Center for Strategic and International Studies

TRANSCRIPT

Event

Betting on America

"Reviving U.S. Commercial Supersonic Flight featuring Blake Scholl"

DATE

Wednesday, October 1, 2025 at 10:00 a.m. ET

FEATURING

Blake Scholl

Founder and CEO, Boom Supersonic

CSIS EXPERTS

Navin Girishankar

President, Economic Security and Technology Department, CSIS

Transcript By
Superior Transcriptions LLC
www.superiortranscriptions.com

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Navin Girishankar: Many of us remember Concorde flights from decades ago with their famed supersonic boom breaking the sound barrier, taking travelers across the Atlantic in less than three hours. Supersonic flight was always about more than just speed. It was about ambition and innovation and technological progress. But it came at a price: high production costs, rising fuel prices, environmental concerns, ultimately safety concerns.

Fast forward several decades, and today a new generation of innovators wants to revive the dream of commercial supersonic flight. To do so, they'll have to answer some questions. Is supersonic aviation commercially viable? Who stands to benefit? What kind of opportunities does it provide not only for technological innovation but, importantly, job creation here at home? And how does one manage the environmental costs, the noise pollution costs, that are clear downsides?

To answer these questions and more I'm joined by Blake Scholl, CEO and founder of Boom Supersonic. I'm Navin Girishankar. Welcome to this episode of Betting on America.

(Music plays.)

Mr. Girishankar: Blake Scholl, welcome to Betting on America. Thank you so much for joining us for this conversation on supersonic aviation.

Blake Scholl: Thank you for having me, Navin. Good to be here.

Mr. Girishankar: I've been looking forward to this. You know, I was a young, young man, I should say, when Concorde was flying, and I had the opportunity to fly on it a few times. And what was striking was just the experience of being able to go across the Atlantic in three hours or less – or, three hours, if I recall.

Now, you are part of this new generation of American innovators that are trying to revive commercial supersonic flight. So, tell us about Boom Supersonic and how you're approaching this challenge in this day and age.

Mr. Scholl: Yeah. It's a really bizarre thing in the history of technology to have something and then to lose it and go backwards. In 1969, Concorde flew supersonic within months of the first Moon landing. And I think if you had stopped somebody in the street and said, imagine the year 2025, what do you think space exploration's going to be like, what do you think travel's going to be like, I don't think you could find anyone who would say, well, you won't be able to go to the Moon and you won't be able to fly supersonic. And yet, that's where we are. And we can – I think we can talk about how that happened, but you know, what we're working on at Boom is setting that right and in a certain sense picking up where Concorde left off, or maybe in a different sense doing what it should have been and bringing back supersonic passenger air travel but doing it in a way that's going to actually change the way millions of people, and ultimately everybody, travel.

So, our first airplane, that we call Overture, is profitable for airlines at about what people pay at business class today. That's tens of millions of passengers. So, imagine you could leave London, three-and-a-half hours to New York. Also, we've solved sonic boom, so it's three-and-a-half hours from New York onward to San Francisco.

Mr. Girishankar: Amazing.

So, tell me a little bit more about what Boom is bringing to supersonic flight that we didn't have before, because there are some technological innovations in your – in your airlines or in your flights that we didn't have before.

Mr. Scholl: That's right. I mean, if you think about Concorde, here was a 100-seat airplane – mind you, 100 uncomfortable seats – that, adjusted for inflation, cost $20,000 a ticket to fly on. And right there is the real problem; $20,000 a ticket, that's royalty and rock stars. And especially in the 1970s and 1980s, there wasn't nearly enough international travel to fill those seats. So here we had an airplane that really only flew on a couple of routes. It was only, you know, affordable to a tiny number of people, so it didn't change anything.

And that we are leveraging is 50 years of basic progress in aerospace technology to turn it into a new-generation airplane that, unlike Concorde, can reach a mass market. So, think, you know, three-and-a-half hours across the Atlantic, but more like a $5,000 ticket, which is what people pay in business class today. And now over time we're going to continue to innovate and bring the cost down. We want to make this available to everybody from the president on down to families. But we're – you know, we're riding the backs of lots of fundamental innovation: carbon-fiber composites instead of aluminum; turbo-fan engines that are clean, quieter, radically more efficient; aerodynamics that are optimized in a computer simulation, not in a wind tunnel; and then being able to do away with things like that drooped nose that Concorde was so famous for and replace it with digital technology.

Mr. Girishankar: Amazing.

You actually described for me when we were initially talking about a software solution that was really essential to breaking the sound barrier without the boom. Could you explain that? Because that seems to be another important component of all these new pieces you're putting together here.

Mr. Scholl: Yeah. It's huge. I mean, for 50 years sonic boom was made out to be this bogeyman that is on one hand theoretically obnoxious and on the other hand theoretically, like, next to impossible to solve. And it turns out neither of those things are really true.

The solution for sonic boom is primarily software. We have invented a ray-tracing algorithm that takes in current weather data and basically tells you how to fly a supersonic jet such that no boom reaches the ground, and it operates on the principle of refraction. Basically, you control the speed and the altitude, and as the boom comes off the airplane it comes off at a shallow angle and it makes a gigantic 30,000-feet-tall U-turn in the atmosphere that never touches the ground. So, there's a – there's a boom, but nobody ever hears it. And that allows you to fly up to 50 percent faster than you could on a Boeing or Airbus today, absolutely no audible sonic boom. So that's what we'll do over land, make sure there's no boom for anybody to hear. And then over water we can fly fully two times faster. So that's why it's three-and-a-half hours across the Atlantic and also three-and-a-half hours across the country.

Mr. Girishankar: Fascinating.

Now, are you actually flying planes that do this and that you're demonstrating this?

Mr. Scholl: Yes.

Mr. Girishankar: Wow. Tell us more.

Mr. Scholl: Yes, yes. So, we've broken the sound barrier six times earlier this year with the very first airplane to do that outside of – built outside of a government or military. So that's – this airplane here, it's called the XB-1. It is about 70 feet long, a 20-foot wingspan. This is the first supersonic jet built outside of a government or military. It broke the sound barrier six times, each time without generating an audible sonic boom.

Mr. Girishankar: That is – that is fascinating. Wow.

You described all of these components, too, and these new elements that you're pulling together in this current version of supersonic flight, your Overture aircraft. But you've said something else, and I'm going to quote you because I love this, and I want you to elaborate on this. You said, "The most exciting things about supersonic will be the second-order effects that we're not smart enough to predict or imagine. But what happens when this increased connectivity, increased accessibility comes out for millions of people and eventually billions of people? What do we do with that? What do we create?" So, what did you mean by that?

Mr. Scholl: Yeah. Well, I think, to a first-order effect, if you cut flight times in half people are going to save a lot of time. And of course, time is the most valuable resource we have. It's the one resource that can never be made renewable. And that alone is pretty great, but I think that massively underestimates the story because when we break down the barriers to traveling around the planet what we're going to find is there's a lot more travel. And that enables things that we're not smart enough to predict or even imagine.

And I think the best way to see that is to look backwards and study what happened last time we had a doubling in speed. And so that happened in the '50s and '60s when we went from the propeller age into the jet age, and that was – that's really the best analogy here.

So, some examples. Before the speed of the jet, basically nobody went to Hawaii. Why? Because even from the West Coast it would take 15 or 20 hours, and that's too much of a barrier. You had to be really rich not just in money but in time to afford to go to Hawaii. In the first 10 years of the jet age travel to Hawaii went up sixfold, and then we had double-digit growth for the next few decades as people built hotels and resorts and tourist attractions and there's more reason to go.

Another example, sports. If you look at the map of Major League Baseball – same thing's true for really any major sport – for the first 100 years of baseball it was confined to the Northeastern U.S. Why? Well, baseball games – you know, there's 160 games in a season, and you just can't afford to spend too much time in transit to get the teams together. And then, within six months of the first regularly scheduled transcontinental jet service, the Brooklyn Dodgers moved, and they became the L.A. Dodgers, and then the game spread coast to coast. So, the fact that we have national sports leagues was enabled by the jet.

Or here's another example: Nike. There's a connection between Nike and jets. What is it? I discovered this by chance reading Phil Knight's memoirs. The story is not well told. Phil took a chance trip to Japan after business school – again, in the 1960s, a trip that would not have been practical 10 years earlier with slower airplanes – and he fell in love with Japanese-style running shoes. And Nike got their start importing Japanese-style running shoes to America.

And then – so we have now global supply chains. We have vacations in other countries. We have remote offices in different places.

Now, imagine another doubling in speed. Instead of a national sports league, maybe we've got a global one, right? I was talking with somebody who works with the NBA, and they play a couple games in Europe every year, and they could actually measure the human impact of the travel time on the player's performance. When they go to Europe, they don't play as well because these long flights are unhealthy. OK. If we make a flight to Europe like a flight in the U.S., all of a sudden, we can go to Europe, we can play, we can be healthier. We can have global sports leagues.

We can have a lot more, you know – and there are going to be a lot of other things that smart people are going to go invent when the world is effectively a smaller place. But as humans, our world became a bigger place.

Mr. Girishankar: Yeah. I mean, that's a great way to think about this and, like, work through in your mind what the spillovers could be. And we have the experience of the past 70 years of what's happened.

Now, there is this perennial question whenever you have something that is initially, let's say, closer to a luxury good and not available to everybody. There are always these questions, like, it's only a few that will benefit, and then over time it diffuses and becomes more cost-effective, and more and more people can benefit from that. How did that happen with the – with the jet age? And how do you see that happening with supersonic flight?

Mr. Scholl: It happens with virtually every new technology, right? Like, cellphones started as car phones at exorbitant prices for a tiny number of people. Cars, similar story. Electric cars, similar story. Computers: I mean, you know, you had to be the government or a bank to have a computer, and now – you know, and I think we've probably lost count of how many computers we have now per person. And the – so I – you know, I'm a believer in trickle-down innovation. And the way – the way it works in most cases is innovation goes to a small market of people who are most able and motivated to pay for it, and then as we scale the cost comes down and it becomes available to everybody.

And so – you know, so I think the way supersonic should have started was actually with a supersonic private jet. We should not have built a hundred-seat, uneconomic supersonic airliner in the '60s; we should have built a five- or 10-seat supersonic private jet in the '70s. That would have kicked off an innovation cycle and we'd all be going mach five by now. And the fact that we blocked trickle-down innovation is why we've had a 50-year hiatus in progress.

Mr. Girishankar: Yeah. Well, actually, if I tease out what you've said there, there are different pathways for diffusion of these technologies that will create spillovers on innovation, job creation, and so on and so forth, and it's not just one path. You look in the rearview mirror and you say it was just one path, but in fact at that particular moment in time there are different options, different pathways. And I think – I believe what you're saying is you got to be open to different pathways to achieve that.

Mr. Scholl: Yeah. I think markets find a way, and I'm a big believer in letting markets find a way and Adam Smith's invisible hand guiding it in a good way. And you know – and when we put handcuffs on Adam Smith's hand, we get bizarre, bizarre results.

You know, like, both – you know, one of the things that just is a very controversial opinion I have, I think both Concorde and Apollo were fundamental mistakes and should not have been done. And you know, I think Concorde killed supersonic flight, and I think Apollo killed space exploration. And I go to these aerospace conferences where people expect, you know, to treat me like a hero, and I say that, and I get – you know, I get stoned.

Mr. Girishankar: (Laughs.)

Mr. Scholl: But I think – but I think the thing we have to remember is both of those things were heralded as progress, and yet 50 years later we can't go to the Moon, and we can't fly supersonics. So, what happened? And I think what happened was we got very confused for how we drove innovation, and we let governments fund it and governments spec it without any kind of commercial constraint.

And the result was, you know, we did – Concorde was supposed to be economic, but very clearly nobody thought it through. It made no sense to have a $20,000 ticket on a hundred-seat airplane in the '70s. Makes no sense, right? Which is why, when the subsidy for Boeing to create a supersonic airplane got canceled, they canceled the entire program because they knew it made no commercial sense. And Apollo didn't even try, right? Like, obviously, there was no business model for landing on the Moon in the 1960s. And I think the – I think in both of those cases we could have gone a little bit slower upfront but had a massively different long-term result had we – had we let Adam Smith be in the driver's seat.

Mr. Girishankar: Yeah. So, you raised so many points there. Let's come back to the question of policy and government in a minute. You talked about, you know, your own views on the evolution of these types of technologies and what the drivers are. And I am a believer in markets as well and particularly their role in innovation and diffusion.

And then your own kind of journey into this whole space. Now, I don't know if you're an engineer or if you're a jet propulsion engineer or a supersonic engineer –

Mr. Scholl: (Laughs.)

Mr. Girishankar: – but how do you get into this? Like, let's just take a minute to understand your personal involvement in this. This is very interesting.

Mr. Scholl: Well, it became a bit of a joke in January when we broke the sound barrier for the first time, because my last job before Boom was, I was a product manager at Groupon working on internet coupons.

Mr. Girishankar: (Laughs.)

Mr. Scholl: And so, my LinkedIn went viral because there was a quote I put in there 10 years ago that said something like there's nothing like working on internet coupons to make you yearn to work on something you truly love.

Mr. Girishankar: (Laughs.) Like, how do you make this transition? Like, how –

Mr. Scholl: Well, a thing –

Mr. Girishankar: Can you walk through that for a second?

Mr. Scholl: Yeah, absolutely. So, a thing I believe is that passion and drive trump knowledge and experience because it's very difficult to change what we love but it's totally possible to change what we know. That's called learning. And I think – I think we tend to get told as we grow up that you're supposed to pick what you're going to do in life relatively early, and then you go to school in it, and if you're smart then you go to grad school in it, and then if you're really smart you go to postdoc, and then you go and do something else that's even more narrow, and you know – and by the time you're done with this, you know, you're a millimeter wide and 10 miles deep and you couldn't possibly change. And there's nothing wrong with that path, but I think some of us go down a bit of that path – I actually never made it past undergrad, but I found that I was off a little bit relative to what I loved. And as – and yet, the more I, you know, grew up, the more I was able to actually study and learn and get my head around things.

And so, what I – what I found was, I mean, I was really motivated I could learn new things, and I spent – so after leaving Groupon I wanted to start a company and I wanted to work on one where I would never give up no matter how hard it was. And so, I thought, let me just organize my ideas by how awesome it would be if they worked and forget everything else like whether I have the resume for this or even whether it's possible. And I thought I would get two weeks into supersonic flight and understand why it was a bad idea nobody was pursuing, but instead what I found is all – you know, the internet was full of this conventional wisdom, and you know, like, oh, supersonic flight costs more and people don't – people won't pay for it and if you don't solve sonic boom you can't have a market, and that's impossible technically and it's impossible politically, and so it's going to be decades of R&D before anything happens. And none of that stuff added up to basic – with basic models that I could build in a spreadsheet with data I could pull out of Wikipedia with, like, a high-school – you know, heck, a junior-high level of knowledge of math.

And so, I started turning over these cards. And what I kept finding is it was plausible, and so I just kept going deeper. And I ended up – you know, I bought every textbook I could find. I took remedial calculus and physics. I ultimately took an airplane design class. And I built a spreadsheet with a really basic engineering model of the airplane and a really basic engineering – a really basic business model of the market. And it was very surreal for me personally because I'm, like, the – I was, like, the ad tech guy from Amazon and Groupon. The closest thing I had to anything in aerospace was a pilot's license. And yet, here I was with a spreadsheet that seemed to contain the formula for a supersonic renaissance.

Mr. Girishankar: (Laughs.)

Mr. Scholl: And it was – it was a real, you know, bizarre experience of my own ego because I'm like, this is strange; how am I the person with this? And you know, I didn't know if I could do it, but I decided that I would much rather try and fail than be 80 or 90 looking backwards and think, well, I kind of just didn't have the courage to go for it.

Mr. Girishankar: That's inspiring and, you know, in a way a really important lesson for American innovation, which is not to put limits on oneself.

Mr. Scholl: You said it beautifully. I mean, if we could just get every kid – and frankly, every adult – in America to internalize that, it would be such a huge unlock. It is – my experience has been that it's way easier than we're told to skate to the frontiers of human knowledge and way easier to add something to it than we get told.

Like, I grew up, you know, basically thinking, like, oh, people who change the world, that's, like, some small, tiny class of people, and you know, you probably feel different if you're one of those people. Maybe someone taps you on the shoulder and, like, you know, OK, you're Steve Jobs, you're Bill Gates, you're Thomas Edison, you're Rosa Parks. But, like, that's not how it works. They just decided to go for it.

Mr. Girishankar: Right.

Mr. Scholl: And I think anybody can. And for me, I wanted – I would rather have gone for it and failed and be lost in history than not have tried.

Mr. Girishankar: Yeah.

So, individuals matter, but institutions and policy matters as well. So, let's shift gears for a second to your thoughts on government policy. Recently – I think earlier this year – President Trump signed the executive order "Leading the World in Supersonic Flight" to begin, and I quote, "a historic national effort to reestablish the United States as the undisputed leader in high-speed aviation." So, give us your view – I can guess what it is, but give us your view on what the executive order does in terms of unlocking/unleashing potential for the kinds of things that you're trying to do. And if you can be specific here just so we understand what are the bottlenecks that that – that aims to address.

Mr. Scholl: Yeah. Well, I think regardless of where you stand politically this is something to be really excited about because it reverses 52 years of a literal ban on progress in flight. If you look at the Wright brothers through the jet age, what made every generation of new airplanes different is it flew faster than the last one. And then, in 1973, we put on the books a literal prohibition on flying past the speed of sound. And it should have been a ban on bad sonic booms, but instead it was a ban on speed. And what that meant is the way supersonic passenger flight would have started was not allowed.

And you know, we talked earlier about this, you know, idea of trickle-down innovation, and I think this would have been a great example of it because the – so in Silicon Valley people talk about what's called minimum viable product – what's the smallest, simplest thing that's useful that you can ship – and then start innovating on top of that. The minimum viable supersonic passenger jet would have been a small, maybe five- or 10-seat supersonic private jet with just enough range to be able to fly from, say, Seattle to Miami. That's about as far as you would need to go. And by the way, that small airplane would have been much easier to make quiet than a big one, and it would have been for a small number of people whose time is most valuable. But a bunch of problems would have got solved on that airplane, and then there would be a bigger one, and then there would be a bigger one, and then there would be a faster one, and then, you know, our kids would be going mach five and taking it for granted. Which is exactly what happened with computing, right? We went from the mainframe to the – to the iPhone is a similar time period. But in aviation, we kind of never got past, you know, the speed of the 707, which is, like, right under the speed of sound.

And so that 1973 regulation resulted in there being no progress in speed. And frankly, I think there's a connection to just the gradual undoing of the American aerospace industry. It's not good for America. It's not good for the future. And how did it happen? The story's complex. A lot's been said about it. But I think one of the things that's underappreciated is when there is a policy ceiling on innovation, the most innovative, most talented people don't even want to work in the industry. And so –

Mr. Girishankar: OK. I think that's a really good point, which is that there isn't an enabling environment, there isn't an incentive to actually get great talent to come in there and innovate and come up with new approaches. And I think that's generalizable to different companies, including the one –

Mr. Scholl: That's right. That's right. I think how we inspire young people really matters. And, you know, all of us have sort of an inner five-year-old that would just be dazzled by getting to work on something. And for me, if my inner five-year-old would have loved to build a supersonic jet. And, you know, that's not – that's not everyone's inner five-year-old, but we all have that. And if we've canceled or blocked some portions of what's possible, that restricts where people go and what they work on.

Mr. Girishankar: Yeah. Great point. So, there's all these benefits from having great talent come into innovative companies and really push the frontier.

There is another set of issues, and I just wanted to raise this with you, because we are now in an era of reindustrializing the United States. And I think there are important questions when you have a global value chain, like the one that is underpinning the building of aircraft, how do you think about reindustrialization at home or in the U.S. when it comes to the aircraft that you're building?

Mr. Scholl: Yeah. Well, I think – just to kind of capture where we are today, I think we're all aware that U.S. manufacturing got hollowed out. Textiles left. Electronics left. Home goods of all kinds left and went to Asia. And there's been these Herculean efforts recently, you know, like exemplified with the CHIPS Act, to try and bring semiconductors back. Because we realized, like, what a national security problem it was for high technology, or really manufacturing in general, to have left the country. And once it's left, it's hard to get back.

And with – aviation is the one thing that hasn't left yet. Boeing is still America's biggest exporter. And we still have something like half the global market for commercial aviation. And yet, if we watch what's going on in China, you know, China has cloned the 737. They're working on a 787 clone. And they've announced they're going to do supersonic too. And so, if we don't invent and build the next generation of commercial airplanes in America, it's not hard to tell what's going to happen. It's going to be the same thing as chips. And it will be every bit as significant, if not more, for national security.

Why? Something people don't realize is 25 percent of all airplanes in the Air Force inventory are modified commercial airplanes. Where do we get our tankers? They're modified passenger jets. Where do we even get some of our spy planes or command and control planes? They're modified Gulfstreams or Boeings. So, if we're not inventing and building the next generation of commercial airplanes here, we don't have the next generation of military airplanes. And that's scary.

So, if I bring it back to the policy thing, OK, why does reindustrialization matter and, you know, how do you think about that relative to the law of comparative advantage? And I think there's a there's a fundamental thing we have to recognize. Like, imagine for a second that, I don't know, all hard manufacturing moved to California and all software moved to, I don't know, let's say Tennessee, right? Would that be a problem for America? Not really. Like, there's comparative advantage. It's all kind of OK. So, what's the difference between California and China? Well, it's the CCP. And it's the fact that this isn't – that China is not a free country.

And I think if we had a, you know, global division of labor between free countries, well, that's all fine and well. We've got an economic competition. You know, we should try to win, but it's an economic competition. It's all fun and games and we can high-five each other at the finish line. But what we have is, you know, not just an economic competitor in China. We have a – we have a not-free country. And that's fundamentally a threat. So, for that reason, we got to be very careful what we let leave the U.S. And just saying, hey, free trade, we'll get abused that way. We can't quite do it that simply.

Mr. Girishankar: Right. All very good points.

And I want to ask you two things here. First, let's just drill down into the U.S. industrial base and reindustrialization. For Boom and your aircraft, what are you doing and what are your plans for maximizing opportunities to build at home?

Mr. Scholl: Yeah. So, we're going massive vertical integration. And we're taking control of our own supply chain. And we are – we're inventing not just the airplane, but how we make it. And I'm very proud of that. This is an American-made airplane. We're likely to have some suppliers on it from other countries, free countries, America's allies, but we are – we're vertically integrating and we're inventing the next generation of manufacturing here.

And the supply chain has really been – I could tell stories about this. The supply chain has really been hollowed out. It's much harder to build things in America. And I think that there's a major reason and a minor reason. You know, the minor reason is talent that's been sucked out of the U.S. and moved to Asia. That's the relatively easier thing to fix because we can either relearn or, better yet, we can just invent the next generation of manufacturing. The harder thing is back in the policy world, which is we've made it really difficult to build in this country.

Like, we built a 180,000 square foot manufacturing facility in Greensboro, North Carolina and it took longer to get the building permit than it took to build the factory. We built the factory in 12 months. It was 18 months to get the building permit. And I talked to my, you know, CEO friends. And they say, why are you complaining about 18 months? Mine took five years. You must have had it good. And we got to get out of our own way.

Mr. Girishankar: Yeah. Yeah. And I think permitting reform and the various aspects of that whole agenda clearly has bipartisan support, something that I think is important in a number of areas, including the ones that you're mentioning.

Let me ask you something around this. What are you doing with respect to 3-D printing or other advanced technologies? And do those feed in any way towards a cost advantage to doing stuff at home, or at least address that?

Mr. Scholl: Some great stuff to talk about there, but I'd love to touch on permitting reform, since you mentioned it.

Mr. Girishankar: Please, yeah.

Mr. Scholl: I don't think we're thinking big enough in permitting reform. Imagine if we drove – imagine if our commutes worked like our building process. You know we want to go to the office this morning. Well, we need permission before we go. We have to show somebody our exact plan, what turns we're going to take, what speed we're going to drive on every road. And then we need a little stamp before we can actually leave home. Like, we could literally not go to the office if it was like that.

And yet, that's how – the way it works on the roads is we've got well-established rules and if you break them then you're in trouble. But if you follow them, it's just go. And I think we've managed to have a permission-based system, when instead we should have an enforcement-based system. And if we make that pivot, we're going to find a lot of things where, on permitting, we just don't need it at all. We just need enforcement. And I think that can be enormously liberating. And it won't result in any loss of safety or quality or any of that. I think it could be much, much better. And I'm happy to talk about the advanced manufacturing technology too.

Mr. Girishankar: Yeah. I mean, let's put it under the context of, like, are there other cost disadvantages to building in the U.S. that we can address? Like the cost of labor and other such things? Can you walk through that, and then, like, how can we get ahead of that, including through robotics and advanced manufacturing and other technologies that we use on the shop floor?

Mr. Scholl: Yeah. I think we – you know, it's well established we've got a labor cost disadvantage in this country. And I think if you ask why – there's no one answer, but if you could imagine making a pie chart of labor costs, you're going to find there are two big slices called "education" and "health care." And I think everyone understands that we don't do that terribly efficiently in this country. And if we can manage to get better at the big slices of labor costs, then labor costs can come down. That's one whole thing to attack. That's pretty difficult to do.

The other part of it is, well, let's just get more – let's get more leverage in how we use our labor. And I think that's probably – I'd love to see the country go down both paths in parallel. But so, here's – you know, here's an example. It takes 18 months to get a new engine turbine blade built. Why? Well, the first half of that is just to build the tooling. By tooling, I mean the high-precision industrial molds you use to make these things. Well, why nine months? Is someone really sitting there for nine months to make a mold? No. Six months of that plus is just waiting your turn in line. Why? Because we let the tooling industry go to China. And in China if you throw a baseball, you're going to hit a tooling design engineer. And in the U.S., you know, there are a handful of – there's only a handful of people, and they're booked out the wazoo.

OK. So, let's redesign manufacturing so it's not needed at all. So, our process that we're using to build the highest tech components inside our custom jet engine is very tooling light. We either don't use tooling at all because we just 3-D print it, or we 3-D print the tooling. Which means we delete nine months of delay and turn it into about 24 hours. And so, I think that one of the fundamental things for how we reindustrialize this country is not try to pull back everything we lost, although there's nothing wrong with trying that. It's to invent the next generation and leapfrog and heavily leverage automation so that our labor cost disadvantage doesn't matter as much. And then I think that's – you know, if we if we do that it doesn't matter that we have a quarter of the population of China. It doesn't matter that our labor costs are higher. We can run circles around them.

Mr. Girishankar: Right. Yes.

So, let's go back to the question of costs, and the cost of actually operating supersonic flight.

Mr. Scholl: Yes. The big problem with Concorde was it wasn't worth the cost. You know, $20,000 for a fast flight in an uncomfortable seat wasn't worth it, except for a tiny number of people. And for this to work economically, it has to be worth the cost to the passengers that are flying on it. And it has to be worth the cost to the airlines. Meaning, they got to be able to sell the tickets for more than the plane costs to operate. And so, when you go faster, the number-one challenge and cost is energy consumption. And that's why we've worked really hard on energy efficiency on Overture. And it's a big leap forward from Concorde. And there's going to be second, third generation supersonic that will be another leap forward.

But the thing that a lot of people overlook is what I call the speed dividend. When you go faster, you can accomplish more with the same airplane, the same pilots, and the same cabin crew. In fact, those costs are proportional to hours. You know, maintenance that's proportional to flight time. Even food. You know, you don't eat as much on a short flight as you do on a long flight; so, if you go faster, the costs can come down. And I think, ultimately, it's about creating an overall product experience that's worth what it's costing.

And so, Overture version one, this is going to be a flight twice as fast for a similar fare to what people pay in business class or first class today. And that's going to keep coming down. You know, where does it settle out over time? My expectation is it probably settles out being a little bit more expensive than economy in the end, but for an experience that's far better. And so, anybody who values their time or values their experience, supersonic flight is going to be worth it. And it's going to be incredibly profitable for airlines.

Mr. Girishankar: So, you're assessing that supersonic flight, with all of the improvements that you cited, will be as cost effective or more cost effective than subsonic flight?

Mr. Scholl: So, in the first-generation Overture it is cost competitive with subsonic business class. And then there's going to be a second generation, a third generation. The costs are going to keep coming down. The airplanes are going to get bigger. And I do think it will be, you know, a little bit of a premium experience. You know, it's not going to be for Ryanair or Southwest. But it might –

Mr. Girishankar: And you wouldn't expect it to be, yeah.

Mr. Scholl: Right. Right. And, by the way, I don't think that's an experience that most people want. It's a very strange thing in aviation. People in aviation say no one will pay better – pay more for a better experience. But why? And, by the way, that's unique in the economy. By the way, first off, it's not completely true. You've got first and business class. Some people are paying more for a better experience. And yet, if you look at every other area of the economy, or even every other area of travel – like hotels, restaurants – you can pay any amount you want for an experience you want. And there's a whole – you know, there's a whole thing between the Four Seasons and the Motel Six, and lots of things in between. And yet in air travel, we don't really have that. And I don't think that's inherent. I think it's an artifact of how the industry is developed. And I think with supersonic we have a chance to kind of reset the passenger experience bar upwards.

I mean, one way to think about this is flying is the most inspiring experience you can have as a human. Like here we are, we're hurling down the runway, ever accelerating to hundreds of miles per hour, you know, in near complete safety. And then we're able to look out the window down and we're able to see the natural beauty of the planet. We can see everything we've built as humans – roads, bridges, twinkling electric lights. And we're able to do that on the most amazing thing that humans have ever invented. And we get to do something no bird could ever do. And yet, we've turned that into an experience that most of us hate and dread.

Mr. Girishankar: Well, certainly something we take for granted, but when you look at it, and everything that goes into it, it's something really to be marveled at, as you say. Couple of other questions for you. You hit on China. You raised a really good point about their own significant acceleration on different types of aviation, including supersonic. And I think the company is called Comac in China that's developing their own supersonic flight. Could you just give us a double-click on what they're doing and the nature of the competition? Obviously, the implications for civil-military fusion are real, but give us a window into that from where you sit.

Mr. Scholl: Yeah. So, you can think of Comac as, like, the Chinese Boeing, or maybe it's really better thought of as the Chinese Airbus because it's really a branch of the CCP. It's part – you know, this is a piece of the government, in effect. And they're doing what China has done in every other branch of industry, which is starting by copying with Western partnerships, then learning to make it home grown, and then leapfrogging. And so, the Comac right now is shipping something they call the 919 which is a 737 clone. By the way, enabled by Western engines.

What are we doing? You know, I imagine a lot of people watching this have read "Apple in China." If they haven't, I'd highly recommend it. It's the story of how, you know, China kind of took over the electronics industry. And they're running the same playbook on aviation right now. And it will have the exact same results unless we do something different. Like, there was a headline a couple weeks ago about how Airbus is now going to start assembling A320s in China. What are we doing? The result is – you don't have to be a genius to know that that's not going to end well.

Mr. Girishankar: Well, listen, this podcast is very much trying to understand the drivers of U.S. technology competitiveness and, importantly, competition with China, and the race across a number of advanced technologies. So, it's really good to understand what they're doing in supersonic aviation, what they see the benefits of that are. Because it's just good to keep that in mind. And I think you've shed some light on that. We obviously – if I understand it correctly, we have our own approach to technology innovation that's very much fitted to our system, the role of markets, the role of entrepreneurs, and the power of individuals, as you say. So, I just wanted to use the opportunity to highlight your thoughts on that.

And so, I want to go back to where we started. You talked about, you know, your own very interesting journey into this space. Now, you've actually been able to garner the interest of a number of investors for Boom. Several of them – and, you know, Bessemer Venture Partners, Y Combinator, Alex Gerko, I can list several of these, I mean, it goes on –

Mr. Scholl: Sam Altman –

Mr. Girishankar: Sam Altman, yeah, go ahead. Yes.

Mr. Scholl: We're proud of the team that's backed us.

Mr. Girishankar: Yes, excellent. So how did you approach these investors? I mean, something's working here. I'd like to get your thoughts on private capital that you've invested – that you've attracted to Boom.

Mr. Scholl: Yeah. I think fundamentally raising capital is – it's like any form of sales. And people tend to think sales is, like, some form of trickery. Like, if you use the right psychological persuasion method then people will do what you want. And I actually think it's quite different. If we – if we have something that's actually good for the other person, then all we have is a communication challenge. And supersonic flight is – well, let me put it this way, because people are going to fly more when flights are faster, the market for supersonic is inherently bigger than the market for subsonic. So, if we succeed at what we're doing, we're going to build a company that's bigger than Boeing and Airbus combined. It could be the first trillion-dollar aircraft manufacturer.

So, it's a really smart investment. And that's – you know, and then we – you know, so that's what we explained to our earliest investors to our latest. You know, Sam's a great example. He's invested in every round of capital we had, from the first to the most recent. You know, and we've just shown that, hey, the plan is working. You know, we went from a blank sheet of paper to preorder some airlines, to going and flying the technology and showing that it works and our team can pull it off, you know, to being ready to scale up, which is where we are – where we are now.

Mr. Girishankar: Yeah. Yeah. Fascinating. And let me ask you, because when you're entering new fields like this, or now reentering a field that – you know, after many decades – there's been some combination, if you look at government policy, of either subsidies or tax breaks along with private investment to really drive growth. Are you either relying on or do you aim to draw on either tax incentives or public subsidies to be able to achieve what you're trying to do?

Mr. Scholl: You know, I'm grateful for some public support we've received. North Carolina put together a really generous package that helped bring the super factory to North Carolina.

Mr. Girishankar: Yeah. Yeah. Keep going.

Mr. Scholl: But the vast majority of the investment has been – has been private. And I think that's – you know, I think that's as it should be. I think a policy dialogue that's important to have is if – you know, on one hand and if we embrace what I think we should, which is free market capitalism in the U.S., how do we handle it when we have a competitor in China that's not playing by the same rulebook?

Mr. Girishankar: Yes, exactly.

Mr. Scholl: And that can be manipulated. Like, the story of how tooling went to China is a good example of it. There was no respect for intellectual property in China. They ripped off Western design software. Because they ripped it off, they could do tool design much less expensively than it was done in the U.S. And as soon as one company outsources the China then everybody has to do it because of the competitive pressure. And so, if you kind of step back and don't do anything from a policy perspective, that allows, you know, a manipulative foreign actor to suck something important out of the economy.

And so, I think we have to deal with that somehow. I don't claim to know what the best answer is. You can look at subsidies. You can look at tariffs. You can look at, you know, various other kinds of policy tools you could use. I do think you have to do something, or else you just get abused.

Mr. Girishankar: You hit the nail on the head when it comes to the threat of mercantilism, particularly from the PRC. But let me ask you something, because you mentioned tariffs. We are in an era of major, let's call it, renovation of the trading system, driven by the United States. In particular, the tariff agenda by the Trump administration. But when you talk about the various components that are needed for you to build your aircraft here on home soil, I could imagine that the tariff agenda cuts the other way as well. Which it makes it more challenging for you to be cost competitive, doesn't it?

Mr. Scholl: You know, there's been a lot of, you know, chaos around tariffs, right? They're up, they're down, they're left, they're right. And the way I look at it is to say, what's the policy intent and are we aligned with the policy intent? And the policy intent is reindustrialization of America. And I think as these things get fine-tuned, my – you know, my hope, my expectation is that the policy details get locked in in alignment with that. You know, and that – there'll be some pain on the way from point A to point B as we work to be able to – work to be able to build more things in America.

But I think at most tariffs are a short-term tool, because let's imagine the worst comes to worst and we're a shooting war with China. You know, we can tariff really highly in the U.S. to protect American industry from foreign competition. But in a shooting war, you can't tariff your way to success, right? You know, if we are not the lower cost producer of what we need to win the war, we're not going to win the war.

Mr. Girishankar: Well, before we get to the hot war scenario, I just want to – just want to linger for a minute on cost competitiveness of U.S. industry and tariff agenda. Because I hear your point about the goals, but let's just get very, very specific. Like, there are literal value chains you can map out where if you impose tariffs, whether it's on steel or aluminum or other things – and that's not just with China but with any number of trading partners, including historic allies – it becomes more challenging to produce in the U.S., not less challenging. And so, what do you say about that?

Mr. Scholl: I think you have to look at short-term versus long-term impacts here, right? Like, we are standing – like, real world Boom example. Yesterday I approved an order of millions of dollars of industrial production equipment that we're going to use to make jet engines at scale. And guess what? Some of them are imported. And they come with a 10 percent tariff. And, you know, do I wish it didn't have that? Sure. But guess what the result's going to be? We've got all this industrial production equipment in America and we're going to go make jet engines homegrown. OK, the other thing is we need to be able to build industrial equipment in the U.S. too. And so, I think the tariff creates an incentive to repatriate the industrial equipment.

And, you know, that's not going to happen overnight, right? Like, these are – these are complex industries. They're value chains that are well established. They're going to take time and cost to move. And, you know, and it's – I think we start out sometimes with very blunt object – blunt instruments. And my hope is over time we get smarter about the details. You know, like maybe industrial production equipment should be not tariffed the same way as a finished product should be. You know, but I think we'll figure that out over time as we go through this process. That's certainly my hope.

Mr. Girishankar: I hope so too. I hope we figure it out, because what strikes me as something that you and I share, which is a strong belief in markets and the invisible hand, the kind of, I should say, erratic and sprawling tariff agenda that we've seen seems to cut against a market-oriented approach. So, I don't know. For me, like, there is a question about the consistency of that approach with the desire to have cost-competitive industries in the U.S. But maybe I'm missing something, so you tell me.

Mr. Scholl: No. I mean, the best argument I know to make for tariffs is it is an accelerant – it's a tool to accelerate an industrial transition that needs to happen. But in the – let's talk about what the desired end state is. My belief is the desired end state is we can make everything critical that we need in the U.S., and we can do it here at the highest quality and lowest total cost of anybody in the world. Certainly, anything that's important for national defense, that has to be true. And you can – you can argue about, like, is it OK if some goods leave the country in less critical industries? And I could argue both sides of that question. But we have to get to being the lowest cost producer of the best stuff at scale.

And that's the real end goal. And tariffs might be a nudge that help you move that faster, because they kind of put a weight on Adam Smith's hand. But the more important thing is that we get out of our own way, and we look at what really drives those costs. And a lot of them are very influenceable through policy – like the whole permitting conversation we were having before. Permitting is a huge driver cost. We have to fix that. You can't – you know, if we have to go through our own red tape to build things here, it doesn't matter how high tariffs are. It's still going to be a problem.

Mr. Girishankar: Blake, thank you so much for joining and generously sharing your insights. We're going to be watching supersonic flight in the U.S. going forward and, importantly, what you're doing with Boom. And thank you all for joining this conversation with Blake Scholl of Boom Supersonic.

You can find this episode of Betting on America and more on CSIS.org, YouTube, or wherever you get your podcasts. This is Navin Girishankar reminding you that everyone has a role to play in winning the tech race.

(END.)