“I think that the space economy is experiencing what I’ll call a leapfrog technology moment. And we’ve seen these in the past, and there have been many of them, and whenever they occur they do create significant opportunity, significant wealth, and have a big impact on civilization.”

Chad Anderson
Welcome to the Space Capital Podcast. I'm your host, Chad Anderson, founder and managing partner at Space Capital, a seed stage venture capital firm investing in the space economy. We're actively investing out of our third fund with a hundred million under management. You can find us on social media at Space Capital. In this podcast, we explore what's happening at the cutting edge of the entrepreneurial space age and speak to the founders and innovators at the forefront.

Hello, everyone. It's been a decade of extraordinary growth in the space economy, but the global financial markets have slowed the pace of deployment into the category. The funding environment is getting tighter, particularly for companies building capital intensive space infrastructure. But at the same time, the space economy continues to grow rapidly, and innovation is happening at an unprecedented pace.

Space technologies are providing essential insights and information to enterprises and governments, making them countercyclical and resilient to macro market pressures. Today, we'll discuss some of the key trends and big ideas that we believe are driving growth in the space economy and how we're thinking about them. As seed investors will examine how global economic headwinds are impacting the category.

Which industries are most affected and which are best positioned to weather the storm? For those of you joining us for the first time today, by way of introduction, Space Capital is a seed stage venture capital firm. Investing in the space economy or specifically focused on unlocking the value in space technology stocks such as G.P.S., Geospatial Intelligence and Satellite Communications.

We're actively investing out of our third fund with well over 100 million under management. What sets us apart is that our partners have built rockets, satellites and operating systems. We've found companies with assets currently in orbit and have led multiple exits as operators. We've been pioneering, invested in this category for ten years, and now we've literally written a book on the subject with the space economy, capitalize on the greatest business opportunity of our lifetime, published by Wiley. With that, I'll turn it over to Justice Gillian to discuss the macro market.

Justus Kilian
Thanks, Chad. Over the past few quarters, we've seen an adjustment across global markets. This reset is working its way through venture and a number of space companies. In the next few minutes, we're going to look at the data and try to answer a few key questions. How far along

are we in the events of your market reset? What are the implications for investors and founders? And is now a good time to be investing in space? The global venture market has continued its reset in Q1, hitting its lowest point in 13 quarters. Total funding into startups fell year over year 61%, while deal volume fell 37%. If you exclude the two largest deals during the quarter, there was a $10 billion round raised by open air and a 6.5 billion round raised by Stripe funding dropped nearly 72% year over year.

While the buildup for investment in space companies has been less dramatic. The drop in investment and deal volume reached its lowest point since 2015. Total funding and startups year over year fell by 61%, while deal volume fell 37%. The two big spikes that you see on the screen here, Q2 and Q4 2021 were concentrated in space X, OneWeb, Blue Origin, Sierra, SpaceX and Relativity Rounds. They were sort of outliers in this data set. It's clear that a reset is well underway. We have a lot more data available to help us understand the state of play, and there are three primary drivers to really better understand this correction and its impact. The interest rates that are rising, IPO market being closed and tourists investors that are leaving.

Justus Kilian
So, let's unpack each. The US Federal Reserve Bank has been aggressively raising rates to slow inflation. Central banks from Europe to India are all raising rates to slow their economies and stamp out inflation. The recent numbers have annualized inflation in the US at about 5% the end of March, and this has been falling for the past nine months consecutively. Jerome Powell communicated that hikes are likely nearing an end, and you can see here that market expectations are showing that rates are likely to top out over the next quarter or two. The IPO window is another important driver, particularly for liquidity for investors and executives. Listings peaked in 2021, as we saw a dramatic pullback in 2022. This trend has continued into the current year and it's effectively meaning that the IPO window is closed.

There's another way to look at this, and it's really from the companies that are waiting to go public. So, we're actually seeing significant implications for late stage companies that need capital to grow and survive. They have to rely on the private markets. We're now seeing a growing backlog of these companies preparing to IPO as soon as the market stabilizes, and the window opens. Realistically, though, there's a limited number of banks and capital out there to take these companies onto the private market and only a select few or few are going to make it through.

We're actually seeing a similar trend in early in growth stage as founders raised significant crowds in 2021 to extend their runway to two plus years and sort of wait out the market uncertainty. Many of these founders are actually going to have to come back to the market in the coming months and face a really difficult time. Investors are going to have limited bandwidth to look at their companies and valuations and growth may not be what they previously had expected. And crossover investors that helped drive valuations to all time highs have largely left the market data shown here.

There's been a 68% drop from 2021 highs as hedge funds, mutual funds and sort of other outside nontraditional investors stop deploying capital into the venture capital market. This means that founders have fewer options from where they're going to go and raise capital to sustain their valuations and drive their company. Data from our Space Investment Quarterly suggest that space companies are experiencing a similar pullback, with VCs accounting for about 60% of total investment and 76% of leading the rounds in Q1 2023.

Justus Kilian
All of this is leading us to see a sharp bifurcation between the winners and everyone else. As the market mania of the previous two years has fully subsided and tourist investors have left the market as VCs are increasingly reserving capital for companies that have built strong fundamentals. This is particularly true in launch of the 100 plus companies that collectively raised 27 billion over the last decade. There are currently only two that are operational Space X and Rocket Lab. Space X continues to execute at an unprecedented level with 25 Falcon nine launches to date. The deployment of StarLink V2 Mini starship reaching Max-Q just a few days ago. Several aspiration and launch companies had setbacks in Q1. While some have made progress, APL experienced that alarm anomaly and shut down prematurely.

Virgin Orbit saw launch attempt fail that ultimately led to the company filing for bankruptcy and relativity space as Rocket passed its initial milestone of reaching Max-Q but failed to reach orbit. So, all of this has significant implications for the state of investment and the terms that founders and investors are able to achieve. Looking at deal terms over the past ten years, we're able to see that the supply and demand of capital for voting rights and valuations aggregated into an index. And gave us a good sense of the power dynamics that are at play between investors and founders as they raise subsequent rounds.

Data here shows that the power dynamics has shifted significantly back towards investors across all stages of your investing. Of the companies that are able to raise the valuations step up between each round is compressing. So, step up from seed to series a R near their lowest point that they've been in the last three years. And series devaluations were down more than 58% from the year prior. Round sizes were growing across all stages through 2021, but since have now been declining across all stages. Inflation in over that same period has been about 18%. The median seed round is the only round size that has increased in terms of real dollars over that time period, but all others have declined.

Justus Kilian
This is forcing founders to do more with less capital and the time that it takes to raise your next round is now two years or greater. This resource constrained environment is a powerful forcing function to cut costs and drive revenue growth. Many of the companies that have relied on momentum are going to be unable to make the shift. And the impact of these cuts is being felt across venture and tech, with layoffs increasing significantly over the past several quarters. While this adjustment is painful, it has real human costs. It also has some benefits. This reallocation of talent is resulting in new companies being formed and companies that are able to fill key roles that have been previously impossible during the war on talent.

If we drill in and look at space specifically, we've actually been tracking the growth of new founders being incubated across some of the more mature space companies as they've went public or as they've matured since 2020. There's been a 300% increase in new founders across this small subset of companies. The skills and experience that are developed at these companies has broad applicability.

We're seeing founders go on to start companies across 47 different industries. Space X has produced by far the most number of new founders, more than three times that of Blue Origin or planet. We have deep networks across these alumni communities, which means we've looked at hundreds of opportunities coming out of these companies and we can quickly assess the founders through multiple points of contact that have interacted with them directly.

We're continuing to invest in the exceptional leaders that are coming out of these companies. And we actually just closed a new investment in space and its founders a few days ago. So while the capital markets of the past year have been painful for most and devastating for many, we believe that the shift away from momentum investing and greater focus on fundamentals is an overwhelmingly positive development for the space economy. Quality companies with product market fit, positive unit economics strong leadership will continue to get funded, although valuations will become more in line with historical averages. We believe less speculation will result in fewer competitors. A larger talent pool will make it easier to found and find great talent over the next couple of years. We've said it many times, but it's never been more relevant today.

Space technologies are the invisible backbone of the world's largest industries, and they're playing an increasingly critical role now. Despite these challenges caused by the macro headwinds, we've never been more bullish on space or our investment thesis. Back to you, Chad.

Chad Anderson
Thanks, Justus. The space economy is a massive market opportunity that touches every aspect of our lives as we like to say, in the same way that every company today is a technology company. Every company of tomorrow will be a space company where thesis driven investors and our thesis recognizes that space-based technologies are the building blocks of innovation on Earth. And our thesis is playing out on a global scale GPS, geospatial intelligence and satellite communication are the invisible backbone that powers the world's largest industries and demand for precise positioning. Global intelligence and ubiquitous connectivity are driving tremendous growth, despite difficulty in the financial markets. We're seeing several major forces that are fueling this growth over the next decade. And I'd like to walk you through some of those today.

From the beginning of last year, the conflict in Ukraine has really been a showcase of the growing capabilities of commercial space companies. Space X is StarLink enabling Ukrainians to stay connected and combat Russian misinformation. While Earth imaging companies have

provided a foundation of truth for what's happening on the ground. These space technologies are providing essential insights and information to enterprise and government customers who most importantly, are willing to pay.

Despite market cycles, in fact, the National Reconnaissance Office announced a multi-billion dollar satellite imagery purchase its largest ever in Q2 of last year during the steepest decline in the financial markets. And as a result, record revenues for Earth observation companies are demonstrating how some segments of the space economy are countercyclical and recession proof. One of the companies benefiting from that narrow contract is Planet Labs, who at the end of March recorded record revenue of 191 million in their fiscal year.

Chad Anderson
2023 results up 64% year over year, and their full year revenue guidance for the upcoming year is 248 to 268 million. The co-founder and CEO of the company said that their growth continues to be underpinned by global secular tailwinds that are driving demand for their solutions. And it's not just planet. We're seeing the same thing across our portfolio. The fact is that in times of uncertainty, government and business leaders are hungry for insights and information, which is exactly the type of data that space technologies provide. Many of our portfolio companies have seen an increase in demand for their products and services as the world becomes more dynamic and uncertain. And this is driving top decile performance and space capital funds one and two.

And which is why we're proud to have just launched Fund three to continue investing at the intersection of space and tech. Diving Deeper. We've written playbooks on each of these space technology stocks. The GPS Playbook is our seminal thesis paper. In it, we explore how GPS has become a platform for innovation on a global scale. This space technology has delivered trillions of dollars in economic value, and some of the largest venture outcomes in history. We believe that GPS provides us with a playbook for how space-based technologies will create new investment opportunities in areas like geospatial intelligence. Now, the geospatial intelligence market is expected to grow from 63 to $148 billion in the next five years. Satellites transformed modern mapping from static approximations into dynamic reflections of our world and the activity with that in the early 20 tens.

The use of distributed networks of small satellites made it more cost effective to capture timely geospatial data at a global scale. Today, a variety of geospatial platforms, including satellites, capture data at different altitudes, benefiting from low-cost components, commoditized, storage and compute, and decades of just product development. The adoption of cloud edge computing, new AI capabilities and increasingly powerful geospatial APIs and SDK are making the benefits of geospatial intelligence more accessible. Developers no longer need to be experts in image capture and data processing or object detection. Instead, they can focus on building specialized applications tailored to unique customers. Similar to the proliferation of GPS brought about by Apple's App Store. The ability to collect process and analyze endless amounts of geospatial data is creating powerful new applications that are helping to reshape how the world's largest global industries operate.

Chad Anderson
A seemingly infinite number of venture scale businesses are now being built in multi-trillion dollar global industries like agriculture, insurance and climate markets. Likewise, Satcom is becoming a strategic communications backbone. There's never been a hybrid communications network that gets support from both terrestrial and satellite networks. They've been kept separate. But the future of communications is convergence, where we no longer look at how many bars we have or the quality of the signal. It's truly ubiquitous. We're already seeing the convergence of these two networks as telcos and satcom operators need for higher throughput, broader coverage and dynamic prioritization. Drive hybrid satellite and terrestrial communications capabilities into one seamless, ubiquitous network fabric. Space X's partnership with T-Mobile, Amazon, Kuiper and Verizon. One Webb and AT&T, Apple and Globalstar and many, many others have all been formed to provide cellular backhaul via satellites demonstrating that these new capabilities are beginning to take shape.

In addition to the increasing performance of satellites in terms of bandwidth latency costs and interoperability, there are also two developments taking shape within terrestrial networks. 5G and AR is a technology that enables mobile systems to take advantage of 5G as well as satellite communications and on the network management side. 3G protocols lay out rules for how systems must operate, making it simpler for telcos to integrate with 5G and our devices and satellites. As technology and network capabilities enable SATCOM on mobile devices, direct satellite to device communications could be one of the biggest markets the satellite industry has ever seen. In the Satcom playbook unpacks the innovations driving these changes and what it could mean for our day to day lives. The use cases for Satcom and Earth observation are only growing from the standpoint of governments, which is the traditional customer for this data.

And these budgets are increasing as a share of overall defense budgets around the world. As we're saying now, government dollars can help a business weather a downturn. But equally important is access to technology transfer. Rising geopolitical tensions, particularly with China, are driving an increase in US government funding to meet the occasion. NASA's Artemis program is underpinning growth in lunar activity, committing billions of dollars to build a permanently crewed outpost.

The successful Artemis one mission in December was the first time in 50 years that a crew capable spacecraft has entered lunar orbit and successfully demonstrated the technologies needed to take humans back to the moon. The next Artemis two mission won't take humans to lunar orbit until next year, but we're already seeing a lot of activity in preparation. The first of a series of robotic precursor missions launched in December and is now in lunar orbit in preparation for landing and several more are planning to launch this year, including two Space Capital portfolio companies.

Chad Anderson
China's lunar ambitions have put the country on a trajectory to overlap with the U.S. at the Lunar South Pole, reflecting the limited amount of prime real estate based on access to water,

ice deposits and sunlight. The accelerating timeline of Chinese plans prompted the NASA administrator to warn that Beijing could establish a foothold on the moon and dominate the most resource rich locations on the lunar surface. And in Q1, a top Chinese space official called for the country to speed up its plans to develop lunar infrastructure and, quote, seize the opportunity and lead the earth moon space industrial market. And in turn, NASA established the Moon to Mars program office to prepare NASA to carry out our bold missions to the moon and land the first humans on Mars.
The government is acting as a catalyst that we're already seeing growth in these emerging areas. And in line with history, geopolitics will continue to be a driver of growth in the space economy going forward. Take capital. Markets have put a premium on sound business models and revenue, including government contracts, and many leading space companies are actively prioritizing these fundamentals.

Late last year, SpaceX unveiled Star Shield, a business through which it will cater to the national security needs of government clients. National security space is now one of the fastest growing areas of the DOD budget, and the 2023 Space Force budget is now larger than that of NASA's for the first time and the requested budget for 2024 would increase that further in the space economy. We talk about the origins of the Space Force and its purpose, and you may be surprised to learn that the Space Force was not just something that was pulled out of the air at the last minute. In the book, Scott Pace, who was interested or mental in establishing the Space Force, told me that it had been cooking for three decades since the 2007 Chinese anti-satellite test.

We've been seeing more and more threats, and it was actually the Obama administration that had started putting serious money into resilience. They put a down payment towards it. As he put it, the United States has a security dilemma. We are dependent on space, both militarily and economically, as much as, if not more, then Great Britain was dependent on the ocean in the 17th and 19th centuries or dependent on space. But we don't own it. We have no sovereign rights to it. We can't control it or put a fence around it. So, the US Space Force takes a broad view of providing space capabilities to American military forces at sea air and on the ground by relying on commercial capabilities that can be deployed more rapidly and cost effectively than traditional systems.

The Russian Ukraine conflict is only accelerating innovation that was already well underway. The strategic value and importance of the space economy will only continue to grow. So where do you find growth in this market? You have to be creating real, tangible value. You have to be mission critical and that's what space technology does. Next, I'm going to pass it over to Tom Ingersoll and he's going to talk about the pace of change and future outlook.

Tom Ingersoll
Thank you, Chad. I appreciate that. I have a very unique perspective on the satellite industry because I play two roles. I get to see the vision side of the space industry as I participate as an investor and partner at Space Capital. But I'm also a consumer of the space economy because I'm actively involved in a number of significant space projects where I'm buying systems from

the ecosystem. So, I get to see the big difference between the vision that's created and from the entrepreneurs and the investors and the reality that exists when we actually try and buy things with the contract and pay them actual money for delivery. And I like to call that the space reality gap. And historically there has been a big wide gap between what people claim that they could do and the things that they were promising that they could do versus what you could actually purchase in the marketplace.

But as I've been watching and experiencing and working within the space industry over the last few years, I've seen a really dramatic closing and reduction of that space reality gap to the point where and I'll talk more about this a little bit later, where in reality in some cases, the vision, the reality is beginning to expand and be more capable than even the vision. And I think that what we're what I'm finding and what I'm trying to communicate here is that I think the space economy is experiencing what I'll call a leapfrog tech technology moment. And we've seen these in the past, and there have been many of them. And whenever they occur, they do create significant opportunity, significant wealth, and have a big impact on civilization.

One of them was the personal computer. I, I did grow up with mainframes and saw what happened when we were able to expand into the personal computers, the Internet. I remember the pre-Internet days. How would we live today without the internet? The iPhone and mobile computing is another one. And in the cloud computing as well has had a significant impact on how businesses operate and has had a significant impact on business models, investment opportunities.

I think there are two significant leapfrog technologies that are occurring right now in our world. One is in and large language models who we won't talk about that today, but that's something that's going to impact our lives dramatically. But the second is what I'm going to call the Starship ecosystem. We've all been watching the news recently about what's going on with Starship, and here's some dramatic imagery of that massive the largest rocket system to be launched, heading off the pad, losing control, and then finally ending an explosion.

And there's been headlines ranging from, you know, another explosion in space. But I think that the folks have put it put it best maybe from The Economist magazine said, “despite the explosion, Elon Musk is much closer to his new space economy”. And I think that what we need to realize is that with Starship, not only is he closer to his space economy, but we are also much closer to our new space economy.

Tom Ingersoll
And let me talk about why I think that's the case. I'd like to say that that starship is symbolic of a space culture revolution and what's happening now. And I think what's emblematic of what's happening with Starship is that we're now able to learn through doing and risk taking. And what we're now seeing is the end of what I'll call the traditional space perfection ism culture.

Historically, now the Department of Defense, we're spending billions of dollars on systems and we're working to ensure that they were perfect before they launched one because so much

money was being spent. But secondly, just to protect reputation, you look at systems like the James Webb Space Telescope that recently launched, it was a spectacular success, but it was also roughly 100 times over budget from its initial estimates, as well as roughly a decade late. And I think that's what's happened in our industry, is that because we've been so perfectionist, focused, that we haven't been able to make great progress. But Elon and Starship are showing us that we can continue to evolve and move faster by taking risk and doing. And what's that? What that is doing is it's teaching a whole new generation how to operate quickly in an environment having success at a rapid pace, but also learning how to scale large systems.

In the past, you could spend your entire career building a system and really not experiencing end to end success. Those that started on the early stages of the James Webb Space Telescope, likely retired before it ever launched, went at the pace it's moving now. People are able to experience that end-to-end program capability, and that's really creating a whole new set of space entrepreneurs, which is what Justice was talking about earlier.

We're seeing entrepreneurs now that understand how to do early development. They understand how to build systems, they understand how to successfully fly systems, and they're able to see the economic impact of what they're doing. So that's creating a new set of entrepreneurs, but also creating and expanding the capability within the space segment and also reducing the cost of systems within the space segment.

Tom Ingersoll
So, I can give you an example. I'm working on a project right now where we have put out a request for information to the industry and we've contacted some 23 different companies to discuss to see what their capabilities are with respect to building satellite systems. I expected personally that we would have maybe two or three companies that would have that capability at the price point that we were expecting. What we found, however, was roughly a dozen companies were able to provide a capability not only from what we had, but we had requested, but then a capability at a price point that was far greater than what we even had imagined. So here we're seeing a case where that space reality gap I talked about, where actually the vision is somewhat behind even the reality that I've never seen that existed in my experience in the space industry. So that rapidly narrowing space reality gap is real. The second thing that's very, very important that I am seeing is not only with this, with this piece of technology, it's creating a whole new set of customer friendly business models in this request for proposals that we've put out to industry.

Not only do we get very innovative technical solutions at very aggressive price points, we also had very innovative business models proposed to us we had expected to need or that we were going to have to actually go out and purchase the satellite network. We had several people come back to us and say, Hey, why don't you consider a data service agreement where rather than having to purchase these assets, we'll just sell you the data at a service level agreement because that's really what you want is data and not a satellite system, and that's a revolution that's going to impact the way the business is done. It's going to impact the way business models are created, and it's also going to increase demand because it's going to allow consumer

to be able to get access to these space-based data systems much more quickly and much more cost effectively.

Tom Ingersoll
It's also going to enable, I think, and improve the investor community because it's going to allow business models now to be more flexible. They're going to be less capital intensive. They're going to have a broader application, they're going to provide larger returns to investors. So I see this technology and I call this culture revolution, this technology expansion having significant impacts not only to the business models and customers, but also to investors that are investing in those companies. Now, I want to make it really clear that space is still hard, that it is still difficult to make these things happen. And I'll give you another example is we're one of the projects I'm working on. We are trying to buy a high-speed radio from Honeywell, who, you know, a multibillion-dollar company, and they're delivering a radio that has just modest, capable and even with that modest capability, they're struggling. They're roughly a year behind schedule. And I don't know how much overbudget they are, but it's very, very difficult enough for you to do a modest job on its own. Space hardware can compare that to even one of our portfolio companies, Muon, who is who can deliver that same radio technology roughly ten X improvement in that radio technology at about half the price.

Tom Ingersoll
So, there are still traditional companies out there that are struggling because space is hard, but there are those out there that have learned these lessons, that have experienced this rapid pace of development, that understand what they're doing and that can execute and we at SpaceX Capital take pride in our ability to dig deep into companies and understand which teams know how to execute. And in my opinion and as I look, I've never been more excited about the opportunities that lie ahead because those companies that can execute are going to win big. Thank you, Chad.

Chad Anderson
Thanks, Tom. Amid these challenging economic times, one thing remains certain that space-based technologies are playing an increasingly vital role in our economy and will continue to transform the world's largest industries for decades to come. That's why we're proud to announce that we've launched Space Capital Three, a $65 million fund to continue investing at the intersection of space and tech.

We continue to believe that the reset in the venture capital market is healthy and that less frothy valuations, less competition and more available talent will make the next two years a great time to start and invest in technology companies, particularly space technology companies that are providing essential data and insights to enterprise and government customers. As the space economy matures, we're tracking a 300% increase in alumni from companies like Space X, Planet Labs and others who are founding new companies and feeding our robust pipeline of investment opportunities. Despite the challenges caused by macro market headwinds, we have never been more bullish on space as an investment category.