Space Capital Podcast S01E02 - Reimagining Space Stations with Jeff Manber Transcript

The International Space Station is the last space station the government will own and operate. Which means what comes is commercial.

Welcome to The Space Angels Podcast, episode number two, Reimagining Space Stations. I'm your host, Chad Anderson, CEO of Space Angles - the world's leading source of capital for early stage space ventures. The purpose of this podcast is to provide Angel investors and other stakeholders with the context and information necessary to understand the opportunities and risks inherent in what we like to call the entrepreneurial space sector. In this episode, we'll be discussing commercial space stations, and how they'll help actualize a future where millions of people live and work in space. And if this seems like a flight of fancy, consider this, Jeff Bezos, one of the most successful entrepreneurs in the history of our planet, is selling one billion dollars of his Amazon stock every year in order to fund his space company, Blue Origin. Which will play a material role in making the widespread utilization of commercial space stations a reality. When you stop to think about it, this is a really big deal, and an indicator that investing in space is a winning proposition. Space is a large and growing global market today, with over three hundred and twenty billion dollars in government spending and commercial revenue each year. And with seventy-five percent of that market, commercial companies are playing an increasingly more prominent role in this traditionally government-led sector. A couple of years ago, NASA held a workshop on the commercialization of low Earth orbit. The goal of the workshop was to start a dialog about creating a thriving commercial marketplace in low Earth orbit over the next decade. Through innovative new public private partnerships, NASA's purchasing cargo transportation from a handful of companies now, and will begin purchasing crude launch from companies, like SpaceX and Boeing, next year. This will be the first time American launch vehicles take astronauts to orbit since the shuttle was retired in 2011. And by the 2020s, near the planned end of life of the International Space Station, NASA's intention to transition low Earth orbit from a domain that's primarily government-led to one that is led by the private sector. This creates an opportunity, not only for commercial space ventures to supply the space stations that will fill the voice, but it will also provide an incredible opportunity for Angel investors to participate in what will inevitably be astronomical growth in this market. That's why I'm confident that you're gonna be fascinated by our interview today with Jeff Manber, who's CEO of Nanoracks. Nanoracks is the world's first commercial space station company and, as CEO, Jeff is one of the most influential people driving this sector forward today. Back in the '80s, Jeff was a journalist writing for the New York Times, and the space industry at the time was the space shuttle. Cost a billion and a half dollars, a hundred thousand dollars per pound to get to orbit. It was all government, and, you know, a couple of defense contractors building some things for NASA. And that was the space sector. And he went from that role, in a couple of decades, to being one of the most influential leaders in the entrepreneurial space sector. His journey has really shown the opportunity in the space sector. I mean, he came in and transitioned from that career into, basically, now the world's leading provider of commercial space station services. So, for me, you know, this is not only just a fascinating personal story of career change and following your dreams, but it also goes to show just how much opportunity there is in the space sector. And how you, as an individual, sitting on the outside with an interest, how quickly you can go from... from being on the outside to really making a name for yourself. So, Jeff, welcome to the podcast.

Jeff:
Great. It's great to be here with Space Angels.

Chad:
Thanks. So- So, Jeff, when I talk about recent developments in the space sector, I usually like to point to 2009 as a key turning point. The year that SpaceX successfully launched their first commercial payload. But that wasn't an isolated event, and in fact you, and Nanoracks, have played a key role in laying the foundation for the sector that we're seeing today. So back in 1999, you founded MirCorp, and that was the world's first commercial space station. So can you tell me a little bit about that, your experience with MirCorp, and how you got involved in space in the first place?

Jeff:
You know, it's- it's a funny thing, Chad, but a lot of folks in our industry focus on the launch vehicles. And, for me, it's the destination. And it's always been the destination. The goal, for me, is to make space just another place to do business. And for that, you need commercial real estate. So, in the '90s, I used to joke, that if you wanted to work with the capitalists in space, you'd have to work with the Russians, and if you wanted to work with the socialists, you'd work with NASA. And that was the situation in the '90s, and I'm very proud today that it's not the situation today. America has returned to its rightful place as leading in all markets, including that of commercial space. But at the end of the '90s, the Russian government wanted to bring down the Russian space station, Mir. And I've always been passionate that you simply do not throw away hardware that's in space. And so, a group of us got together and we raised considerable capital, and we leased the Russian space station, Mir. And also, at the time, the Russian government privatized it, so it belonged to a Russian company called Energia. This is the heart and soul of the Russian Space Program. They did, uh, Yuri Gagarin, the first human in space. The first space stations. They did Sputnik. And they owned the Russian space station, Mir. So MirCorp was a Dutch company, we took it over, and when the- finally, we did far better than we even imagined. We signed with Mark Burnett of- the Survivor producer. We had a game show with NBC where the winner would go with space. We signed Dennis Tito before he subsequently went on with Space Adventures to the ISS. And we had a backlog of a hundred and seventy-nine million dollars when, for political reasons, really, the US government forced the Russians to bring to the Mir. So, I- I came into Nanoracks with extremely unique experience, but one convinced that sometimes it's not technological change where you get commercial growth, but it's- it's a policy change. It's a new business model. In this case, it was a private company operating on a government-owned platform.

Chad:
That's great stuff. So, you personally, how did you get into space? How did you get selected for your role at MirCorp, or how did you, you know, find your way into MirCorp? How did you- You founded the company, so...

Jeff:
I- I got involved- There was a wave of commercialization and excitement. The first wave, we kind of call it, that's when Deke Slayton one of the original Seven, he wanted to launch rockets,

such as the Conestoga. People were... proposing all sorts of things, such as external tanks, which would be space stations using the discarded external tank of the space shuttle. It was an exciting time, and I was a writer. And I was writing for The New York Times and others, and I got captivated by the- this coming commercial frontier. And pretty soon, I became the go-to for, in New York, for The New York Times, Business Week, Aviation Week writing on commercial space. I got to meet all of the entrepreneurs. And so, that was great and that's what really launched my career. And then slowly I became an advisor, and then I became a dreaded thing, a consultant, and pretty soon I became an entrepreneur. And that's how I arrived. But then I- we found out at that time in the '90s, that very often the space agency was a competitor. And so, I ended up more and more... I worked with Lance Bass when he wanted to fly, of NSYNC, to space. And it was- it was very difficult in the early '90s and mid-90s to work with NASA. That was a change which has taken NASA's, as you say, SpaceX and the beginning of that, cargo, commercial cargo to the station. And then later... I mean, I'm sure we'll talk about that. How they were willing and why they were willing to work with the Nanoracks as a commercial pathway to their space station. So, it took an evolution. One of the reasons I'm convinced this time it's to stay, is that this has been a bipartisan slow evolution. This is not just a whim. This is not just a change. Slowly, United States has recognized that the space frontier should be treated like any other extension of our society, including capitalism.

Chad:
So, Nanoracks is the world's leading space station services company. Is that an accurate statement?

Jeff:
Yes. We've become the go-to for companies, organizations, educational institutions, and governments wanted to use the space station in a commercial manner. What makes us unique is Nanoracks is absolutely customer focused. At the end of the day, what we want is a happy customer. Whether you use our hardware, whether you don't, we want to make the customer happy. And so, what's happening now is we have several types of customers. We have those that are sophisticated. They've used the space environment many times, and we have a service on the station. Whether it's a satellite deployment service, whether it's pharmaceutical drug research, whether it's educational, whether it's a test bed for electronics. And they look at that and they say, "Gee, we could work with NASA and have that problems. We could work with something else, perhaps. Or we see, here's a private company that owns and operates its own hardware and offers it in transparent pricing." And they use us. On the other hand, we also have customers that are new to space. They, maybe, they know they want to do an educational project with a satellite, a CubeSat. Maybe they want to get some data. Maybe they're in research, but they don't know the business today. And the business is growing rapidly, as you well know. And so, we have a couple of customers now that have come to us and said, "We don't want to you just to deploy a satellite. We want you to find the satellite for us, or have it manufactured. Get the regulatory approval. Operate the sat- Deploy the satellite and handle the down- the data down for us." In other words, a turnkey system. And suddenly an eighty-five or thousand dollar customer becomes a four hundred thousand dollar customer, because now we're doing the entire service. And they're correct. We know most of the folks who are doing the CubeSat manufacturing. We know those who will be willing to work on one satellite, or those who work well quickly, or those- and we know the right lawyers. And so, for us, it's almost a concierge, we call it. Where if

you're sophisticated, fine. Here's our price, here's what we do. You're not as sophisticated, we take the time to sit down with you. And what's important, Chad, is we made a decision several years ago never to compete against our customers. So, we don't own and operate constellations. We don't own and operate or intend to launch vehicles. We're as agnostic as we can be in performing in space services.

Chad:
I love that that touches on barriers, and how Nanoracks is helping to bring down those barriers. In this case, like you mentioned, it's not a technological issue. It's an issue of, there's a lot of- to do business in space, is to do business with the government at some level. And trying to navigate through all of that, the public government side, the commercial side, making sense of all that, and helping those- those two sometimes very different sides come together is a key service that you guys provide. And so, that's- I love that, because that speaks to how you're making space more accessible. You've also, like SpaceX and others, you've played an essential role in lowering the barriers in other ways. So, for instance, you've launched - correct me if I'm wrong - over five hundred payloads to the International Space Station. The last I spoke to you, you had launched a hundred and eighty small satellites that, I mean, there was a launch yesterday, so that number's probably gone up. I'm looking back to Planet Labs. When they, you know, they're a recognized name in the space industry. They operate the largest constellation of small satellites. And you helped launch some of their first satellites and helped them get to orbit, and it seems as though if Nanoracks didn't exist, maybe that doesn't happen. And can you talk us through how all of that- how all of that came together, and how Nanoracks is enabling?

Jeff:
As we do this podcast today, the latest SpaceX docked at the station and brought, not only a very large satellite on behalf of our customer, the US government, but also the first Boy Scouts of America projects. We really have the range of customers. We could not be more proud, at Nanoracks, for the customers we have introduced to space. Planet Labs has kindly said that we probably sped up their introduction to the market, two years. Spire, we did their first satellites. GOMspace, we did their first satellites. We did the first satellites of the country of Lithuania. I think we did the first satellites for the country of Peru. We launched the University of Hanoi, Vietnam into space. We just finished the first commercial Chinese project onboard the International Space Station. Beijing Institute of Technology doing a synthetic DNA project that's very important. I look forward to reading in English their results. We- What others like to say, we're democratizing space. We're doing it. And we've done it, okay? Every mission, every time, we will take any customer, regardless of size. And sometimes there's pressure and my shareholders saying, "Why are you working educational payloads that the margins may not be as good as the big boys?" And the reason is, we want to be a space station company. We want to truly understand this market, and we understand it as well as anyone. So we could not be happier that we helped Planet Labs, we helped Spire, you know, we've helped all these organizations, and now we're excited about helping the next generation.

Chad:
Love it. Can you tell us a little bit about where you see the market going? Where's the market now? Where do you see the opportunities, and where do you think it's going?

Jeff:
There's a window of opportunity now for the next five to eight years, in my view. It's an extraordinary time. I think, again, as we do this podcast, they're pretty well announcing who the administrator's going to be for NASA, who the deputy administrator's going to be. We have in place the Space Council. So, we're seeing the outlines of where this administration is going, and I think it's going to go at a gallop. I think the next few years are going to be very exciting. What we see, finally, is a maturation of access to space. I'll say, personally, I'm really glad I'm not in the launch vehicle business, no offense to anybody, because every month, every quarter, you hear about a new exciting venture. And let's say, half of them are successful when you're gonna have thirty or forty new ways to get to space. That's why I'm happy to be in the destination side. So, first off, we're gonna see a maturation of space transportation. We're going to see prices come down. We're going to see opportunities increase. That's going to allow a furtherance of new ideas and new business models. You see the United States government pulling out as an operator. You're going to see a huge rush on infrastructure development, where Nanoracks wants to be. And you're going to see services, and extraordinary need for services for all these projects going to space and be handled in a cost-efficient manner. And lastly, I think we're going to see a continued revolution of making life better here on Earth using space assets. And I think we're just at the beginning of how we monitor the environment, ecological, waste management. All these things are gonna be better utilized and monitored from space. Our last large new customer, the European Union Commission, they had a project with thirty satellites, all from many nations, all studying different aspects of the upper atmosphere for the environment. An area very difficult to monitor. Is that research? Or is that commercial? For the European Union, it was research and policy. For people like Nanoracks, it's commercial. And so, who's our customer? Well, it's government. Oh, then if it's government, says a lot of people, it can't be commercial. It's completely commercial. If I didn't deploy them, I wouldn't get paid. So, we're seeing this entire flowering of a new marketplace where the government's our customers, where research is being privatized, and companies, like Nanoracks, are joining with dozens and dozens of launch vehicles to provide more services in space, for space and for the Earth. And then if I could say one more thing. I have a feeling, it's my just personal... belief that - and I don't know if this is good or bad - but I think within the decade, it's gonna be a lot more expensive to launch a space project. Today, I mean, seven years ago, we started Nanoracks self-financed. I think today, to start Nanoracks, you'd need a few million dollars just to start. Just to get everything into place. We didn't have to. We were first on offering services on the space station. What I see is every couple of years, the cost of entry going up. And for an investor, for folks like in your network, I honestly believe, like in any- whether it's- you look at phones, mobile phones, you know, a decade ago, the cost of entry today is so prohibitive. It's not the technological barriers, it's the customers being tied up. It's the positioning. I think the same is happening in space. And I think in a decade, you have to either launch something in space in a decade that's a very niche market or you have to be very well bankrolled. So, this is the time to invest, because is when the real estate, you know, dutifully speaking, is being taken.

Chad:
There's two key pieces that I want to pick up on what you just said. And the first is, with Nanoracks, how did that come about? I know you've got some key space act agreements with NASA, but how did you turn this idea into a business?

Jeff:
There was- Nanoracks was not my idea. There were a couple of folks - and I won't say who - tried to do this for a year or so, and they were unsuccessful. And their idea was to go to NASA and say, "We want to have miniaturized labs that plug into a research platform to get power and data. And you can do experiments inside." And they just couldn't convince industry, they couldn't get an agreement with NASA, and they couldn't get customers. And so, after a year or so, they came to me and said - and I was looking to do something after finishing my work finally, finally, finally with the Russians. And they said, "We have an idea that will just be part-time. It will never be more than two days a week. We have these standardized small nano labs." And I looked at it, and I went to NASA. And I fought with NASA in the '90s, I was on the Russian's side. And I went to NASA and said, "Are you willing to work with me? I'd like to see if I can get customers for you on the space station." And NASA said, "Look, we didn't like everything you were doing in the '90s with the Russians, but you got lots of customers for the Russian space station, Mir. And we need customers. Sure. We'll give you a chance." And we joke about it now, because they gave us total access to all their launches. They said, "You know, however you want to grow." And we signed a space act agreement in something like three months. We had our first research platform up in six months. And we went with our first customers, and we never looked back. We started with educational customers. We did the nano labs. Then we began to grow into other markets, such as the satellite deployments, and then bio-pharmaceutical. And then we elected to... fund our own external platform outside the space station, a test bed for electronics. And we continued to grow. And now we're moving beyond the space station. We're very proud. We work with Blue Origin on the New Shepard suborbital; we do their payload integration; we help them on business development. And we're working with other folks now. And so, we continue to grow to either own and operate, or co-market real estate in space. And we meet the needs of our customers. So, it all started with a little nano lab, and... I guess, the moral of the story is NASA was willing to work with me, even though I had spent years fighting them.

Chad:
And you started small and you just kept finding more and more customer interest along the way. And, if I remember correctly, when you started launching these small satellites from the station, you were even surprised that that was gonna be such a sweet spot for your company. Is that right?

Jeff:
Yeah. We, uh- The Japanese have a... have a deployer on the station, and they had room for three sat- CubeSats to be deployed. And NASA came to us and said, "Would you like to consider deploying a satellite?" I went all over the country, could not get anyone to pay or to believe that they could get through the NASA system. And finally, the University of Hanoi, of Vietnam, was our first customer. I was at a conference. I met a young man. I told him what we could offer, and he said, "How much for the satellite?" And I told- For the servicing. You know, deploy it. I told him, and he said, "Done." And I said, "May I ask where your money's coming from?" And he said, "Microsoft." So that's the world we live in. And as they say in the movies, when that picture came out, when the astronaut took a picture of those three satellites, and our customer was the middle. As they say in the movies, the phone didn't stop ringing. At that point, everyone in the business calls and said, "Could you deploy my satellite?" And that's when we looked at each

other, we went to NASA, and we didn't ask them for money, we didn't ask them for funding. We said, "If we developed our own CubeSat deployers, would you let us do it?" And they said, "Yes." And in nine months... In nine months, we designed, developed, and... spent about a million and a half of our money internally, and we signed Planet Labs, and we signed some other folks, and off we went. And so, that's how a commercial marketplace happens, and that's also the right way you're supposed to work with the government. We didn't seek government funding. And yet, today, NASA is- and the US government is a commercial customer for a range of our satellite services, as well.

Chad:
And now you've launched hundred. So, this CubeSat deployer. How exactly does that work?

Jeff:
So, we're different. The way everybody else does it is you- you want to deploy satellites into space, it's a beautiful market, it's emerging, it's hundreds of millions of dollars today, it will soon be a billion-dollar market. And the way it's usually done is you put the satellites on the outside of a rocket. It could be a small rocket or a big rocket. And it launches, and it goes to a certain spot, and then you deploy off of the rocket. What we've done is we've introduced a space station as the deployment platform. So, what happens is you ride up inside a cargo ship, which is a lot more gentle, and a lot of our customers have fragile satellites and they like this more. And when it gets to the space station, the astronauts open the door, they take out the cargo, and they take out our deployers. And they load them onto a plate, and they bring it to the Japanese airlock. And at the right time, we deploy them. And so, the space station becomes the deployment vehicle. And what's really cool about this, is we are finding unique uses that's opening up new markets for us. For example, we have something called stash and deploy now. Because when you launch on a rocket, well, hello, you deploy nine minutes after the rocket launches. With us, you can bring it up to space, which is the tough part, we store it on the space station. It can be there for six months, eight months, a year. And you deploy it when necessary. So that's just one example of the- of the ways the market matures. And this is really the first, what's going to be a billion-dollar market in space, is the satellite components. Satellite deployment, satellite manufacture, launch vehicles. We've created this add-on market where you can do new and unique things using the space station.

Chad:
When you were talking about how Nanoracks came about, these space act agreements with NASA are... were critical to that. And it's been critical to a number of other companies, as well, that are working... with NASA. And they allow- they provide a framework for commercial companies to work in an efficient way with the government. And you've had a long-term contract with NASA that's been renewed. And you've now got, well, multiple space act agreements. And one of them that's very interesting, to me and probably a lot of the listeners, is this Ixion Project. Can you talk a little bit about that, and what that means?

Jeff:
A space act agreement is just that. It's an agreement between the space agency and a company. So, we now have three space act agreements. Each one is growing in complexity and interest. And one is for our space station business. One is for our commercial airlock, which we call the

first gateway- commercial gateway to space, and we're partnering with Boeing on that. And we have a third space act agreement, which is fascinating. Which is looking at the reuse of in-space hardware. And where that comes from is the United States has said that the International Space Station is the last space station the government will own and operate. Which means what comes next is commercial. And there's a number of companies that want to be commercial providers of, what I call, real estate in space. And it's really the next generation of space stations. Let me start by saying there will never again be, in low Earth orbit, the area closest to Earth, a space station like the International Space Station. It was clearly built by governments for governments. It's huge. It's a hundred billion, at least, in cost. At worst, you never want to put a module where you're doing manufacturing in space with a module where an astronaut is on his bicycle peddling. Because it disturbs the manufacture. So clearly, for me, the future is a number of space stations, small, commercially owned. Each one does one job. So, at Nanoracks, we want to be the leaders in unmanned platforms that do in-space manufacture, deploy satellites, manufacture fiber optics, Earth observation. And that will be what they do. Each one will be dedicated to one of those markets I just mentioned. Maybe somebody else wants a space hotel. So, for us, it's about, how do we take a market leadership? And what we've done at Nanoracks is we've looked back to the past. When Wernher von Braun was head of Marshall Space Flight Center, he proposed that what you do is you reuse the upper stage of a launch vehicle and make that a space station. And NASA agreed. And that was our first space station, Skylab. It was a modified, upper stage of the Saturn. And so, what we've done is, we've entered into agreement with Loral to look at reusing the second stage of an Atlas V Centaur. And NASA thought it was pretty cool, and they awarded us a contract, five-month study, to look at if it's technically feasible. And as we speak today, we're at the four-month mark, and NASA has already agreed - I don't think I'm letting anything out by saying - that, "Wow. This is cool. It's feasible." And so, we're very excited, because it's extremely cost-efficient to reuse something that's in space, rather than building it from the ground up. And so, what we're proposing right now, as we speak to NASA, is we're showing them different levels of services. You can something that's a few tens of millions, where you get just the habitat, and there's something that might cost you a little more, where maybe you get a window, we can use for space tourism. And I should add, that another partner in our team is Space Adventures. That's the leader in space tourism. And so, we're very excited about Ixion because, first off, for Nanoracks to be partnered with Loral and robotics and satellite communications is very cool. To be working with ULA on reuse and repurposing upper stages is even just as cool. And we see the future being to, how do you repurpose in-space hardware? That's the scalability to Nanoracks. For years, people said, "Hey, we love what you do. But you know what? There's an end date to the space station." And I didn't want to propose, "Oh, I can build, today, a new module on the ground, along with four other people." Because it just didn't feel right to me. And then we had the idea of let's just go back to the future, and let's do what NASA did in its glory days before it was a jobs program, and let's be as efficient as possible. So, we are hoping to emerge as the leader in commercial habitats by reusing in-space hardware.

Chad:
I love it. You've got two data points. One, hundred-plus billion dollar manufacturing project. You, taking something that's already there and using it. I mean, from a commercial perspective, it's a no-brainer.

Jeff:

Well, we have never been able to get economic incentives from all these regional, uh, because we're too cheap. We... I mean, the last thing we want is to say, "Oh. We'll be a hundred jobs." We just don't do that. We spent all our time trying to figure out how to be as economically efficient as possible.

Chad:
Curious, what exactly will be reused, right? So...

Jeff:
For us, it's not about- what we're talking about reusing is the shells that the- the second stage or cargo ship. For example, you told me this podcast is aimed a lot towards people new to the space business. And I- when I speak to folks new to our industry, I sometimes say the best way to understand how this industry has been run, is to tell you that on the International Space Station, we launch a cargo ship, and the upper stage is filled with cargo, valuable cargo, supplies, research equipment. When it gets to the space station, the astronauts unload it. It has Nanoracks' satellites, it has all sorts of things. And then you know what they do? They stuff that perfectly good spacecraft in space with garbage, and they turn it around, and they burn it up in the upper atmosphere. That's the mindset that has existed in this industry. To burn up a perfectly good spacecraft worth probably fifty million dollars. It's in space, and you stuff it with garbage. That is not an efficient marketplace. So, what we are proposing to reuse, we're talking to the Japanese about reusing their cargo ship after it completes its space station. We're talking about reusing upper stages of launch vehicles. We would bring up the 3D printing, we would bring up the robotics, we would put that inside the vehicle before it launches. It's really about the shell. The two main costs to really look at having commercial habitats, whether your customer's the government or commercial sector, is to have a shell, a habitat, and to launch it in space. If we take control of big shells that are already in space, we're getting real estate at very low cost.

Chad:
So, there's a couple of common misconceptions in space, which I find myself making arguments and bringing data against all the time. And I think that Nanoracks is a great example, so perhaps you can help me make this case. But the misconceptions are two things when you're looking to invest. Is that space is capital intensive and it takes a really long time to make any money. And you mentioned that you were able to get to where you are today... generating significant revenue, leaders in space station utilization and services, and you did it with just a few million in equity. How have you managed to do that?

Jeff:
We were fortunate in that we were first. Had we- If we were starting Nanoracks today, the price tag for entry would be far higher. We'd have to move far quicker. We were the only ones doing the commercial utilization of space station. And so, we had the opportunity to start small, build it up customer by customer. For us, still today, it's not, for now, about the revenue, it's about taking the market position. And we've self-invested a lot. Our EBITDA would be better today if we - or I'm not sure - but, you know, we'd show better returns. But we self-invest quite a often. We probably take thirty percent of... of what we get in the positive cash flow, and we put that back into the business... for the next generation hardware, for new services, new ideas. You know, so for us, it's about investing in the future. It's about making sure we're in the right position in the

marketplace. And we want to understand this market. And so, that's why we are very happy. We have customers ranging from high schools to European Union Commission. Because that way, we understand the market and the price points.

Chad:
We at Space Angels believe that, and we end all of our blog posts with the belief that now is the most opportune time in history to be investing in this sector. So, the question for you is, do you agree with that statement? And... and if so, why?

Jeff:
Without a doubt this is the most extraordinary invest opportunity that has ever existed for commercial space. I absolutely believe that for Angel investors this is a unique opportunity to invest in commercial space. So it's both the political, the government accepts that they should be a customer. It's technological, we're beginning to understand very well the rocket technology, the in-space services. Look, we- we went to the Moon with slide rulers thirty, forty, fifty years ago. Today, with what we have at Nanoracks, what we do in nano labs, our customers do, the way we do the satellite deployment, miniaturization, standardization. This is an extraordinary time of infrastructure development. And usually Angel investors cannot take part in infrastructure development. I mean, look, how often does an Angel investor get to invest in a field where the richest person in the world, Jeff Bezos, is saying the next decade will bring about warehouses and factories, jobs are gonna be created in space for space utilization and making life better on Earth. And yet, at the same time, that Jeff Bezos is saying this, and Elon Musk is involved in this, and governments are involved in this, the Angel investor has an opportunity to invest. And that's the way I look at it. And so, this is a golden opportunity, I think, for the next generation. And having said that, it's extraordinarily beneficial that there's an organization like Space Angels. Because this is a complex industry. We speak in acronyms, there's a lot of regulatory, the growth curves are a little different, the issues that we worry about are unique, as is true in every marketplace. And it can seem bewildering if you grew up on science fiction to figure out what's the reality. And Space Angels is an extraordinarily valuable bridge. It can- What it does is it determines what's real, what's investable. And what I like about what Space Angels is doing is what the name implies. Just as we are seeking at Nanoracks to democratize space and access to space, Space Angels is doing the same thing in the liquidity and the investment front. And so, we share the philosophy, we have to understand the commercial usage of space. And I really appreciate Space Angels through all of that.

Chad:
So, Jeff, thanks very much for coming to talk to us today. Very exciting stuff. Happy to be involved with what you guys are doing, and really excited to see where you guys, where Nanoracks, goes next.

Jeff:
Great. Well, it's been great to spend the time talking to you today. And I look forward to the next few years, as well.

Chad:

This was a great interview, and really exciting for me, personally. I really enjoy having these conversations with these leaders. And after that interview with Jeff, I'm certain you're going to want to learn more about becoming an investor in early stage space venture. So, I want to invite you to visit our website, Space Angels dot com, where you can learn all about Space Angels membership and how you can get involved in this exciting new sector. Thanks for tuning into The Space Angels Podcast. And before I sign off, I just want to put in a plug for episode number three, The Entrepreneurial Space Age, where we'll be interviewing Jim Cantrell, CEO of Vector Space Systems.