Full Transcript:

Jorian Murray (00:01):

Hello, I'm Jorian Murray and welcome to Good Things Happen, the show that invites change makers and enablers to share their inspiring stories of progress. Whilst change can be uncomfortable, unexpected, and at times disruptive, it's inevitable and more often than not, change is for good. We'll be hearing from people from all walks of life who have been at the forefront of change, including their journeys to get there and their motivations. Because when people work together [00:00:30] for a common cause, good things happen.

Lori Garver (00:35):

They're trying to go to the lunar south pole where there could be water, where we know there's water, we might be able to mine it and turn it into fuel that could take us onto Mars.

Jason Gursky (00:45):

By virtue of having spacecraft and observing what's going on back here on Earth, we'll garner more knowledge and with that, will hopefully come lots of good decisions about how we go forward in humanity and take care of our planet.

Lori Garver (01:00):

[00:01:00] At NASA, we say, "Why don't dinosaurs exist anymore? Well, they didn't have a space programme."

Jorian Murray (01:12):

We are living in a new space age, the first which began in 1957 with the launch of Sputnik 1, was characterised as a Cold War space race between Soviet Russia and the USA. The current space renaissance is promising to deliver extraordinary technological, [00:01:30] commercial, and potentially environmental benefit as space travel is democratised. It could also present significant danger. To help us understand what's currently happening in the interplanetary world, I'm joined by two space experts, former NASA number two and an advisor to three presidential candidates, Lori Garver is author of Escaping Gravity, a personal account of her time initiating [00:02:00] this new space age. When reviewing the book, an astrophysicist from the American Museum of Natural History encouraged readers to bring popcorn as you bear witness to an untold slice of space history.

(02:14):

Also joining us is Citi's resident aerospace expert and equity research analyst, Jason Gursky. Lori, Jason, welcome to Good Things Happen. We are delighted to have you on the show. As ever, I like to begin by [00:02:30] delving into our guests' past. Lori, was Space something that captured your attention from a young age?

Lori Garver (02:38):

Well, thank you, Jorian. It's nice to be with you. Space probably came to me later than most. As a girl growing up in Michigan in the 1960s, there weren't a lot of people who looked like me involved in the space programme, but I did, [00:03:00] after college, start working for then Senator John Glenn, who had been the first American to orbit the earth, but I was working on his political campaign. I had by then moved to Washington D.C., majored in political science and economics, and while he was not successful,

even in the primary presidential election, he and his team helped look out for the early career campaign workers and [00:03:30] I got a job starting at the National Space Institute, a place that was a nonprofit looking to provide advocacy and support for the civil U.S. space programme.

(03:42):

I ended up staying within an organisation for 13 years, got a master's in science technology and public policy with a focus on space policy, and then went to NASA in the 1990s and worked in aerospace industry, [00:04:00] then going back to lead the transition team for NASA in the incoming Obama administration, and that's when I became deputy administrator.

Jorian Murray (04:10):

Amazing, amazing. Jason, where did you start out on your journey to what you now do?

Jason Gursky (04:17):

Very long and circuitous route, that's for sure. I certainly remember those initial shuttle days and having one of my high school physics teacher, [00:04:30] I think at the time perhaps, it put his name in the hat to be one of those civilians that went up and I think we had a teacher that actually went up on one of those field missions, if my memory serves me correctly. I could be wrong now. My memory seems to fade after seven years. So certainly a lot of awareness then, and then took a big pause, went off to both undergraduate graduates, focused on geopolitics and thought I'd help solve the Cold War at that time and [00:05:00] came back to all things geopolitics by way of my equity research role. Stepped away for roughly five years to work in the space industry and working for a company that builds spacecraft and operates a constellation of earth intelligence satellites. We can talk about that technology as we go into this.

(05:22):

Then made my way back to Citigroup and equity research because I love the intellectual stimulation of the markets [00:05:30] and writing about the industry, and so I've had an opportunity to be both a part of it and be somebody that sits out on the outside of it and gets the opportunity to kind of opine on what's going on, which is fun.

Jorian Murray (05:41):

It's amazing. To put myself in the mood, I've been listening to the soundtrack to 2000, the Space Odyssey. Lori, how would you characterise the current explosion of interest and investment in space? Is a new space age, is that a [00:06:00] term that you would use?

Lori Garver (06:02):

I have used the term a new space age. It's in the subtitle of my book. I think there are a number of things, just like any area of investment that needed to come together to fuel this, and in our case, in the space world, it was a combination of the technology, national policy and access to money and I would [00:06:30] say in a lot of fields markets. For me, when I was in NASA in the 1990s, the administrator of NASA really felt the timing was right then and we were pushing technologies that we thought could lead to reusable space transportation. That's really the key. Once you leave Earth's gravity well, you are halfway to anywhere. I believe it's a science fiction author who coined that phrase. But getting out [00:07:00] of the Earth's gravity well is challenging.

(07:03):

So reusable rockets have been the goal for decades and really I think the reason we're having this renaissance, as you called it, now for space is the lowering of the cost of space transportation and NASA set that in motion when I came back at a time when, this is now 2008, 2009, we had not only technological advancements since the [00:07:30] 1990s, but we had a number of wealthy individuals who were willing to invest. So we set policies that allowed NASA to be a customer instead of just what we called cost plus count accounting as just an acquisition method, and we were counting on the private sector putting some skin in the game, and that's what they did. So far the cost of getting into space, the regularity of it, the reliability [00:08:00] is what has really underpinned, I think, the growth.

(08:04):

Now, at least in the U.S., that growth peaked a few years ago and is maybe starting to build back up and that's ... again, it's a combination of things that are required and the access to capital when it was reduced, I think a lot of people felt space investments were sometimes not as ripe as they needed to be when they were going into at least [00:08:30] be traded in the public markets through our special acquisition, the SPAC that we have here in the U.S. But this is really something that I believe is still just at the beginning. I view space as just another domain. The previous one being air and before that, being able to cross the oceans.

Jorian Murray (08:56):

Jason, this lowering of the cost is bringing in many more players. [00:09:00] Give us a shape to this new era, if you will.

Jason Gursky (09:06):

Sure. Look, I think to Lori's point, the lowering of access to space has been the key here, and there are dozens if not multiple dozens of companies in the launch industry. There's obviously been one that does the vast majority of all launches [00:09:30] that get done across the globe, particularly here in the United States. That in and of itself is a bit of an ecosystem, right? People chasing the launch market and trying to find out new and clever ways to lower the cost and coming at it in different ways from large rockets doing ride shares and putting up multiple spacecraft at a time to smaller launch vehicles that want to insert spacecraft [00:10:00] as close as they can to the intended orbital slot for the spacecraft themselves. But what that has enabled, start maybe on the military side of things, to Lori's point, a new domain in warfare.

(10:14):

First it was land and air, and now we've got space and the utilisation of space, it's really the ultimate high ground. It allows countries like the United States and our allies and certainly our near peers as [00:10:30] well to launch spacecraft to be able to understand what's going on down on earth almost in real time and almost every inch of the earth on a 24 by seven basis. At least that's the goal. We're not quite there yet, but that's where we're heading. The idea here is to have eyes on what your potential enemies are up to. That certainly has [00:11:00] incented a lot of investment and a lot of the money that's flown through these SPACs have gone into these kinds of technologies, earth observation and launch in particular.

(11:13):

Now as we've got this vision of larger spacecraft being able to go further, we've got people that are standing up business cases to do lots of different things. From putting up space stations for zero gravity, R&D labs [00:11:30] to potentially going out mining asteroids, to companies that are even being set up to further transport spacecraft into their eventual orbital slot after they leave a launch vehicle. So it's

kind of like transportation within transportation. The ecosystem has very robust, but all of it has been catalysed by the lowering a cost of access to space, which has been, I think, the key unlock [00:12:00] and I think a part of what Lori has some experience in helping bring about, which is great.

Jorian Murray (12:06):

Lori, give us some insight. You talk about reusability, we talk about public-private partnership. It's easy with hindsight just to talk about those things very simply, but I know from your book it's quite challenging. Not everybody was kind of aligned in following the same kind of policies. Give us some insight [00:12:30] into how that evolved, please.

Lori Garver (12:33):

Sure. I think it actually was helpful that, as one of your first question you asked how I got involved, I didn't get involved in the traditional sense and get tied up with a certain way of doing things. When you open your aperture, you can really see, "Well, this just makes sense." But those people who were launching thanks to space and able to charge hundreds of millions of dollars, it didn't make [00:13:00] a lot of sense for them to open this up to new entrants and for the government to stop just paying them whatever they wanted to charge. Of course, it wasn't super popular and yet when you're a government employee, I felt at least that my role was to represent what was best for the nation. It was so, so clear that this was holding the U.S. back.

(13:28):

We had lost the launch [00:13:30] business. It really always has been a business for 50 years, aerospace companies had been building these rockets and launching them and charging the government. So we were able to go from what had been a lucrative business for the U.S. to losing all of that to the Russians, the Chinese and the French, to winning that back. I think last year there were 50-some [00:14:00] launches. We had one or two commercial launches around the year 2000. So it just made a lot of sense and it obviously was going to be something that you had to overcome the status quo in order to accomplish. Now the way we work here, the contractors work very closely with their representatives on the hill and while we in the administration proposed this new way [00:14:30] of doing business, congress had different ideas and that was ultimately a compromise that allowed us to get our foot in the door and I think everybody's on board now.

(14:41):

But change is hard and the very real reason is that the incentives are aligned for those who already have the business to keep it. You all know this is about risk and it was risky, and indeed, we really only have SpaceX successfully [00:15:00] doing this today. Hopefully that will not be the case much longer. We in the U.S. have Boeing as a competitor coming up here in a couple of weeks to launch people to and from the space station and lots more still working on and making on the lower end space transportation something that we really don't want to have a monopoly [00:15:30] player. At least, I think, most people in the U.S. recognising this was the right thing to do, but it sure was not easy at the time.

Jorian Murray (15:42):

I bet. I bet. Well done for seeing it through. Jason, the press can sometimes present space as being a kind of plaything for billionaires, but I also read that there will be ... [00:16:00] this space era is a real driver for the future economy. Tell us how, or maybe give us some tangible examples of how space development can help the world at large and humanity at large.

Jason Gursky (16:16):

Sure. Lori knows this much better than me about some of the missions that go on at NASA and a lot of the barriers that existed for [00:16:30] the various labs around the country to be able to launch spacecraft to go out and do, for example, earth observation missions, and this lowering of the cost of launches has been really helpful in allowing us to do that. But today we're launching earth observation satellites and we all have cell phones with apps on it and we've probably all zoomed in on the top of our house for example, using that satellite imagery. [00:17:00] That's come in large part as a result of this lowering of access of launch and allowing commercial providers to go out and put up sensors that do that kind of data. With our ability to do what I just described, zooming in on the top of your house, you can also map the world.

(17:18):

But look, in the future we're going to be putting up sensors that'll be monitoring what's going on with the climate, for example. We certainly have lots of weather satellites that are up there that are operated [00:17:30] by NASA and NOAA and other government agencies. We're launching satellites here I think in the really near terms to track methane emissions. I think everybody agrees that methane's not a great thing to be inadvertently or maybe advertently putting out into the atmosphere. So we're going to have all kinds of sensing capabilities to monitor the health of the earth and human activity on earth. All of that is [00:18:00] pretty good stuff from an economic perspective.

(18:03):

Then, of course, we've got one of these large space companies that is blanketing the skies with communication satellites that will hopefully lower the cost of the access to the world's knowledge and data. At the end of the day, the world's knowledge sits in our pockets every day and we've got now a company that is out blanketing the earth with all kinds of data that will enable [00:18:30] everybody on earth to have equal access to the internet and the world's knowledge. That's probably a pretty good thing, and who knows exactly what that will spur from an economic activity perspective. That's another maybe tangible example to speak of. Earth observation to track the health of the planet, mapping and all that that is enabled and now we've got hopefully lower cost access to the internet for everybody on the planet.

Jorian Murray (18:58):

Lori, anything to add [00:19:00] to that? I know you were a founder of the Earthrise Alliance, which is capturing data as I understand it. What other practical applications would you like to share of the benefits of this new space era?

Lori Garver (19:15):

Sure. I think Jason provided a great summary and around those foundational activities, you can imagine the types of things that are needed and helpful to transition that [00:19:30] information to something or the data to information. We founded Earthrise because we recognise there is a lot of satellite data, specifically earth remote sensing related from satellite constellations not just in the U.S. but around the world that just really wasn't being utilised for all the benefits it could provide. A lot of this development has been paid for, as Jason said earlier, [00:20:00] with a military focus. That tends to be the way things advance, and then you turn out, "Well, now we've got this capability, we've got this data, what else can we do with it?" That has proven to be something that with the, I think, merging of the technologies of data storage, modelling, analytics, we've been able to provide maps using the data.

(20:30):

[00:20:30] That's what's really important. Earthrise for instance, was able ... and it's really through AI. If we in the U.S. can see from satellites where certain assets or polluting factories exist in this country and we know physically where they are, we can just look at the signature and the satellite data and know where they are anywhere in the world. We have been able to go, for instance, to China with maps and show them we can see [00:21:00] what is happening now. This isn't really a military application as much as it is a pro humanity application, I would say, from things. It's not unlike most technology developments. They go through this cycle and right now for us, those things that can utilise the amazing data we have, [00:21:30] are I see some of the most exciting things. There'll, of course, be more sensors, you'll get higher fidelity, but AI has really allowed us to do a lot more with it.

Jorian Murray (21:42):

Jason, there's been a kind of radical changing of the guard. Like most industries, there's been a huge disruption. I've been reading about partnerships between maybe some of the old guard and the bigger companies and smaller firms and the impact on innovation. [00:22:00] Could you comment on that and bring that to life for us?

Jason Gursky (22:05):

Sure. Look, I think what has been really fascinating and interesting to watch over the last 10 or 15 years is this lowering of cost of access to space has brought forth this idea that ... Going back to the warfare example here. So [00:22:30] first it was the sea that it was there and now we're up in space. It used to be the old guard, speaking of the old guard, would focus in on developing very large what they describe as exquisite satellites, which I think from my perspective is code for really, really expensive. Multiple billions of dollars worth of money would get spent to develop these very large satellites and they were large because the cost of launch was so expensive and you wanted to jam as many sensors and as [00:23:00] many capabilities as you could onto a spacecraft because it was going to cost a lot of money to launch it.

(23:05):

Today, with the lowering of cost of access to space, we're able to launch smaller form factors satellites that are going to have more specialised sensors on them and that are designed to not live as long or fly as long, with an eye towards maybe upgrading these satellites over time as technology [00:23:30] progresses. So the space development agency I think has been ... it's a bit of a renaissance and government contracting from my perspective with these various tranches of buys that they've put out to the industrial base, starting with Tranche 0, which is like prototypes, and Tranche 1 and 2, 3, et cetera over time, and what they're doing is opening up competitions in each one of these tranches and allowing new companies [00:24:00] to come in and bid on work.

(24:03):

Because the old guard was focused on these large exquisite satellites, they didn't really know how to do these smaller form factor satellites and iterate on them very, very quickly. So what they have done is gone out and make some acquisitions or they've partnered with some of these smaller upstart companies that have focused on building smaller form factor buses or got specialised sensors to go on onto these spacecraft. This is one of [00:24:30] those, I think, success stories in government contracting and kind of spurring investment and putting people on firm [inaudible 00:24:38] price contracts and getting them to put, as Lori puts it, skin in the game, getting the industrial base, putting skin in the game.

(24:45):

I think a lot of these partnerships that you're talking about have been driven by the government figuring out the right incentive structures and putting those in place and getting industry to bring forth innovation [00:25:00] and do it in a way where they benefit from having some visibility on revenue streams because they know that there are going to be these series of buys over many, many years, but they've got to compete to win. I think that's been a pretty healthy thing overall.

Jorian Murray (25:18):

Lori, I'd love your opinion too about changes that have pleased you and encouraged you, but also changes that haven't happened fast enough [00:25:30] in the world of space.

Lori Garver (25:34):

I really agree that it has been healthy in the macro sense. Of course, there are winners and losers along the way, but I always, and we tried to be at the time of making these changes, wanted to be clear this wasn't about having existing contractors continue to [00:26:00] be even more healthy. If anything, again, I was working for the U.S. government, so it was about making the U.S. more competitive. I think to some extent that is already working and there are going to be on the fringes [00:26:30] things that need to recalibrate. Partnerships have been so fun for me to watch, knowing early on what some of these meetings were like, and I have said, "Boy, if I ..." You can think maybe I had all this in the back of my mind, but I did not.

(26:48):

It turns out that people are really creative when things change and while change is hard, as I said, it is also the only constant. So those generally [00:27:00] who remain nimble, who remain really with their eyes on the horizon are doing the most and sometimes those have really turned out to be positive. For instance, I started a fellowship for women in aerospace and collegiate and they are spending their summers in a paid internship in aerospace companies and there's 50 a summer. [00:27:30] This is only an eight-year-old fellowship and in the beginning I would've thought it would be hard to find 50 aerospace companies. We have a wait list of 50 companies. There are so many new ideas. Not everyone in a classical, we're a launch company, area of aerospace, but to I think your very first point, [00:28:00] this is a time when there is growth in many areas and I think it's pretty unique to see big, small, medium, all trying to figure out because the government is still a huge customer, how they can best capitalise on that and then get their private sector markets and make a go of it.

Jorian Murray (28:26):

You gave me a lovely introduction to my next question for [00:28:30] Jason about future investment opportunity as an analyst. I know we can't go into too much detail, but is there going to be an explosion of interest for private investors?

Jason Gursky (28:42):

Yeah, look, I think there has been to date, and I think what the market at this point ... Lori mentioned early on these SPACs that led to quite a bit of new money coming into the space industry. Some of it's gone well, some of it hasn't [00:29:00] thus far for investors. I think there are a few things to keep in the back of our minds here as we think about the space industry. I think as companies and investors are assessing how to make a go at this, I think the first thing you need to ask your seller, "Who are the customers that have a mission need to be up in space and who are the customers that have the financial wherewithal to be there over the longer term?" So mission and financial wherewithal.

(29:30):

[00:29:30] To date, the one customer you can say very consistently has been there have been governments, both on the military side as well as on the civil side, to be going out and doing either exploration, earth observation kinds of missions, but any space company that comes to the market and suggests that it's going to go out and invent something new and create demand that doesn't exist today I think should be viewed [00:30:00] with some level of scepticism, because we know that the customer that's going to be there over the longer term, given the mission need and the financial wherewithal, are governments.

Jorian Murray (30:10):

It's impossible, Lori, in a half an hour conversations to justice your experience at NASA. I'd love some other stories and anecdotes. Maybe Artemis, you were directly involved with Artemis. Maybe could you tell us about the importance of that, the significance [00:30:30] of that and some insight into the development?

Lori Garver (30:34):

Depending on how you measure it, today we say the commercial and government combined aerospace economy is nearly a half a trillion dollars. So around $450 billion. Much greater than 50% is in communications and telecom. Beyond that, it's GPS positioning, [00:31:00] weather. So these are all markets maturing. NASA sees itself and really always has, and I felt appropriately so, focused on driving to that next level thing where there aren't markets yet and the government, that was part of my rationale for loosening our grip on the transportation element, we as a nation have decided to be spacefarers and beyond [00:31:30] our International Space Station set the goal of returning to the moon. Now, we've set this goal a few times and in fact I was not involved when this happened most recently. That was during the Trump administration. The programme is called Artemis, as you mentioned. It is a named after the sister of Apollo, appropriately so. I did try to name things Artemis when I was at NASA for this reason.

(31:59):

We [00:32:00] have now one test flight of the initial rocket and capsule that has the ability to take us to lunar distance. While President Trump said this would be a landing in 2024, we're in 2024, we are nowhere near landing. I'm even hearing of further delays. Maybe by 2028, 2030 the U.S. will again land people on the [00:32:30] moon. I think there are other nations, notably China, who have said they want to go back by 2030. NASA's called this a race to the moon, which I take issue with since we won the race in the 1960s. This mission, however, the Artemis plan is, if it works, a really different setup. They're trying to go to the lunar south pole where there could be water, where [00:33:00] we know there's water. We might be able to mine it and turn it into fuel that could take us onto Mars.

(33:05):

It's a lot of excitement around it. I don't think there will be commercial viable markets beyond the government in the lunar economy for a while. But NASA is sure hyping it like, "Oh, we took this first step with commercial transportation and now it's going to be the moon and then Mars, and [00:33:30] really without these billionaires, these programmes would be much, much more expensive. We did sort of touch on ... you asked the question about is this sort of a billionaire playground? I think it's an odd mix right now, and hopefully that will work its way through to be something that's sustainable. I think that's TBD.

Jorian Murray (33:55):

Great. My last question to you both, and Jason, I'm going to let you go first, [00:34:00] is just a broad observation. Are you optimistic about where space is going to take us?

Jason Gursky (34:09):

Am I optimistic about where space is going to take us? Oh, for sure. I mean, this is to be a cliche kind of thing to say, but knowledge is power, and I think by virtue of having spacecraft, observing what's going on back here on Earth, we'll garner more knowledge [00:34:30] and with that will hopefully come lots of good decisions about how we go forward in humanity and take care of our planets. I'm certainly optimistic on that side of things. I hope as well from a military side of things that intelligence will lead to fewer mistakes being made in the future. I think we could all think back even inside of our lifetimes, maybe within the last 25 years or so and say [00:35:00] with better intelligence, we may have made some different decisions. So I'm hopeful that with the sensing payloads that we're putting up there, that we will have more transparency about what humans are up to around the world and with that will come ... I don't want to say peace, but maybe things that resemble more something similar to global peace, or world peace I guess is the right phrase.

(35:26):

Then, look, from an exploration perspective, [00:35:30] I think having these billionaires involved has been really, really helpful because they help us dream big for sure. They wouldn't be successful if it weren't for the U.S. government. They're all getting a lot of money from the U.S. government that are kind of subsidising these dreams that they have. But who knows what will come out of the knowledge that we gained from some of these exploration missions that we'll do. I don't know how much more we're learning going back to the moon, but going further afield, [00:36:00] if we are successful in setting up international space stations that zip around different planets or start with our own moon, who knows what we'll learn. These zero gravity R&D labs that we're talking about, maybe it'll help cure cancer. I don't know.

(36:16):

But I think going out and just garnering more knowledge, I am hopeful it's going to be helpful to all of us back here on Earth. Certainly, I guess just to the transparency side and having everybody know what [00:36:30] it's going on back here with human activity and what's going on over our climate is got to be a good thing.

Jorian Murray (36:35):

Last word from you, Lori, same question. Are you an optimist?

Lori Garver (36:40):

Indeed, I am. I don't think you find many people in the aerospace world who are not optimists generally because you have to believe in things before you create them in our business. But for a lot of the same reasons as Jason said, it's positive. [00:37:00] Now we all know there are technologies that have positive and can also have negative implications, but for the most part, this really is a future that I venture to say it's inevitable. We say at NASA that why don't dinosaurs exist anymore? Well, they didn't have a space programme. So we like to believe that we have [00:37:30] advanced to a point where we can help society through our space programme. If that is detecting and deterring an asteroid down the road, absolutely, you bet everyone's going to be happy we had a space programme.

(37:45):

But I think we also have these more earthly needs, like how to understand what's happening on our planet, how to live together more peacefully and space has just offered ... We [00:38:00] live just in a unique time where we have the capability to address some of these challenges of our own making. So of course, I'm hopeful. I think I'm most hopeful that space can contribute to this in ways exceeding what it has done before and what it has done before is truly amazing. We can have instantaneous knowledge communications [00:38:30] because of our space programme. People don't think about it every day, but we all benefit from it every day.

Jorian Murray (38:38):

Well, a beautiful way to finish. Thank you so much. You've totally broadened my mind to the world of space. You're going to leave me with a thought of why didn't dinosaurs have a space programme? I'm going to ruminate on that. Thank you so much for joining us. This has been wonderful. Thank you very much.

Jason Gursky (38:57):

Thanks.

Lori Garver (38:58):

You're welcome. Pleasure to be with you.

Jorian Murray (39:00):

[00:39:00] On the next episode of Good Things Happen, we'll be discussing how technology is enabling better health. I'll be joined by Dr. Harshit Jain, founder and global CEO of Doceree, an innovative healthcare marketing platform that connects healthcare professionals with life science brands, and Citi's Global Head of Healthcare, Nauman Ansari. See you there.

Outro (39:30):

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