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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.

Chad Anderson:

Hello everyone, and welcome to Space IQ, our quarterly webinar where we review startup activity and investment trends in the space economy. It's been a decade of extraordinary growth in this 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 recap 2022 and look ahead to 2023. We'll 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 introductions, Space Capital is a seed stage venture capital firm investing in the space economy, specifically focused on unlocking the value in space technology stacks such as GPS, geospatial intelligence and satellite communications. We're actively investing out of our third fund with a hundred million under management. What sets us apart is that our partners have built rockets, satellites and operating systems. We've founded companies with assets currently in space and have led multiple exits as operators.

We've been pioneering investment in this category for 10 years, and now we have literally written the book on the subject, with *The Space Economy* published by Wiley and available for pre-order. Market education is an integral part of our strategy at Space Capital. This book joins a wide array of research and thesis papers, blog posts, podcast episodes and TV appearances, all of which are available for free on our website.

Chad Anderson:

Okay. So with that, let's get into it. 2022 represented the most difficult market environment since the Great Recession, 15 years ago. As the economy recovered from the Covid pandemic, central banks aggressively tightened the money supply and interest rates rose, which unleashed the fastest rate height cycle since 1988. Market momentum hit the brakes and asset prices fell across the board. While humanity's been operating in space for decades, it has only recently become a category for investment. Because of the early nature of this market, most of the action is still in private markets. Silicon Valley is more correlated with the NASDAQ than most people like to admit. In 2022, public markets tanked, which then caused late and growth stage private markets to grind to a halt. So, how did this impact the space economy?

Well, coming off a record \$47 billion invested in 2021, the space economy saw private market investment decline by 58% last year, with just 20 billion invested. Late and growth stage companies were most impacted, while early stage investments proved to be resilient, increasing only 4% year over year. But despite the market downturn, SpaceX continues to be an outlier, raising \$2 billion of fresh capital last year and surpassing the company's previous annual fundraising record of 2.6 billion in 2020. With investment up 159% quarter over quarter, the market may have hit a bottom in Q3, which was the lowest quarter for investment in the space economy since Q4 of 2013.

The data I'm referencing in this webinar is based on the Space Investment Quarterly, which has been the source of record for private market equity investment activity and startup trends in the space economy since 2017, providing high quality data and insights that connects the dots between governments, enterprises and startups. With the Q4 report, we're proud to celebrate five years of this industry-defining research. By our accounting there has now been \$272 billion of private market equity investment into nearly 1,800 unique companies in the space economy over the past 10 years. Most of that capital's gone to the US and China, which together accounts for a full 75% of total investment over the last decade.

This framework for this report is based on the GPS Playbook, our seminal thesis paper, which we published with Silicon Valley Bank, which explores how a space-based technology has generated trillions of dollars in economic value and some of the largest venture outcomes. We believe that GPS provides us with a framework for understanding how space-based technology has become a platform for innovation on a global scale, specifically the development of technology layers on top of space-based infrastructure and the distribution of data for mass adoption, which unlocks thousands of unique applications. The point is that the space economy is much more than just rockets and satellite hardware.

Chad Anderson:

Now with that context in mind, let's unpack the key themes of last year. It was a tough year for space stocks, but a big year for innovation. In the space economy, 2022 was a tale of two halves. In the first half of the year, the Russian invasion of Ukraine showcased the growing capabilities of commercial space companies. SatCom enabled the Ukrainians to stay connected and combat Russian misinformation, while earth imaging companies provided a foundation of truth for what was happening on the ground.

These geospatial intelligence companies are providing essential information to enterprises and government customers, who importantly are willing to pay. In fact, the National Reconnaissance Office, one of the big five US intelligence agencies announced its largest ever satellite imagery purchase in Q2, which is one of the lowest points for the market last year.

Record revenues for earth observation companies demonstrates how some segments of the space economy are countercyclical and recession proof. In September, Planet Labs, which is one of our first investments as a fund and now publicly traded on the New York Stock Exchange, they reported a 59% increase in fiscal year Q2 revenue, year over year, with net dollar retention of 125%. This performance was driven by growth in both enterprise and government customers, whose operations increasingly rely on critical data and insights from satellites.

In times of uncertainty, business leaders are hungry for insights and information, which is exactly the type of data that space technologies provide. In fact, many of our portfolio companies have seen an increase in demand for their products and services as the world becomes more dynamic and uncertain. The tight capital markets have put a premium on sound business models and revenue, including government contracts. Many leading space companies are actively prioritizing these fundamentals. In

Q4, SpaceX unveiled Starshield, a business through which it will cater to the national security needs of government clients.

Chad Anderson:

National security space is now one of the fastest growing areas of the DOD budget. The 2023 Space Force budget is 26 billion, which is actually 1,000,700,000 more than they requested. It's now larger than that of NASA's budget for the first time. The second half of the year saw a triumphant return to the moon. NASA's Artemis program is underpinning growth in lunar activity, committing billions of dollars to build a permanently cratered outpost. The successful Artemis I mission in December demonstrated the technologies needed to take humans back to the moon in 2024.

In the meantime, the first of a series of robotic precursor missions launched and is now on its way to the lunar surface, while several more are planning to launch in the first part of this year, including two Space Capital portfolio companies, Astrobotic and Lunar Outpost. Like any nascent market that we've seen in the past, like launch for example, government budgets are driving early activity on the lunar surface and we're on the front end of this one.

China's lunar ambitions have put the country on a trajectory to overlap with the US 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 has prompted NASA Administrator Bill Nelson to warn that Beijing could establish a foothold on the moon and dominate the most resource-rich locations on the lunar surface. In line with history, geopolitics will continue to be a driver of growth in 2023 and going forward.

Looking to the year ahead, all eyes are on Starship to reach orbit, and it sounds like we might actually see that happen in March. The next gen launch vehicle is poised to be a game changer. It's really hard to overstate the impact that this is going to have on the space economy. Over the past 10 years, we've seen \$55 billion of private market investment into space infrastructure, but much of that capital was chasing solutions based on a 10-year-old Falcon 9 launch paradigm.

With Starship, we're entering a new phase of infrastructure development. It will make much of our existing space infrastructure obsolete. Billions of dollars of wealth and capital investments will be transferred to new solutions. Just like SpaceX did with its Falcon rocket a decade ago, Starship will fundamentally change how we operate in space. It will further remove barriers to entry and stimulate the development of emerging industries.

Chad Anderson:

As investors in this category, we're looking for founders who see what's coming and are building for this new reality. Space technologies are playing an increasingly important role in the global economy. For example, with the iPhone 14 launch in the second half of last year, Apple announced this partnership with Globalstar to provide emergency communication services to its one billion users. While this service is limited to text messaging to start, it's an initial step to integrate SATCOM into mobile devices and has significant implications.

Apple's no stranger to innovating with satellite capabilities. In the GPS Playbook, we explore how Apple's integration of GPS into the iPhone 3G helped fuel the rise of location-based services and companies like Uber, Lyft, and Grubhub. Apple isn't alone in this. T-Mobile and SpaceX also announced plans to bring persistent ubiquitous coverage to US customers using Starlink, and many others have joined the party.

But regardless of who comes out on top, this convergence of terrestrial and satellite communications networks provides tremendous opportunity to rethink how our data is captured, routed, stored and utilized.

The SatCom Playbook, which we published last year, unpacks the innovations driving these changes and what it could mean for our day-to-day lives. We expect to see continued growth in this area in 2023. The global geospatial 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 within it.

In the early 2010s, 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 GIS product development. The adoption of cloud, edge computing, AI, ML capabilities and increasingly powerful geospatial APIs and SDKs are making the benefits of geospatial intelligence more accessible.

Developers no longer need to be experts in image capture, data processing or object detection, and instead can focus on building specialized applications tailored to unique customers, similar to the proliferation of GPS, which is 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 largest global industries operate. A seemingly infinite number of venture scale businesses are now being built in multi-trillion dollar global industries like agriculture, insurance and climate markets. We're witnessing the birth of a new investment category in geospatial intelligence, that we believe could exceed the \$36 billion location-based services market. This is an area that is poised to take off in 2023.

Now, space plays a foundational role in enabling climate markets. In fact, we wouldn't know about our changing climate if it weren't for space. That's because over half of essential climate variables fundamental to earth science today can only be measured from space and over 99% of accurate weather forecasts come from space. Our partners are leading the world's most ambitious climate projects, including MethaneSat, a hundred million dollar subsidiary of the Environmental Defense Fund. We're also generating industry leading insights, and our portfolio includes market leaders delivering climate solutions.

Chad Anderson:

Climate tech companies were mostly spared the carnage in the markets that hit the other areas of tech last year. Valuations have been heating up in part in response to the Inflation Reduction Act, which committed \$370 billion to combat climate change over the next decade. According to PitchBook, deals in this vertical fetched a median 41% higher than in 2021. Many leading VC firms have dedicated climate funds now, and we see huge amounts of capital available for climate startups, with strong teams and novel approaches. This is definitely an area we expect to see big things from in 2023.

2023 will be a tough year for startups, but there's a silver lining, particularly for some space startups. Here's our take on how things will shake out. Sometime in the first half, central banks around the world will slow rate increases, as inflation continues to ease and the economy continues to cool. Because most startups avoided raising in 2022, many will need to raise capital this year, which is welcome news for the \$200 billion in dry powder, but VCs will be more selective and this pent-up capital will take several years to deploy as hundred million plus mega rounds will be very rare, although SpaceX continues to be the exception.

Late stage private markets will pick up in the second half as public multiples stabilize. Although we expect the frozen IPO market, which is down 88% from 2021, to continue through this year. As a result of investor demand for liquidity, it's going to be a big year for secondaries. In the private markets, GPs have so far been reluctant to mark down their portfolios, but that will happen throughout 2023, starting most aggressively now and throughout the first half, driven by the audit process.

Companies with all vision and no execution are going to suffer, like many of the listed SPAC companies. Some startups have already failed, particularly those with upside-down unit economics or with a lack of product market fit. We believe that we've just seen the start of this trend. As this category's grown, we've seen a lot more investor interest, more coverage by the media and more analyst coverage from banks. But most people are looking at the opportunity set through a very narrow lens, focused only on space infrastructure like launch and what we call emerging industries, which is space stations, debris cleanup, manufacturing and orbit.

But these are all the most CapEx heavy and most risky. These industries only account for one-tenth of all activity in the space economy. The vast majority of the capital has gone to the satellites industry and much of that into satellite applications. The applications is where the real value accrues. Those data businesses are highly resilient to macro market pressures. The CEOs of the leading venture backed launch companies know that launch alone doesn't make a business. All of them are moving down the value chain, into everything from spacecraft manufacturing to satellite services and lunar landers and more, starting with SpaceX and its satellite's manufacturing and internet business, Starlink. Musk has said that the company's launch business is likely around 3 billion a year, but Starlink is expected to tap of market that would be 10 to 15 times larger.

Likewise, within the GPS stack, it wasn't the satellite hardware that generated trillions of dollars in economic value in some of the largest venture outcomes in history. It was the applications, the location-based services that were built on top of those signals generated from orbit. We often say that the space economy is countercyclical, but space itself is not. Certain segments are, and it's important to know which ones when making investments. You can't be a tourist investor in this category. There's too much happening too quickly. It's not enough merely to identify a market opportunity. You also need the category knowledge and the experience to pick the winners.

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 a greater focus on fundamentals is an overwhelmingly positive development for the space economy. Quality companies with product market fit, positive unit economics and strong leadership will continue to get funded, although valuations will be anchored to fundamentals. We believe that less speculation will result in fewer competitors and that a larger talent pool will make the next two years an attractive time to start and invest in tech companies, particularly space tech companies that are providing essential data and insights to enterprises and governments.

We've said it many times, but it's never been more relevant. Space technologies are the invisible backbone of the world's largest industries, and they're playing an increasingly critical role in the global economy. The space economy experienced significant growth over the past decade, solidifying its role as supernational infrastructure. There's no putting that genie back in the bottle. In summary, despite the challenges caused by the macro market headwinds, we've never been more bullish on space as an investment thesis.

Switching gears, I want to introduce my fellow partner at Space Capital, Justus Kilian, who has been instrumental in building out our space talent platform. Amidst the market downturn, tech giants shed about 10% of their workforce. But to help put all this into perspective and help us explore the

opportunities with space companies, I'll pass it over to Justus to discuss some of the trends that we're seeing at Space Talent.

Justus Kilian:

Yeah. Thanks, Chad. So 2022 was a rough year for tech. NASDAQ ended down 34% versus the Dow, which was at only down nine. As a result, the industry shed nearly a hundred thousand jobs, following rapid hiring during the rapid growth during the pandemic. We've already touched on some of the spillover effects that this had on VC funding. Now we're going to take a look at the state of hiring across the space economy.

Founded in 2019, Space Talent is the leading online portal for careers in the space industry and its broader ecosystem. It provides a variety of tools to help both industry insiders and new entrants find a career enabled by space technology. One of the tools provided is the jobs board. We're able to track this aggregate data and get a better understanding of supply and demand for talent in this marketplace. We've aggregated that, and we're actually representing that here for you now. Looking back at two years of data from Space Talent, we're able to see a period of consistent growth in total jobs available on the platform.

During this period, we see new jobs being added that exceed the number of jobs being removed, and so that is showing a buildup. There was a hiring frenzy that took place between October 2021 and May 2022, peaking at more than 48,000 jobs available on the platform. As the public market saw a significant selloff in Q1 and early Q2 of 2022, growth expectations and hiring began to change. From May 2022 through the end of the year, the total jobs available fell 66%. So, it's important to note that this data looks at new roles. It doesn't include companies and layoffs, but it really is a representation of expectations around companies' growth and the new people that they're bringing on with capital and where they see the market going.

So we can overlay the change in total jobs with the engagement we saw on our platform to get a sense of demand. It's interesting to observe that the total jobs rapidly increased. We saw a meaningful drop-off in engagement, suggesting that the labor market was tight and that demand for job search support was less important for a period of time. As total jobs began to decline in May 2022, we saw an increased engagement in open roles, suggesting that there was more candidates looking for roles on our platform.

In addition to hiring, we've been tracking the growth of new founders being incubated within select space companies. Since 2020, we've seen a 300% increase in new founders. The skills and experience developed in these companies has broad applicability, and we see founders going on to start businesses and more than 47 different industries. The percentage of founders that have gone on to found a new space company has hovered around 17% of that total group, since we've been tracking it.

SpaceX has produced the most new founders, more than three times that of Blue Origin or Planet. Part of this is attributed to SpaceX's size, which it's grown over 10,000 employees, but it can't explain the full difference. So, we believe there may be a few forces at work here. SpaceX has gone through several major phases of growth that include natural transition points. So think Falcon 1 to Falcon 9, cargo to crew, and now Block 5 to Starship. Another major component we believe is employee stock options, which are a powerful recruiting tool for the company, especially when paired with frequent broad-based tenders. That wealth accumulation and liquidity make it easier for new founders to step out and take on additional risk. Lastly, a meaningful tenure at SpaceX is highly regarded. Other potential co-founders and venture investors are looking to fund that talent, including ourselves. Pulling all of this together, we see that SpaceX alumni are going on to lead the next generation of space startups. A few of those companies include Relativity Space, Varda, Ursa Major and Violet Labs.

Any market correction is painful and has a real human cost, but there's a positive story here as well. As companies face cash constraints and layoffs happen, talents seek new opportunities to build and form new companies. We're incredibly excited about this next generation of founders and the space companies that are just beginning their journey. We already see the potential that is being driven by a new vision coming from these founders, with diverse backgrounds and a broad set of industry experience. We stand ready to support these new founders. You can apply through Space Talent for pre-seed and seed funding through our Open Pitch portal at any time. We've found some of our most incredible portfolio companies this way and really encourage you to sign up.

The jobs board that I mentioned supports over 700 companies and hosts 15,000 jobs currently. It's a great tool to navigate what's available and in real time and get up-to-date job lists. Lastly, Gravitare is our newest service, that provides curated monthly one-on-one conversations to help you build and grow your network. We've had CEOs meet their co-founders, senior managers find career opportunities and recent grads connect with mentors. That's all for me. Chad, passing it back to you to wrap up.

Chad Anderson:

All right, folks. That's it for this episode of the Space IQ. Thanks again for joining. To learn more about the space economy, make sure to check out the wealth of information that we have available for free on our website at SpaceCapital.com.

Thanks for tuning into the Space Capital Podcast. If you enjoyed this episode, please leave us a review and subscribe, to make sure you never miss an episode.

If you're interested in learning more about investing in the space economy, I invite you to visit our website, SpaceCapital.com, where you can get access to more industry-leading insights and learn how you can join the entrepreneurial space age.