 2011.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:36:14 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[When you when you pitched the idea to investors, I understand that you know that that you had idealistic motivations which, you know many entrepreneurs have, and that's certainly continues. But you still have to appeal to people who want to make money. And So what was the?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:36:32 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[How did you explain to investors that they they would make a return on that investment? Like how how how were you guys going to make?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:36:39 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Money for them. We actually had quite a clear view about this, that it was obvious that the that this data had value to people.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:36:48 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[To help improve crops for farmers to help Google get better maps to help governments do. But disaster response, there's obvious value.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:36:58 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[In it I mean.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:37:00 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Remember that if you went back and asked Google what their business plan was, they didn't have an extensive business plan. What they realized was that search would really help the world.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:37:08 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And that had value, and there was probably a way to monetise it.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:37:13 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[It's simmering here, like the venture capitalists didn't have to believe that there was value. They just had to believe that we were gonna be smart enough to then harness that somehow.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:37:23 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[How much money did you raise in that first year, by the way?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:37:25 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[By the way, yeah, 3.2 million, we ended up having 200K and we we also had friends and family came in.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:37:31 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[A little bit.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:37:32 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[So with that money, did you begin to staff up?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:37:35 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Yeah, that's when we actually decided to move to San Francisco and and rent our first office. You know, we were in the garage until then.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:37:43 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And yeah, we definitely started expanding staff and hiring people more formally and all the rest of it, and started building these satellites.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:37:53 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And I guess eventually you had to set up a like a kind of a clean room to build the satellites, which is a room with like, no dust to no contamination at all. Right. Like it it's it's like beyond steriles. It's like crazy, super sterile.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:38:07 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[That's exactly right. Yeah. And it it, it allows for you to really control the, especially if you have sensors, you don't want dust on it and or any of that type of stuff. So it it it keeps it. So it's almost like it's in space again you know, you know, before it goes up into space. So it's actually really, really ready to be in space because once you get up there, you can't really wipe off the lens.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:38:28 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[So.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:38:28 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[It has to be totally, perfectly clean. Yeah, even on the lens cleaner open space like that lens.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:38:32 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Has to be.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:38:34 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[So clean and.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:38:35 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[That's it.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:38:36 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[That's right, if you if you launch with that spec on the lens, it's going to be there forever more actually exactly in, in. In many ways, though, this is one of the areas where we tore down some of the rule book. I mean, for example, a planet we have what we call clean enough rooms and you know, it turns out that you can have it slightly less.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:38:56 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[I mean, and it's much, much less expensive.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:38:59 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Absolutely. So I believe it was less than $100, which was a a deployable greenhouse that was.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:39:07 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Bought at Target.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:39:10 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Then it had some HEPA filter, so you know a lot of people have this right now because of fires and because of, you know, COVID and so forth. But those HEPA filters were were able to then filter out the air and then push the clean air down. So it was just clean enough in order to test out the entire thing.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:39:30 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[I could tell you that like now we have much better clean rooms because it is worth investing in it when we know that it does work. But at the very beginning we really just.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:39:38 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Needed a picture.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:39:38 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[From space? Yeah. And just before you go to the launch, you can blow off the optics with the little airbrush and get almost the same, but having spent.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:39:50 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Millions and millions less right on those processes. And it's just one example of many of how.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:39:55 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[We've we've changed the way we do it, and mainly it's about a risk approach, which is just assuming more risk per satellite. OK, that one satellite has slightly more chance of having a dust on it, but we're going to put more satellites up than we need. And if a couple have that, it's not the end of the world because we're going to put up 100 or more. It's something we can live with, whereas if you.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:40:15 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Made have a Space Telescope wrong and of course initially it was launched with a slight error in its optics and it was blurred. Then you really gotta fix it because that one.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:40:26 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[It turns out you can go in space and.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:40:29 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[It does, but that's a very expensive way of doing business.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:40:32 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[OK, so so you've been working and and basically building all these small satellites and then I guess around April 2013 it's launch time and and you've booked 1 satellite on an American rocket and one on a Russian rocket, right?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:40:47 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Yeah, we had planned them to be 6 months apart so that we could.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:40:52 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Take the results from the first one and if something went wrong, iterate the satellite and try and fix that before the second one except.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:41:00 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Because you can't control the launch.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:41:01 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[They and they ended up launching just days apart, and in fact these two satellites got deployed within 48 hours of one another and we were like, what is the chances of that? And then it was something a scramble to try and connect with both of them as they popped out of the of the rocket. And it's really critical time when the satellite pops out.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:41:22 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[We need to be action stations, you know, manning the ground stations, man in the Mission Control and making sure.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:41:27 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[The thing works.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:41:28 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[How quickly before you guys knew that the satellites were working?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:41:33 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[With one of them, it was in within an.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:41:35 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Hour. In fact, we got telemetry from it. A health packet basically saying, hey, I'm alive, I'm doing OK and that was already huge relief. And then within a few hours of that, I I will say even just two, the next one flew over that had been launched from a different continent.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:41:55 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And also made contact.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:41:57 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[So what was the first? I mean were the first images that.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:42:00 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[You were getting.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:42:00 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Funnily enough, the first image that we got was a forested region in Oregon.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:42:07 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And you know, the original idea was to count every tree in the planet, and sure enough.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:42:13 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[That was our first picture.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:42:14 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[I was asleep when we got our first picture in and Robbie, didn't you come in and wake me up with the picture? I seem to remember, like at 4:00 AM or something.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:42:24 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Hey here it is and we were just like in awe because we could see that the picture was in focus. It had taken a picture of this forested area. We could see individual trees. We couldn't believe it. I mean, we were in tears and we're like, oh, my God, we've.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:42:43 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Done it like we can do this.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:42:45 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[We can do that.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:42:47 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[When we come back in just a moment, how that one photo of a forest in Oregon led to many millions more stay with us. I'm Guy Raz, and you're listening to how I built this.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:43:04 Speaker 4](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Support for this podcast and the following message come from master class. A new year is around the corner for a lot of people. That means dusting off a creative goal, whether it's writing a book, starting a garden, or trying a new recipe. One night a week, maybe you just want to take 20 minutes a day for yourself to relax and listen to someone you find in.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:43:24 Speaker 4](https://1drv.ms/u/s!AMhVeraEIITCz2E)

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[00:43:45 Speaker 4](https://1drv.ms/u/s!AMhVeraEIITCz2E)

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[00:43:56 Speaker 4](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[This holiday when you buy an annual master class membership, you get another annual membership free go to masterclass.com/built.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:44:16 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Hey, welcome back to how I built this. I'm Guy Raz.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:44:19 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[So it's 2013 and Chris, Robbie and will have finally proven that they can take a photo from space, which allows them to go to more investors and say, see, we actually know how to do this.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:44:35 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Now we had a picture we could say like we can definitely do it. It's just a mess out of scaling this now. And of course building a business around it when we left now, so we said we were going to image the whole earth every day. We had the team as what we said that could pull this off technically.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:44:50 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And in that year, we got much bigger funding round from led by Yuri Milner and he gave us a check for, I think 30 or 50 million and that was a much more significant adventure from there.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:45:03 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[So just roughly, how much does each does it cost? Does each satellite cost to make?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:45:10 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[It's about 300 K.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:45:11 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Just slightly less than two or three 100K.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:45:13 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[There's nothing. I mean, that's for that's that's I mean, compared to a NASA satellite.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:45:18 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Yeah, most NASA satellites average average about a billion. So yes, so so we're we're talking about 1000 times to 10,000 time.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:45:21 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[A billion dollars.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:45:28 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Lower cost than a typical satellite. That is why we've launched all of the now 460 or something satellites that we've launched on 33 rocket for less than the cost of a typical satellite, a lot less actually still.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:45:41 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And one of the things that I have read about your company, which I think is.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:45:46 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Actually pretty amazing is you know that there is always a possibility that a launch is going to fail. Like it'll because there's so much fuel, there's so many moving parts in a rocket launch. So they could just explode.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:46:00 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And you're OK with that because your satellites are so cheap that you could take the risk that you know, if you know if one of these rocket launches fails, it's OK because another one will be OK and and you know, that's the price of doing business.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:46:14 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[We have been on 33 different rockets and three of them have failed.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:46:18 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[But it's not a billion dollar loss for you, it's a, it's a couple million.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:46:22 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Exactly right. It's a bad day. It's a bad week.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:46:26 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Yeah, you know.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:46:27 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[But it's not catastrophic for for our mission and for our business and that that is by.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:46:32 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Design. I mean, I know that you've you've kind of solved the problem of of cheap satellites and they'll get cheaper and cheaper. Obviously, as time goes on. But is there a way to solve the problem of expensive rocket launches? Can you make is it possible to make rocket?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:46:44 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Launches cheaper. Yes, it is our biggest.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:46:47 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Spent so it was now. It's actually people, but it's our biggest capital.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:46:52 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Expense the the Rockets have in fact got cheaper. Just the last five or so years they've gone down about four fold, and mainly because of SpaceX, SpaceX, with its reusable rockets, has brought the price down, which is really quite a big deal. But I would say one thing that people often miss that is actually.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:47:12 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[No.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:47:13 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Radical is that the capability performance of satellites, the cost per kilogram cost per a given capability has gone up about 1000 fold in that same period that sort of change of 1000 X in five or ten years is is very unusual in history even the.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:47:33 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Model T Ford when it first came out was two to three times lower cost than the lowest cost car at that time, and people were like, that's a revolution. But we're talking 1000 X.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:47:43 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[That a closer analogy for this is not the Model T Ford, but the transition from the mainframe computers to desktop computers. Big companies would have one or two computers, right? All countries would have one computer and it was the size of a a factory. And now with the with desktop computers, suddenly.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:48:03 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Everyone could use them for lots of more purposes. Space is undergoing a revolutionary shift right now, and that is leading means that all these changes were in particular, the biggest upshot is that revolution and data that helps us to take care of the earth.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:48:21 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Alright so.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:48:22 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[So.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:48:23 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[We are in the midst of a not only a planetary crisis of mass extinction, we know that and and you both live in California and you have a front row seat to some of what's happening. So how I mean, I understand how the the existing data can help us track some of these things.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:48:43 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[But when you talk about making an impact in in an even bigger way, what, what do you imagine is it? Is it more people using your your data and then making policy decisions based around it?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:48:55 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Yeah. Well, let me just give you a concrete example. Recently, we had the Dixie Fire here in.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:49:00 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Kenya.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:49:01 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And the county of Pluma said, hey, can we use your data? We want to track where is the fire?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:49:05 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[To any of the biggest fire in California history.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:49:07 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Biggest fire in California history and they said where is the front of the fire? Where is the smoke blowing? Yeah, we could give them that data and then they use that to decide where to put people for the firefighters. Also straight after that they were like my God, can we just have all that data so that all the time so that we can actually look where might the next fire?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:49:29 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And but this data is relevant for day-to-day decision making across the globe.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:49:35 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[That's exactly right. Based on everything we can forecast out today.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:49:40 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[We believe that this is really going to help us take care of our planet and you cannot manage what you don't measure.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:49:49 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[OK. So you're you're talking about the the planet and crisis and and the need for more data and and information and and meanwhile by the time.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:49:59 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[This episode is released. You you guys will have literally gone public on the New York Stock Exchange and I wonder.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:50:07 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[What the thinking behind that was, I mean, I mean one reason obviously is to bring in more cash, which clearly you'll you'll you'll do and the other is to make a return for the investors. I guess those are the two main reasons, right.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:50:21 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Well, there is another bit of that, but it's mainly something else, so.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:50:26 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[We always intend to plan it to be a stand alone company. Planet is now ready. We did just over 100 million in revenue last year.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:50:34 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And that's a mature business at some level. I mean I I always think, you know, grandkids will be asking, how did humans take care of the earth before you had regular images of it? So that you knew what, what effect you were having and where was the deforestation? Where are the illegal fishing?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:50:53 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Where is the? How is the harvest doing on that crop field etcetera, etcetera. Before you had that, how did you even know what to do so like, like how did you meet up before you had cell phones? You know, you had to meet all these more complex?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:51:06 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And now we have that data that can help us to take care of the Earth. And as Robbie is saying, you can't manage it if you.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:51:15 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Don't measure it.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:51:15 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[So here's what I'm wondering about, right? And I can't be the first person to to ask you about this. I suspect that there are safeguards built into what you do. But what I'm worrying about is, I mean, this technology is amazing, right, which you made available to companies and businesses and governments and so on.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:51:33 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[But I can't imagine that there are that that it couldn't be used in ways that are that are not wonderful and bright and sunny and optimistic like I know you talked about, you've talked about.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:51:42 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[How you could try?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:51:43 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[You know environmental degradation and, you know, humanitarian disasters and refugee movements, but.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:51:49 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[But you also track for for military intelligence purposes like like looking at at missile installations or the location of airplanes and Subs and and the movement of people across borders and and and things like that. And and I could also imagine it could be used, it could be used easily by governments looking to.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:52:10 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Quash dissidents and people who are trying to, you know.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:52:14 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[To to promote human rights.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:52:15 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Absolutely. Yeah. We we we probably both have a lot to say on this, but Robbie and I have been thinking about this for decades.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:52:23 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And the reason we had called our satellites doves was partly a little poke at the military that would call their satellites birds. But birds of prey. And we were like, no, they're on a peaceful mission. And we actually have a very particular thesis about this. The more information different countries have about each other's activities, including military activities.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:52:45 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[The more is likely to be peace.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:52:48 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And when when it's historically it was when governments didn't know what each other were doing, that it led to tension. So, for example, when the US put missiles in Turkey and the Russians didn't know during the Cold War, it almost led to a war. So actually we lean in to the security side we work with.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:53:08 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Governments and security agencies, military or organisations, even.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:53:13 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And we think it's the right thing because we think it produces tension as long as we focus on one principle, which is don't give that data exclusively.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:53:21](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Would you?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:53:22 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Give it to ISIS or al Qaeda.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:53:24 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[No, it's banned. That's a great question. And and we have two checks. 1 is that we don't give it to any known organization on these.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:53:33 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Embargoed lists that's both countries like North Korea or terrorist organizations or individuals, and then in addition, we have our own Ethics Committee that reviews every case with the government and checks is is there some way in which this might bring civilian harm and we have many cases refused.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:53:52 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[To give data where we think that will be.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:53:54 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[The case we had an ethics team internally before we launched our first satellite and I anticipate over the coming years there though it will get more sophisticated as we have orders of magnitude more users and need to really think about and be responsible for the the unintended consequences of this.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:54:13 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Level of of transparency and this level of data on society.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:54:17 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[This this is an important point because often times on the show I talk about, we hear from companies talk about mission and most companies have a mission, right? You have the mission to motivate people and for people to feel connected to what you do. The mission has to be baked.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:54:31 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[In.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:54:32 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Doesn't mean mission can change. Mission can change, but it has to be baked into the company from day one.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:54:38 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And I think this idea of baking in an ethics team from day one is absolutely crucial, right? I mean, I'm assuming that's how.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:54:45 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[You thought about it.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:54:46 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Absolutely. So Andrew Zolli, who's our Chief Impact officer, you know he he says that like.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:54:52 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Regulations tell you what the law requires.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:54:56 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Yes, ethics tell you what your values require. Yes, and ethics is really more of a process. So anytime there's a crisis, if you bring out your ethical framework, then you can follow a predetermined process that allows for you to look at it from different perspectives.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:55:15 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[To then make a better decision.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:55:17 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[You know, most of the companies that we profile on the show produce consumer products.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:55:24](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[They.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:55:24 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[They tend to hit profitability, you know, within four or five years we we profiled Moderna recently and and obviously that company took ten years right before they became profitable. I think they spent $4 billion. What you do is very capital intensive. It requires a lot of money.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:55:44 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[To get satellites up into space and to process all the data, I think I think your satellites produce like 15 terabytes of data a day.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:55:52 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Right. It's about double the double what?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:55:54 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[It's just a lot of Google.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:55:57 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And and so you are not profitable. You haven't, you're not, but. But is there a path to profitability, a clear path to profitability?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:56:05 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Yes, it's absolutely clear. We already have very clear users in at least 4 markets.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:56:16 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[In agriculture, where big companies buy our data, that's the biggest market we have. We also serve as governments and then we help with defence and intelligence customers where we help them to see new threats around the corner. And then we also help companies like Google improve maps. So we supply data to Google for.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:56:35 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Their maps, they do huge numbers of requests. Whilst I'd like to update the maps online so that it stays up to date. So your directions are up to date. Those are four use cases that are already working very well and they're growing very fast. And so we have very clear line of sight now on the growth path, you know going just over 40% a year for the next 5 years.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:56:55 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[You project.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:56:56 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And that gets us to profitability in the next couple of years.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:57:00 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[I I know we we we touched on this earlier you you guys had originally moved into a a Community house or group house for more than 15 years and I think both of you are in your 40s you.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:57:12 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Both I think.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:57:14 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Either one of you, both of you have partners in your lives. You still live in a house.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:57:19 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Together with other people, like no judgment at all. Like I I'm a super introvert. I don't like to live around other people except my family. But can you explain this? Why you you guys choose to live this way?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:57:30 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Now at this point in your lives.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:57:32 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Well, personally, I love. I love it. Yeah, we we live at a house with 15 people. Wow. We have fascinating discussions about technology and society philosophy.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:57:43 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Stressful, always discussions all the time around the house. I just want to put on my slippers and like watch Ted Lasso.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:57:50 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Well, it is big enough. It is a big enough house where there are nooks and crannies for you to actually breed if you want to or to, you know, be bring be more social. But what what I love about it is people are are passionate. They are, they're conscious, turned on.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:58:06 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And I I really do enjoy having the.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:58:08 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[That, that environment where you can push one.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:58:11 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Another I'm thinking of like the real world on MTV. Like, did you ever have to kick anybody out? Like they kicked out Puck from the real world?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:58:18 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[I don't know what that is, but.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:58:20 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[People listening though.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:58:21 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[So we we communicate, we communicate through conflict and you know we we have values and shared agreements and and people have moved up they they they choose to leave and some of them have been more difficult conversations than than others, yeah.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:58:38 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[I bet.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:58:40 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Better so. So when you think about, you know, how far you know, you know where you are now and what you have up in space and what you're able to do, how much do you think that you know that it has to do and and we're just kind of reflecting your journey to get here which is which is why I asked this question because some people think I'm asking by the way some people think I asked this question.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:59:02 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And I think you know the question when asked because they want a binary answer like oh, it's luck. Ohh it's skill. It's 72% luck and you know 37.8% skill.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:59:12 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Whatever. It's really a question.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:59:15 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Is is designed to be reflective, you know where you've been and where you where, where you've arrived to, how much do you think that has to do with how lucky you got and how much do you think it has to do with?](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:59:26 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[How hard you worked and how smart you were and and all that stuff.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:59:30 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Well, gosh, I mean, it's not a, it's just simple question to answer.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:59:34 Speaker 3](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[But it was definitely the right place, right time I mentioned how when we left NASA to start planet, it was very much the stars are lying in the moment. It was just like what we have to do this. But I would say persistence is the biggest thing that comes through. It's it's not quite you know what you just said it was it's persistence and endurance. You have to keep going.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[00:59:54 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Yeah, there there is a. There is a drive and a motivation in the art of creation. You've got to love it, right? You have to be OK not knowing and being on that edge and and right into that edge of being.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[01:00:04 Speaker 2](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And like comfortable and overstretched, I always find that that's where the most creative things come from. And as well said like you get a lot of things wrong, you know, and and you as long as you learn from it, you have a safe space to allow for people to actually learn from it. Then that collective knowledge is actually internalized by the team. And then you then you take the next step again.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[01:00:27 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[That's Robbie Schindler and Will Marshall Co, founders of planet. They're satellites last about two to three years before they basically disintegrate, which is why even though Planet has.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[01:00:39 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Launched more than.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[01:00:40 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[400 of these satellites they only have about 200 circulating the Earth right now.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[01:00:46 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Still, that's the largest fleet of Earth imaging satellites in history.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[01:00:51 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[And by the way, one of the coolest things there, satellites recently detected a fleet of World War 2 ships that slowly washed ashore in Japan. Hey, thanks so much for listening to the show this week. Please do follow us on your podcast app so you can always have the latest episode downloaded if you want to contact us.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[01:01:12 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

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[01:01:15 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Org and if.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[01:01:16 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

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[01:01:27 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[This episode was produced by Liz Metzger, with music composed by Ramtin Erebuni. He was edited by Neva Grant with research help from Claire Morishima. A production staff also includes Casey, Herman, Farrah Safari, Jacey Howard, Julia Carney, Kerry Thompson, Elaine Coates, and Harrison Vijay Choi. Our intern is Catherine Seifer.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[01:01:47 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[Jeff Rogers is our executive producer.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[01:01:50 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[I'm Guy Raz, and you've been listening to how I built this.](https://1drv.ms/u/s!AMhVeraEIITCz2E)

[01:01:59 Speaker 1](https://1drv.ms/u/s!AMhVeraEIITCz2E)

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