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Eric Volmar (Stanford University) – A New Entrepreneurship Playbook [Entire Talk]

Eric Volmar

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Eric Volmar is teaching lead at the Gordian Knot Center for National Security Innovation at Stanford. His work focuses on connecting defense, academia, and entrepreneurship to accelerate innovation for national security, supporting new ventures at the intersection of technology and policy. In this presentation – followed by a conversation with Tina Seelig, executive director of Knight-Hennessy Scholars and director emerita of the Stanford Technology Ventures Program – Volmar advises entrepreneurs about how to navigate a new landscape shaped by a shift to deep tech, blended capital, and governments reengaging with technology innovation.

Transcript

(triumphant music) - Well, it is a joy to be welcomed back as the guest host today. I could not be happier to introduce Eric Volmar. I have known Eric for many, many years. He did his PhD right here in the MSNE department with a focus on entrepreneurship. We taught together. He is truly remarkable. Eric has a fascinating background that he's gonna be able to share with us today. Before he came back to Stanford to do his PhD, he was working in consulting at Accenture. He came back, did his PhD, and then went to work for the government, where he had an amazing, amazing opportunity as chief strategy officer for the Office of Strategic Capital. Pretty amazing.

We're gonna learn a lot about that. After doing that for a few years, he came back to Stanford to work at the Gordian Knot Center for National Security Innovation, where he is the lead instructor there. In addition to doing that, he just recently joined a very fast-growing startup called WebAI. So we're gonna learn about all of these different experiences. Eric really is an expert at the intersection of technology and policy. This is a very, very special opportunity for us to learn about something we don't typically learn about here in Silicon Valley. So without further ado, please join me in welcoming Eric. (audience applauds) - Thank you, Tina. There truly has never been a more interesting and exciting time to be an entrepreneur, and that's not just an extension of where we've been, excuse me, or some trajectory that we're on, some optimism about it. It's that we're in a fundamentally new place.

Can you feel that about entrepreneurship right now, as you look for jobs, you look for opportunities, you see what's out there? The playbook that we've used over the last decades isn't the playbook that we need right now or the playbook that we need to use in the future. Understanding this will fundamentally shape your opportunities and contributions in the years ahead. So let's talk about what happened in the last 30 years. In the 1990s, there were forces that shaped what entrepreneurship was, and it was largely driven by the rise of the internet. The internet served as a platform for limitless scale. You could build something in your garage and have it scaled to millions within months or years. This was something that had never happened before, and we saw from that things like search. Just outside this room, we see the first server that the Google founders made, and all of a sudden, it spread throughout the world. We see the rise of companies that were able to reach across borders, almost frictionless, in frictionless ways, and that was paired with another force, and that was a shift in capital that came in the '90s as well. Mature venture capital was ready to fuel this growth.

It was designed for things that needed high returns on fast timelines with low risk. That's software. Venture capital just at Sand Hill Road and throughout this valley was able to fuel this growth in ways that were unimaginable. But there was a third force that happened, and that was an in institutional shift. This happened after the Cold War, when governments were no longer as coupled with technology innovation. There was a bit of a retreat, where the markets were able to do what they wanted and software and internet was this new thing that wasn't generally very regulated. Sure, an antitrust thing coming here and there, but generally software startups were able to flourish. Now, imagine the startups that came because of this and so much of the world's wealth. Mentioned Google, but think about early marketplaces like Amazon or eBay. Think about companies like Facebook or Instagram.

Think about Netflix. Think about Spotify and streaming. Think about Zoom. These are companies that were able to explode in growth. They became integral to our lives, and there was a playbook that emerged over time and much of it was developed here at Stanford University, and not only that, here at STVP. Over the next 30 years, entrepreneurship became a profession. Think about that for a moment. There are doctors and there are lawyers, there are people who go into management. Entrepreneurship became its own profession where if you said that you were an entrepreneur, people understood more about what that meant. Tina did so much of this work here in ETL and diffusing these ideas throughout the entire world.

Other colleagues here, like Tom Byers and the ability to create entire structures and ecosystems around this, brilliant researchers like Kathy Eisenhardt who led on Nascent Markets, that was happening here in STVP. What others did for management about 100 years ago to create the MBA, in many ways, you could say the STVP during this period professionalized what it meant to be an entrepreneur. It's astounding, and many of those ideas diffused right here in ETL with some of the best and the brightest and the people who were leading out on new frontiers come to talk about what they did. And it was interesting that we also had playbooks emerge, people like Steve Blank with the Lean startup, who has taught so many classes to so many people here on this campus. And that software playbook worked incredibly well. It's brought those products that we take for granted into our lives. It brought the ideas that you could overnight come up with an idea, you could soon pivot, you could find product market fit, and then you could scale that business. Again, those venture capitalists were thrilled to come work with those aspiring entrepreneurs and take those ideas throughout the entire world. This has been an incredible period of growth. What's interesting to me is that we've seen a shift, and again, I think you can all see it.

I see it. I was trained in this paradigm, here in this building, and talking about getting professionalizing entrepreneurship, they even give degrees in this. I got a PhD in entrepreneurship. It coalesced around all these ideas, these frameworks and these models. And then I chose to do something unexpected. I had no plan to go do this, but as I was learning about how the world was changing and which technologies were going to matter, I chose to go work in the US government. It was something I hadn't anticipated, but when I learned about the state of the world and which technologies mattered and which stakeholders mattered in those conversations, I learned that there was a shift, and that while governments before were decoupled, in many ways, from technology innovation, all of a sudden there was a reintegration, and there was a new shaping that was happening. I went first to work for the Department of the Air Force with an organization called AFWERX. We worked with thousands of companies on critical and emerging technologies, and that led me to realize that we were in a completely new era. You could see it.

These companies were trying to use the old playbooks, but they were failing. Many of them were just saying, "It must be hard to work on deep tech," but when you just think that it's hard, oftentimes it's because we don't really understand the underlying principles. Deep tech has emerged as a new foundation for entrepreneurship. Things like AI, biotech, quantum, semiconductor, space, and the list goes on and on of these cutting-edge emerging technologies, many of the areas that you are working on here in the School of Engineering. And these companies were trying and trying and trying. They weren't getting success raising capital from VCs. I remember talking to one VC here in the valley, asking what they were doing with deep tech. The answer was, "Oh, I wish I could invest in semiconductors. I want to be in microelectronics. But a series A for microelectronics might cost me 40 million.

At the very same time, I could do eight FinTech deals at 5 million each." And that led to an insight that, in a new era, there needed to be new types of financing, so we saw a capital shift, with patient, blended capital for long horizons. And what happened is that these investors started to get, they started to know that there were technologies that they wanted to be involved with that they didn't have the capital to invest in. Their structures weren't set for it. Again, it was because they had the wrong timelines. They needed five to seven years for the technology to mature, but something like an advanced battery manufacturing company would take maybe a decade or more. They also knew that they needed higher risk, and they also knew that they needed to accept lower returns, and so we saw blended capital start to arise. That's where private equity or even sovereign wealth funds. Family offices get involved to lower the cost of capital to fuel these deep tech areas. But something else interesting happened along the way. Governments reengaged with technology innovation.

This has been happening over time, largely for the last 10 years, but most people have been tracking it for the last five, and it's been a moment where governments around the world have seen that their national power and the interests of their citizens depended on the ability to lead out on frontier technologies. Many countries see that it's a bad world if they don't lead out on quantum. They see that it's a dangerous world if they're not ready for biotech advancements or they're not leading there. We see an incredible race that's never happened before with artificial intelligence and the amount of capital that's coming in. I had the privilege of working in an organization in the US government called the Office of Strategic Capital with an amazing group able to establish this within the Department of Defense for patient capital, for deep tech on long horizons, things that show up in all of our supply chains, whether it's semiconductor components, whether it's quantum technologies, whether it's sensing or whether it's computing, looking at biotech manufacturing. There was a sense that the world was changing and our institutions weren't quite ready for it in many ways, and we wanted to change that. We established a new organization. There are many others, and there are many throughout the world. Altogether, we see that this new era of entrepreneurship needs new forms of capital, it needs government involvement and it needs groundbreaking scientists and engineers who are at the very, very leading edge. Now, think about what this might mean for you.

I've introduced a new model. It's something I believe in. Think about the things that you're working on. Perhaps you are

working in the Photonics Lab here on campus, leading out on quantum. Perhaps you're working in biotech. What does it mean to you as far as what capital you would need if you were to do a startup? If you were to be that entrepreneur who took this forward, are you ready to be involved with governments? Are you ready to be involved with new forms of capital? It's a fascinating question and once again, I believe that many people will establish, create startups that they will try to scale and then they're gonna wonder what went wrong. In many ways, it will be a lack of understanding that the entire game around us has changed, fundamental shifts in all of these forces. Let me give you a few examples to make this real. First off, it's only fitting that here we are in the NVIDIA Auditorium in the Huang Building. This is the NVIDIA Blackwell chip, a chip purposely built for AI data centers.

We just saw the NVIDIA earnings reports today that exceeded earnings. These and other chips like them are selling faster than anyone could have anticipated. This is the point of technology as the foundation. Deep tech is the foundation of what we're doing. We're excited about the AI companies. Many of them are built on this. In another paradigm, we look at quantum science. This is a company called PsiQuantum, based here, and this is a quantum wafer, to use quantum computing that can do calculations far beyond anything that we ever imagined. It's amazing to see what they've done to engage with the US government and also to get new types of capital providers to play in this new era. Here's another example.

Joby Aviation, another local company, electric vertical takeoff and landing. You've seen quadcopters. Well, imagine that as a taxi that could take you around anywhere. And this took absolute breakthroughs in science and engineering on the batteries, the motors, the avionics, but what's interesting about Joby is it wasn't just the technical breakthroughs that were needed. They made the decision to invest early and often in their relationships with the US government, because the government was acting as regulator, also investor and customer. That was a choice that they made to engage actively in the process. They had competitors who chose not to. Those competitors, some have gone out of business. You can't fail fast when working with government, or the FAA, the regulators for airspace. Joby knew that.

They've done well. This is one of my favorites, another company called Hermeus. Hermeus is building hypersonic craft, hypersonic meaning five times the speed of sound, which is depending on the conditions, maybe it's around 4,000 or so, miles per hour. Blazing fast. Things that we used to do in the '60s, we forgot how to do, and we're bringing it back for a new era. This is a test that happened here in California at an Air Force base with their Quarterhorse craft that's intended to test many of the properties. This company chose to enter in agreements with the US government for capital and for regulation. It is an example, the US Air Force, through AFWERX, offered a package of $30 million that was set aside for small businesses as long as it was matched with another $30 million of private capital, public-private partnership to fuel deep tech forward in incredible ways. I'm excited about the future of what Hermeus might do. Here's a picture of their concept of what they call a Darkhorse to fly farther and faster.

Looking at others, this is a company called Relativity Space, also based in California. This is a 3D printed rocket. Think about that for a moment. From the ground up, building a rocket. This is a picture from a few years ago. I'm captivated by this idea, and doing this in new ways. Relativity Space, likewise engaged early with Space Force. They knew that this would ultimately be a customer, a regulator and an investor, a recurring theme for almost anything in deep tech. This is from a brake, a brake device that you would find on an automobile. This is a company called Divergent Technologies, also manufacturing here in California.

It started out as a company that was 3D printing parts for high-end cars, and then soon realized that they could 3D print metal for anything. Imagine that you could reduce waste weight, you could actually increase strength, and imagine the applications for aerospace and other capabilities. Divergent has been fascinating to me to see their growth as a place that something that could seem mundane with advanced manufacturing, and it creates breakthroughs for so many other areas. Again, a foundational technology and a company that has chosen to engage with governments and to look at long-term financing using a blended capital approach. This company called Redwood Materials is taking used electric vehicle batteries and repurposing them to power data centers. This is a plant in Nevada. Imagine that. All the electric vehicles we see on the road. What happens to the batteries when they're done? Well, they had a novel idea to do that for data centers. After the useful life of the battery is completely expended, they figured out how to recycle it.

It requires scientific breakthroughs to do, and it requires government involvement, and it requires new types of capital. This one is fascinating to me, Ginkgo Bioworks. we talk often about fabrication facilities for semiconductors and chips. Well, what about for biotech? What about all those chemicals? What about all those materials? Ginkgo Bioworks, which has operations in California and Boston and elsewhere, is on the very cutting-edge of manufacturing for biotech. They engage often with the US government and with different types of capital providers. Another example, Antora. This is thermal energy, carbon blocks that you heat to extraordinary temperatures. They retain that heat, and you could imagine that on the grid there are excesses in energy and there's lower periods with energy, especially with solar panels, and is there a place that you could capture all of that energy, store it and power data centers, again, it's a recurring theme, and other things in industrial facilities? This, and other companies like it, are at the cutting edge and they have chosen, again, to engage with the US government as an investor and also potentially as a customer. This is a company called Oklo, also based around here. They take nuclear fuel, before it's fully expended, and repurpose it, and they figured out how to do this safely and cost effectively, and they've been able to create alternate sources of power, and they've done this with nuclear energy facilities in the United States.

They're going to be expanding, from what I understand of the news, by 2027, be powering whatever is needed using nuclear fuel that would've had to be expended or disposed of anyway. That takes a lot of work with regulators, especially with anything associated with nuclear, but it's at the very cutting-edge of solving some of society's biggest problems. But here's one that just came in the news this last month called Starcloud, not based in California, based in Washington, but imagine putting data centers in space. Maybe you've seen this in the news. The reasons, of course, is you want to do local inference in space for earth observation and for deep space observation, to do it there, to reduce energy costs, and also the heat dissipates into space. It's a novel model. We'll see how it goes. This type of technology requires a new type of relationship as an entrepreneur. Before, you could ignore government, but now, for these critical and emerging areas that can benefit society in some pretty incredible ways, government is one of your first partners, and you need new forms of capital, larger amounts of capital, more patient capital to see where that'll go. Now, I'd ask every one of you in this room to think about what you're working on.

I know we have incredible scientists and engineers. You're working in laboratories or maybe you're from the business school, the law school or the policy schools, or whatever it might be. Think for just a moment: what does this new model mean for you? These shifts are coming, they are underway and they're here to stay. Those who can understand this game will be able to have incredible opportunities ahead, but for you, understanding that game is going to be the very first step. So a question for all of you, and we'll leave on this, and then Tina and I will talk more. Where will you make your contribution in this next era? I'm absolutely convinced that if you show up and make a difference for these big missions with big institutions, it will change you forever. I could not have imagined what would happen to me when I rose my hand and chose to serve in the US government. It was one of the greatest periods of my life. It was an incredible privilege to serve, and not only did I get to serve, I got to work on some of the biggest topics on the biggest stages with some of the best people I've ever known in my life. You have that chance as well.

Now, it may not be serving in government. There are so many ways to serve for society's big missions, but the key point here is that it will involve policy and it will involve new forms of capital. It's your choice on how you'll engage in that, but I promise that this will shape your opportunities and your contributions, and I'll say it again, if you choose to engage in this, in this new era, it'll change you forever. Tina, should we chat? (audience applauds) - Let's start with asking you about what you're doing in your classrooms today to help students prepare for these opportunities. - I'm glad you asked. It is one of my greatest joys to be teaching here, and I love our students. It just so happens, Tina, that my class that I teach with Joe Felter is happening right now, so we teach 3:00 to 6:00 on Wednesdays, and so the class is here. The class is called Technology Innovation and Great Power competition. Students are working on real national security problems, like quantum sensing or extending naval power or counter drones. We think about the vulnerabilities we have with infrastructure here in the United States.

How do you counter that? What they're doing is they're taking their technology expertise and matching that with policy. Their purpose is to actually change the law, or to change executive orders, or something like it, by the end of the quarter. They'll do public reports, and it's pretty interesting to see them take an entrepreneurial mindset to some of these hard problems. - Great. Well, for folks in the room who are interested, this is all very big. What are the entry points? I mean, what are places, the opportunities that a student could have coming out of college or graduate school to enter this sort of opportunity space? - You know, it felt so opaque to me as a student. I had always wanted to, as far as my story, I had always wanted to serve in government and I didn't really know how, to your point. It felt like that was something that others did, but how would that be me? There are so many opportunities on campus now to talk with people who are at the very cutting-edge of this. I'm part of something called the Gordian Knot Center for National Security Innovation. It's essentially policy entrepreneurship, or entrepreneurship for some of the world's hardest problems.

We have events. We welcome any students who are interested to come talk to us about this. There's a growing community on campus, one called DEF CON, that recently held a conference, the Technology National Security Conference. There are about 300 students or so on Stanford campus who've chosen to be part of this. And any students who wanna get involved, even if you're just curious, I would say jump on in. Talk to somebody, reach out to the center, come be involved, see if it's for you. Everyone has their own mission and their own priorities, and maybe this won't be the right one, but I'm pretty sure it'll open up some ideas for people. - Great. We are steeped in this world of Silicon Valley and the skills and the mindset of being entrepreneurs in this setting, do those skills, does that mindset translate directly into working in government, or are there other skills and mindsets that are needed in that space? - The expertise from Silicon Valley has never been needed more in government, but it is important to recognize that when you're going between Silicon Valley and the US government, it's essentially, either way, it's essentially like entering another country, where they have different rules and norms and expectations. There's a different language, there's different culture, different ways to go to jail.

The whole thing, the whole landscape is different, and you need to respect the culture. The Silicon Valley fail-fast culture often breaks down when it runs into institutions. In fact, that was the core of my dissertation work here, was this idea that if you were a venture-capital-backed company and you had a big mission, and you wanted to get involved in some of the biggest missions that society has, you were in for a rude awakening if you tried to disrupt those institutions. One of the frameworks that came from my dissertation was this concept of mavericks and diplomats. A maverick is fail fast, be the lean startup, and it has its limits when you enter the institutions. In contrast, organizations that act more like diplomats tend to fare much better. It's a slower process, but it respects the norms, rules, language, and customs, and when you do that, you can really

accomplish far more. There is a translational difference, though, between these two institutions, like you mentioned. - So speaking of culture and difference, I mean, one can often get involved with working with the government under one administration, and when that changes, things can change dramatically. How do you navigate that? You know, you go in with a certain vision of what success looks like, and it could change completely with a change of leadership in the country.

- It's a reality, and there's so much that you can't control. I mean, that's the baseline, and that's one of the complexities of it. what I have found and what I would recommend to anyone who's thinking about engaging in this area is to anchor to the purpose of what you're doing, anchor to the bigger picture view of national priorities and really, why you showed up in the first place. Politics will come and go. Administration officials come and go, and within the civilian force, people are there for a period of years at a time. A lot of change, and it's a fact of it, but again, I would come back to that. For anyone considering this, and you're not sure with the winds of change and whatnot, anchor to the surest foundation of, at least for me, if I'll speak about that, protecting freedom, promoting American values of the individual, the freedom of thought, the freedom of expression, self-determination. Now, those are pretty abstract ideas, but when you're building a business, if you can frame it in those and the why of what you're doing, I found that it withstands change a whole lot better. - Great. I'm just gonna ask a couple more questions, and then we're gonna open it up to the audience so you can be thinking about what questions you might wanna ask Eric.

There's some great stories about technology that was developed by the government, whether it was for military or for the space program like Tang or Velcro (Eric laughs) or even GPS, right? And can you explain to us how those things get translated, how they move from that environment into the public sphere? - Sure. Those are great examples, and if you don't know what, I'll just riff on those for a second, if you don't know what Tang is, it's an orange drink mix that would go in water that astronauts drink. I do know a little something about that, actually. Tang was developed by General Mills years before it was taken to space on John Glenn's first orbit around Earth, first American to orbit earth. It became popular after that. It wasn't actually developed by the US government. - Oh really? - Velcro is an interesting story as well. It was a Swiss inventor who had noticed burrs sticking to animals and clothing, looked at it under microscope and saw how hooks and fabric came together. But the US government adopted it and integrated it into the space program, just like using Tang. What I would say about GPS is it was developed by the Department of Defense for precision guidance.

It was developed at a time when that created a unique offset for the United States of America. It was then diffused to the commercial markets. The big lesson here, Tina, what you've talked about is sometimes the technology originates in the commercial sector, sometimes in the public sector. There are ways they go back and forth. I'll talk about the pipeline you mentioned. Oftentimes, a cutting-edge idea will happen in a university lab, just like all of you are in, or that you've seen here on campus. The frustrating part is that they often get stuck in the lab. Now, we have transfer offices here, technology transfer offices here and elsewhere. The most successful instances I've seen of deep tech being commercialized is that they work with a government partner, whether it's the National Science Foundation or DARPA. - Mm-hmm.

- Or the National Institute of Health, and then they quickly try to find entrepreneurs who can connect them to the right types of capital. Like I've mentioned, that capital landscape is changing. Longer-term, more patient and blended capital is needed. The third piece then is connecting to government sponsors early who could actually buy it and pull it through. That is absolutely essential for anything out on the edge. The government is oftentimes the high-risk buyer of leading technologies the commercial market's not quite ready for. I wish I could say that the pipeline was smooth, and I wish I could say that it's linear. There's a lot of iteration and a lot of conversations that happen and a lot of uncertainty, but by and large, it happens with cutting-edge scientists and engineers who are matched with government funding, not only on the early stage, but then they find who customers are to pull through on the later stage. There's a term called dual use that's been in vogue the last few years, and that means that it's a technology that can be applied to a commercial market and a government customer. It's hard to do both.

Some are having to choose, are you commercial only and then later government? Are you defense or government first and then maybe commercial later, or only government use only? There's a mix there, not linear, and it's a hard process. - And I assume it's also really, can be very long. - It is long. It is long, and the timelines, again, we talk about how there's an app for this or that and that you built that app overnight and that you beta tested it. These types of things, you can't pivot overnight and you have to develop over a long period, and it really is a new, it's a new paradigm for a lot of entrepreneurs. - Great. Well, I'm gonna hand the baton to our trusty TAs, who are gonna manage the Q&A. - Okay. Okay. - Great.

Thank you so much Eric. - Thank you, Tina. (audience applauds) Ryan Hi. Thank you for taking the time to come in and speak with us today. My name's Ryan. (audience chattering) The question I had was, for an early-stage startup, what concrete steps would you take to build a relationship with government, and what are some common traps or misunderstandings that people fall into that you would avoid? - Well, thank you for that, and the question for an early-stage startup, what are a few steps that you would take to work with a government, and what are some traps that you would avoid? You know, over the last 10 years, there have been a number of government organizations that have been specifically designed to open the door to more startups, notably the Defense Innovation Unit, established here in Silicon Valley 10 years ago. At a flood of other organizations, one of which that I worked for at AFWERX, was intended to have an open door to provide small contracts to these startups. The opportunities have never been better to engage with the government, and there are many, many opportunities, excuse me, through tools called small business innovation research or commercial solutions offerings to

engage. What I would say is a trap for startups is to get excited about one of those early startup or one of those early contracts and to feel like you're in and the work is done. And it's just the beginning of a long, long process.

I wish it were easier. I wish it were better. A lot of people are working on doing this, and especially we've seen incredible momentum, even in just the last few months of these organizations trying to reduce the barriers for startup entry. In some, I would say there's never been more opportunity. It is hard, arduous work. The payoffs can be incredible over time, but I wouldn't assume early victory by just getting through the door at the beginning. - Okay, thank you. - Thanks. Hey, thanks. Amari Hello, my name is Amari Luu.

I am a sophomore studying public policy and history, and thank you for coming today. My question is with communication with government, so in a short lobbying window, do think it's better to focus on the positive effects of a startup, for example, job creation or innovation, or talking to them about the negative repercussions of not investing in the technology, such as China gaining access to that technology first? - Well, I'm gonna flip this around, and you've thought about this. I have some ideas. I'm curious what your intuition is. Amari From my experience, I think it does depend on the individual. Like, when I talk to the person I know on the Armed Services Committee, I typically focus more on the negative side, but I'm still very limited in my experience. - In many ways, it's similar to how you would pitch investors. Different investors with different theses will care about different priorities for your technology area. It's no different in Washington, and whether you're talking to somebody, like you'd mentioned, on an Armed Services Committee or some type of appropriations committee, they will care about some different things. You also have priorities all over the political spectrum.

I would go back to that point of anchoring to consensus bipartisan issues, and then you can adapt your message based on what different people are interested in. Of course, you have to be true to yourself and what you're talking about. You can't adapt beyond what you actually do or say, but you can highlight different parts, and that's an important part of stakeholder management throughout, I think, any organization and particularly the US government. So in sum, I don't know that it's actually all that different from pitching different types of investors. Certainly different audience with different language. - Thank you. - Yeah, thank you. Hello. - Hi. Thank you for your talk today.

I was wondering, well, I think it's really good that the government is taking very big risks on a lot of frontier technologies, but I'm also wondering about your perspective on how the government could help, like, legacy industries that are sort of struggling today throughout the country. - Can you say more about legacy industries? Audience Member Like, I guess, like, current manufacturing methods and sort of throughout, like, the Rust Belt and other areas that sort of would also like a lot of innovation as well. - Yeah, absolutely. And to be clear, as I talk about these, I'm not speaking as a government official. I'm here at Stanford, and also at a new AI startup called WebAI. I was thrilled to work in government, so let me just give some observations that you could have just as easily as me, as somebody here at Stanford and watching what happens in Washington. But I would say this, there is a consensus that manufacturing of the United States is something of a lost art. Of course, we manufacture in the country, but not like we did. And it's this tacit knowledge of how to produce at scale that is missing, and that we outsource that throughout the world, and many others developed remarkable capabilities on that. So what to do about the lag in manufacturing? I don't have a view on a policy position or what should happen.

Here's one thing that I do know. For these critical and emerging technologies, you need vast amounts of capital. I remember talking with an organization that would've needed, or an organization that was a startup, it would've needed hundreds of millions of dollars to develop manufacturing capability here in the United States. No bank would give them a loan, because of the risk and the timelines and the amounts, and that's an instance where there needed to be blended capital, whether it was some form with government, some maybe with venture capital, some with private equity, some with foundations, some with other types of funds. It's a huge problem that needs massive amounts of capital, but that's not the only piece that's going to solve it. There's also a retraining issue. There are a few choices you could make. You could double down on the legacy industries, as you've called them, or you could focus on emerging technologies. That's a policy decision that would need to be made by a government. I don't have a view on which one, which policy should be made, but I do know that if the United States does not develop manufacturing capability for emerging and critical technologies, then it's going to rely on others, and that's not a position that any nation wants to be in.

- Thank you very much. - So thank you. Hello. Tina Hello, my name is Tina. Thank you for speaking today. My question for you was, like, what are the most common, like, challenges or mistakes you see innovators making when trying to work with government, and like what would you say about that? What are the best ways to, I guess, mitigate those? - The question is, what are some of the most common mistakes that startups will make when trying to work with government and how could we avoid those? You know, I'll go back to that comment earlier. A lot of startups will act like Mavericks when working with the US government. I talked about some of those technology areas, I won't say which company or even infer which one, but I was in a meeting while in the government, here in Silicon Valley, and there was a company, it wasn't any of these. There was a company, that said, in a room with me, my colleagues and several senior military leaders and said, "You're going too slow. We're actually not going to work with the regulators.

What we are going to do instead is we're going to build the most remarkable technology that you've ever seen. And we promise you," it was a pretty brash statement, "we promise you that it's going to surpass everything else and you are going to need to accept it and to accept it through regulation." I was astounded. Now, I appreciated the confidence, but it was also, it

was a disregard for how the institutions work. And in Silicon Valley, where everything about breaking the rules is rewarded and the rebels and the renegades are the champions, that was actually the wrong move to make with, not just the US government, but generally any government. I was disappointed, but in some ways, in retrospect, not surprised when that company went out of business, I would have loved for their technology to have succeeded. Now, it wasn't just because they bypassed regulation. I'm sure there were many other business problems, but what could have been if they had chosen to engage with the government in ways that work for the government. And I will go back to that one. When you enter the public sector and you go into any of these institutions, it's like walking into a foreign country, and you need to get a passport, and you need to respect the culture, the norms and the language. Those are a few things I'd say about that.

- Thank you so much. - Hey, thank you. Hello. Audience Member Hi. Thank you again for the great talk. We've, throughout this talk, have been referring to the government as a sort of monolithic beast that feels rather unchanging, but in the US, we run on a four-to-eight-year cycle of administrations, and so how does a startup respond when an administration perhaps no longer agrees with what the previous administration was responding in, and how do we weather these kinds of tides? - You know, I would compare that to what happens in the commercial sector. Maybe there's a change in customer preferences. What do you do? And by and large, in Silicon Valley parlance, you pivot. And I think that's true working with the public institutions as well. Generally, there's not much you can do if there's a massive change in priorities or policies, and it's one of the risks of entering a particular sector.

It's devastating for the entrepreneurs for which that happens. There's no question about that. But it's also devastating for the entrepreneurs in the commercial sector. Some people hire lobbying firms to try to change the law or change priorities, and some do that to great effect. So that's a route that can happen. But I would also offer that, when entering the public sector, people need to be ready to pivot with market changes and switches and dynamics. Audience Member Beautiful. Thank you so much. - Okay, thanks. Hello.

- Hello. Thanks for your time. I'm curious on your take about what the government priorities are for deployment of processing chips for AI, other than data centers. - So the question is, what are the government priorities for AI aside from deploying data centers? Audience Member For deploying processing chips for AI, other than data centers? - You know, I don't know what the government priorities are right now for AI. Again, not speaking as a government official or having unique insight into that. What I will say is that investments in AI are going to be essential. We've seen that over the last several years. And that's not just in frontier models, but that's in the infrastructure that supports AI. And I also believe that it's not just about deploying the chips. It's about how to use it for your organizational use cases.

One of the things that I have really come to see over the last while, I love these general models that we have. I love using them when I wanna learn about history or art or I wanna look up something as an alternate to search, and I know for search organizations that would break their heart to hear that, but I love doing that. And yet, these models often can't help me with some of my most pressing challenges. They don't know me, and they don't have my memories and they don't have my data, and that's true for enterprises as well. I think we're going to see a shift. I think we're going to see a shift where organizations, or governments, or anyone else, are going to prioritize AI that's trained on their data and their models. So that's a longer way of saying I don't know that the bottlenecks for AI adoption and changing the world will be about more chips deployed. I think it'll be actually about people learning how to use AI for their purposes. I think we'll see a world more of specialized models. - Okay, great.

Thank you. - Thank you. TA We're running out of time, so we're gonna take one last question, and Eric, if you can answer briefly. - All right, Ellie, a former student, Ellie Thank you for being here. You mentioned that within this new entrepreneurial atmosphere, where innovators in government are collaborating to an unprecedented extent that innovators must, like, learn and adapt to the language of government, so my question is kind of two part, do you believe that this influence will be unilateral? And if not, in what ways do you hope or fear that the language and character of Silicon Valley might shape the US government? - Oh, that's interesting. So the question being, when speaking the language of government and skipping forward with that, Ellie, will Silicon Valley change the language of the US government? Well, I hope so. I hope that the US government and the Silicon Valley starts speaking more of a common language with this. It is interesting to think about the effect over time, as these worlds get brought together. And when we talk about Silicon Valley, that is often a geography, but it's shorthand for technology innovation and there are many hubs around. I do think that there is going to be greater understanding, and I will say that is one of the great opportunities that all of us have in this room.

If you seize the moment and choose to be about these topics, if you choose to engage with policy and also new types of capital and with deep tech on the very frontier, you are going to be well-positioned to be a game-changer in the years ahead and to increase your impact and contribution. I'll say a last piece is a tribute to Ellie and her team, in our class last year, they worked on nuclear energy policy. It was so successful they were invited to the White House to present to the National Security Council, and that could be any of you in this room. I'm so proud of what that team did, and I learned so much along the way. I think you and your teammates have exemplified what it means to speak both languages, so thank you for that. Tina. - Well, thank you so much, Eric, for this incredibly eye-opening talk. Please join me and thanking him. (audience applauds) (bright music)..