

Dani Berger, Moderator: I'm very excited for this conversation. Umesh, thank you as well for joining us here at Bloomberg HQ.

Umesh Subramanian: Happy to be here.

Berger: This is such an important conversation, and technology really speaks to the ethos and the DNA of Citadel, because, in many ways, the meteoric rise of Citadel itself coincided with the technological advances that you and your peers before you really pioneered. For today, how much is that still the case, that growth at Citadel is also dependent on advancements in technology?

Subramanian: Good point. It's a good question you're asking. The origin story of Citadel is well known, but Ken at Harvard with a satellite above his dorm, getting market data to be able to trade convertibles. So the origin story of Citadel is consistent with today, and I think it's going to be consistent going forward, because, at the core of who we are, we are a hedge fund, and what do we do? We trade in systematic markets. We trade in fundamental markets, and the edge is through analytics, data, and our ability to make better investment decisions through that. So technology remains critical in certain business and central in certain others.

Berger: So that's where it's the same. But markets are rapidly evolving, the way they behave, the size of them, the players. How much is the tech evolving with that?

Subramanian: Has to, right? You know, four five years ago, we were not sitting here talking about predicting weather. Now we are. The amount of data that we are going to consume, that we consume to be able to make the investment decisions in our equity business, is in petabytes. To be able to make meaning out of that in a quick, insightful way, to be able to make it matter in the markets, it's a race. It's an arms race to be able to consume the right kind of data, in the right kind of way, to be able to make the right decisions.

Berger: What are you spending most of your time on right now? What is taking up the bulk of resources, would you say?

Subramanian: So, I mean, if I take a step back and think about what my job is, how do I define my job? A successful my job? I'll break it down in a few parts. First is world class investment research. Second is to be able to trade in the lightest possible foot in the market. And three, to be able to manage risk. So engineering talent is spent between these three. At times, it might be the first more than the second, sometimes maybe third more than the first, but almost always central research. And, to be able to drive research, we can talk about data. We can talk about all the things that you provide us, which is news forecasts; insights that we have to consume to be able to do what we need to do. If you think about the life of a portfolio manager at Citadel, he or she would cover many stocks. A portfolio manager has analysts; each analyst would cover, like, 40-50 stocks. So, when they come in to work, they've got to make decisions on when to go long or to go short within that universe. So they're analyzing news about not just those 40 companies, the entire ecosystem around those 40 companies, the supply chain around those companies. That much amount of information to be consumed and put to work is not easy. What should that person focus on becomes a question. So, to drive engineering, to be able to drive the best ways in which information can be consumed in a right, prioritized manner, is the beginnings. If you look at a systematic business, it's a completely different ballgame.

Berger: These are huge amounts of data that you're talking about, and, to your point, this question of what do you find or how do you use it? How do you decide what's a priority? What is, sort of, the push and pull between consuming new pieces of data and deciding whether they are worthwhile, whether there is a signal behind them?

Subramanian: Very good question. There's an in-depth process that needs to happen to make sure that this particular piece of data that you're about to consume has orthogonal benefits to everything else that exists; otherwise, all we're going to do is drown in a big sea of data, looking for meaning within it, and that's not a good expedition.

Berger: How tempting is that, though, to drown in a sea of data? Because there is a lot out there, and a lot of the data, I should say the public data, is becoming less and less, considering half the companies are publicly listed than they were in the late nineties, that even now, in a government shutdown, macro data is harder to come by. Is there not just a grab, through all parts of the world, for alternative sources of data?

Subramanian: It's definitely gained a lot of importance in our industry. Alternative data is gaining a lot of importance in our industry, but I think running towards any new source of data for the sake of it is like running towards a new piece of technology for the sake of it. So you've got to be really careful, because that's a good way to burn time. But, if you don't do it, you may not be looking at the thing that you need to be looking at. So you need to be doing it at the right level, and that comes with a lot of judgment. It comes with a lot of understanding what you already have. Is it providing value? How is this orthogonal, there's science behind it.

Berger: Before Citadel, you spent 13 years at Goldman Sachs leading up the tech effort there, and coming over to Citadel. How much does the culture and importance placed behind technological advances, how different were they? How much of an adjustment was it?

Subramanian: Two different questions. Okay.

Berger: Tackle as you see fit.

Subramanian: So that's a really good and interesting question. So, if I had to think about the change, Ken, I think Ken's a technologist. He just masquerades as a guy who runs two businesses as much. So, when I think of the person that I work for, he has an incredible amount of depth and insight in the analytics and the technology that powers the firm. So I have a very strong manager who can challenge me, question me, and guide me towards the things that I need to be focused on that did not exist in some of the prior places that I worked at. Second is, our focus is production. We are very, very commercially focused. So that focus also results in the focus that our engineering group has. Focus is two things: what you really decide to move the needle on in a material way and, pretty importantly, what we then choose, therefore, not to focus on in a material way. So I think, as the CTO of Citadel, I also consider myself one of the chief no officers.

Berger: Are you saying that there's lots of wasted banks, a lot of rabbit holes being chased?

Subramanian: It's easier for me to be able to do that. It's just easier for me to be able to do that. The banks are regulated institutions. They have a lot of things to do. But, at Citadel, given the focus that we have, it is easy for me to say, this makes sense, we're going to pursue it; but this does not.

Berger: Part of the reason I ask is because there's always this question as to whether the big legacy banks and other institutions are dinosaurs. They're behemoths. They can't keep up in financial services, considering you've worked for many different flavors of different types of firms, who do you think is leading that push? And I realize that there might be a little bit of bias, considering you're at Citadel now, but do the banks have a role in pushing technological advances? Is it Citadel? Is it smaller players that are more nimble?

Subramanian: Absolutely. I don't think there's a monopoly in pushing the technology, and I truly don't believe that that's the case. I think we use technology as a tool in different ways, and the ways that we use it can have different effects on the bottom line and the top line. In certain cases, it might be more, like I said, more central and somewhat critical, and sometimes it may be needed and necessary. So it may be operating in different spheres of how critical or needed is technology, as you go through various businesses within a bank, and also various businesses within a hedge fund; I think it's more central and critical in a place like a hedge fund.

Berger: Right. I mean, in the beginnings of things like prop trading, and that sort of thing, at Goldman, Goldman was really early in leading some of those advances. You see the likes of HSBC, for example, saying that they've cracked quantum computing. Are there any areas where you learn from some of your competitors?

Subramanian: We learn all the time. We're here to learn from many, many. It goes back to recruiting. I think we cast a reasonably wide net in terms of the kind of people that we attract to the firm. We go on campus; that's the easy one. And we hire from tech companies, we hire from the South Side, we hire from competition. Why do we do that? It's important for us to take the best of what, I think, people have learned outside of us, so that we don't think what we do so far at Citadel is the only way for something to be done. What we have done so far at Citadel just happens to be exactly that: what we've done so far at Citadel. What we choose to now do at Citadel has to be from a first principles, zero sum cost fallacy basis, and, for that, we need to keep learning.

Berger: How competitive is it to get that talent? Every day, I feel like I open up the Bloomberg terminal, and Meta has stolen someone else from Apple and paid them a salary that looks like a star player on a sports team. I mean, these are big salaries that the tech firms are paying for top tech talent. Is that who you're competing with; are you also having to dole out that kind of amount to attract the top talent?

Subramanian: Look, I think competing for engineering, good engineering talent has always been exceptionally hard. Some of the numbers that you're quoting about are for very, very specialized AI model training and model tuning, kind of a skill set which is in extreme demand right now, and I understand that. But, if you step back and think about talent, it's been competitive. It goes through a bit of a cycle here and there. I've seen the dotcom days of talent boom. I used to say things like, you know, if you are able to code, trespassers will be recruited. That was the kind of thing that stuck in my head. I've seen that cycle, and then we've seen what happened after that, and we've seen cycles through the 20-something years that I've been in the workforce.

Berger: That sounds, I'm going to say, a little bit like a warning. Are we maybe in sort of the top of that cycle of the talent raising and kind of the bubbly part of it?

Subramanian: I'm saying that it's always remained competitive for the top talent, and we tend to go after the top talent. And, said in another way, the talent that Citadel goes after, I want them to have a lot of choices, and I want for us to be their choice. That's how we want to position ourselves. We want to give them a career that is extremely interesting to start with, extremely accelerated. They were given what is needed. They're going to learn a ton from our colleagues. They're going to learn a ton about the markets, about risk management. So an ideal candidate for me is somebody who can, basically, thrive in the intersection of math, finance, and computer science. It's not for everybody; it's for somebody, and those somebodies is what we want. So we don't want to compete just for the sake of competing in this playing. We like applied engineers. We like people who can transform our business process, who have a genuine curiosity about the market, and then can learn and grow with it. Because soon you've seen a lot of careers that start off in engineering, go off as an analyst, or start off as an analyst, come in to engineering. You see a lot of career paths that blend like that, only because we create a path that that really promotes that. So now, are we in a bubble? I mean, I can't speak too much about that.

Berger: Okay. Maybe not a bubble, but are we near, kind of, the top of that peak? And, if we are, you warned about what that looks like on the way down in that race for talent. If we are heading towards the way down, what exactly does that look like, and how does it change what you do for recruiting?

Subramanian: I don't think it changes quite a bit. I think that the kind of people that we are looking for, in the few years that I've been here, what really good talent looks like has been pretty consistent. The technology that good talent has used has changed over time, with new tools coming up in the stuff. Now, I think one interesting way to think about recruiting, going forward, is, given the amount of tools that make coding so much easier, should we have three one hour interview, or should we have one three hour interview where the person just solves an entire problem, front to back, because you have the power to be able to do that? We're rethinking how we recruit good talent, but I don't think the qualities of that person has changed too much.

Berger: So it costs money to recruit top talent? Costs money to get the best sources of data. These are very expensive undertakings. Can you compete in this day and age unless you have the size and the power of capital to back you up to be able to invest in those things?

Subramanian: I think so. I think you can see, look, there's startups that compete on talent. The great thing about this country is that if you have a really strong idea and you want to go after it, you can have talent that can follow you. Citadel is a fantastic example of that. We have a simple mission. We want to be the best hedge fund on the planet, and we want to be able to attract the people who are driven towards the mission, that particular mission, and, therefore, what that work entails. We don't hire people for jobs; we hire people for careers. If you talk about what we do and what life would look like, we can attract them. Of course we want to win. But I don't see that it is so massively distorted that you need to be big or super successful for you to be able to do that, because there are startups that do that.

Berger: There have been some challenges for the university system coming from public policy about research and about granting foreign visas. Additionally, complications, when it comes to H-1B visas, does that affect recruiting talent for Citadel at all, of getting people from outside of the US to come here, if there are those external and policy pressures?

Subramanian: I think the long term impact of who comes to this country, performs undergraduate studies and graduate studies, will potentially change over time. And, if, over long periods of time, it's going to set up in a way such that other countries will have competing education systems like the amazing ones that we have here, then it's going to be a long term potential erosion. Look, I am an immigrant in this country. I went to an undergraduate institution in India, chose to come to the United States because of its excellent education system. Today, that's still the case. If that changes, we're going to have a structural change, and we're going to have to adapt.

Berger: What does that mean for Citadel a decade from now, if that is the case?

Subramanian: I mean, it's hard for me to predict. I'm sure we'll compete and evolve. One of the best things about Citadel is that, I've seen in the seven years that I've been here, lots of things have come our way. We are an incredibly resilient organization. We are an incredibly adaptive organization. Markets change on us all the time, and we compete to win in that. So our DNA is built in a way such that, things like this, we will adapt. I mean, a great example for this is COVID, we were just talking about COVID outside. The thing that we did when COVID happened, and I think it's been out in the press, is, over a weekend, the decision was made that we need to get our people to work together. So we took over a hotel in Florida and made it our work environment, with the trading floor, everything set up. The decision was made over a weekend; over the next week, everything needed to be set up to be able to have a trading floor. Apart from the contract for that hotel, of course, was all done. So who knew COVID would be such a big change? But, in the week, we can adapt. All I'm saying is, we can adapt.

Berger: Well, the technology world has had another thing that has exploded onto the scene. It's been around for some time, but that it is figuring out how to adapt, and if it needs to adapt, and that is generative AI. Your colleague, Ken Griffin, has made some comments, just yesterday, about it, saying that it wouldn't be a meaningful source of Alpha. I know you said something similar at Milken, too. I think it bears repeating: why, though, why is the promise of AI not an alpha?

Subramanian: Look, I think I'm just going to talk about what it is here now. What does AI do? Let's go back to the portfolio manager example, covering 40 stocks, and then 40 times many stocks, and then you have the supply chain and all of that stuff. What AI does a good job of, and, you know, it didn't used to do a very good job; it's increasingly doing a much better job, of getting the information that I need to consume at that point in time. So, if engineers can work with AI to be able to create an information funnel that is huge into the right set of things for us to consume, to be able to make decisions, we will do that. That's not alpha. That is just a tool in the tool set that increases the speed with which the flywheel turns for decision making, and there are several types of improvement in productivity that you've seen, AI is an important one. I'm not minimizing the importance of AI; I just want to tell you that that is the place it is in. It is improving the speed with which we can consume information. That is not generating alpha. At the end of the day, in our discretionary businesses, Alpha remains to be generated by our portfolio managers. We've had systematic businesses where the alpha is a modeling effort, it's a mathematical modeling effort,

and, as soon as machine learning, TensorFlow, came out, we started making models using machine learning models. That is AI, it's old school AI, but it's AI nonetheless, and we've used that to make alpha. But, in the discretionary space, which is what people are talking about right now, when we have AI tools, I think it is a tool that will improve productivity for sure.

Berger: It can also lower the cost, in some of that productivity, too, in some areas. And this kind of goes to one of the audience questions we have, that we were talking about: can smaller hedge funds compete? You said there's space for them. Is there potentially more space, even for them now, powered with AI, maybe not to generate alpha, but to increase productivity and maybe to lower costs, or lower the necessary amount of staff that they might need?

Subramanian: So, I think, if I think about AI as a tool, it's an important tool. It is a force multiplier, not a leveler. So, it really depends on how people are using it. If somebody small is able to use it better, that's a different story. But, in of itself, I don't think it is the reason why smaller players are going to compete better, because they have the advantage of AI, because everybody has the advantage of AI. It is the people who cannot adapt to use it the right way that will fail, or people who think they are using it the right way but use it exactly the wrong way, which is interesting to see, because, if you offload judgment that a person needs to have to an AI machine, that's one good way to lose money.

Berger: Are you seeing that happen? Is that common?

Subramanian: I'm not saying that it happens. We have to make sure that it doesn't. So, it's a very slippery slope, because, I think, when people say AI, they latch on to the intelligence word, and then they quickly slide into the judgment territory. That is a slippery slope.

Berger: Could it change, though? Is it definitive that you can't get any source of alpha from it? Could you see a future, or changes to the technology itself, where that does become a possibility? Can you write that off for the future?

Subramanian: All I'm saying is AI today, it doesn't predict. It doesn't help me predict the future. It helps me see the present more clearly. That's all I can say right now. If anything were to change, I will make this statement based on what it is then. But, as I see it, right here, right now, and the trajectory that I see it in the near future, is going to make me see the present more. It's going to help me, not make me, help me see the present more clearly; and it is an important tool, but it is one tool in the toolbox.

Berger: Is it changing the importance of that tool? Has that changed, as more advancements have been made in generative AI?

Subramanian: Of course it has. Of course. Three years ago, we were not talking about this. Especially for engineers, we're seeing, in some places, again, we are seeing productivity boost in coding and testing and the like. So we are seeing it making changes. But, like you said before, it is increasing productivity.

Berger: I mean, there have always been points in the past, especially with LLMs and, honestly, just in quantitative hedge funds in general, of this idea of p hacking, of overfitting, where you have a

back test, where things look great. Does the temptation to do that increase even more when powered with AI? Are mistakes more likely, where you torture data to make it look right?

Subramanian: In the market, there probably is. At Citadel, there is a clear culture that makes sure that that doesn't creep in.

Berger: Talk more about that. How do you make sure that doesn't creep in?

Subramanian: I mean, we have to stay vigilant in all tools. When we set standards, when we think about what is appropriate for use, for where there is a clear depth of leadership focus on making sure that the best in-class research is preserved. And then there's a culture to make sure that that is not just preserved in words, it's preserved in software. That's my job, to make sure the best practices of how things are supposed to be done has to be made easy in software. That is, at the end of the day, if you really think about how that process makes its way into the software, that is the beginning of the building of a competitive advantage for your firm. And, if you don't think about that and build another piece of software, you might think that it is a force multiplier, but it might be a competitive disadvantage.

Berger: I remember you said, in Milken, that Ken Griffin uses ChatGPT.

Subramanian: I think I was asked that question, yes, and I answered it.

Berger: Do you use ChatGPT?

Subramanian: I do use ChatGPT.

Berger: How do you use it?

Subramanian: Oh my God. In my personal life?

Berger: Yeah, sure. Life work. Are the folks at Citadel allowed to be using ChatGPT on work computers? Is it blocked?

Subramanian: Okay. So, you remember, you and I were talking about the problem that I have in my foot outside. I took a picture of the thing and then asked ChatGPT what it is, and it was like, yeah, it was pretty darn close to what exactly my physician said it was.

Berger: Get rid of doctors is the theme of this meeting.

Subramanian: I'm not saying that. But I did go to the doctor right after that. So anyway, so ChatGPT, I'm not going to sit here and say what everybody here already knows. The uptake of ChatGPT and tools like that has been way beyond what Google and Internet has seen. It's all well known. I think there's a lot of powerful retail in that.

Berger: I know you think about this technology day in, day out, and you were talking about how it's important that you're not offloading judgment to it. But, often, the way that this is being used, maybe it's being used to augment, or to be additive to, judgment. Is there a risk that, in doing so, it

kind of dulls our own judgment? You can talk about this, maybe, at the firm or society as a whole. If you let the machine do more of those sorts of things where it helps you out, does that set us back in some way? Do we offload judgment and, therefore, weaken our own?

Subramanian: When I think of something being a force multiplier, I think of it as a tool in my toolbox. It is how we use it that is going to, potentially, create risks. A very clichéd response to your question would be the invention of the calculator, and, you know, I was very involved in our schooling system from where I am. There's a constant debate as to how much of these tools should be allowed in the pedagogy, in the teaching, of kids, and you can see a vibrant debate in the community between students and teachers, and you know where the students are on this topic. And I think this tool is here to stay, and we need to make sure that we are well educated on how best to use it and how best to not use it; when to use it and when not to use it. That we are going to learn as we go, but I think that is going to have to be an area of focus.

Berger: But is there this risk, again, as funds look at adopting this, that it enforces groupthink, that there are wider implications of it, even if Citadel, and you're being very deliberate about what it can and cannot do? Is there a risk that funds, as a whole, really start, not just an AI bubble and AI names popping up and the valuation of them, but the use of it and that causing some sort of groupthink and wider rupture in markets?

Subramanian: I think that that is no different from the groupthink that comes out with researching data. That is no different from groupthink that comes out with reading research reports. I mean, it is different, but it is not, fundamentally, different. People who are going to be susceptible to new ways of groupthink are going to be susceptible to those ways of groupthink, so that's where the culture really matters, how do you run an organization that steers clear of slippery slopes.

Berger: So, as the technology advances, and advances rapidly, are the tech skills that you, as a firm, have they changed what you find most valuable?

Subramanian: I think, as technologies change rapidly, definitely changes. But I think what I want to keep focusing on is, are you, as an engineer, are you a software developer or are you an engineer? I think that's an important distinction. Are you an information technologist, or are you an engineer? And there are appropriate places in which you need an information technologist, a software developer, but sometimes you need an engineer. And what I mean by that is the true value add of a strong engineer is one that sees problems for what they are, questions them, reshapes them, breaks them, puts them back together using tools like Java and, name your AI tool, or whatever it is that we want to think about, and then does that job. In my prior job, you know, people who are very obsessed about languages, they had a role to play in a very small part of the firm. In most cases, a person who is very obsessed about the language that they're going to use to solve a particular problem isn't driven by the problem, they're driven by the language, so we just want to make sure that there's a distinction between those tasks.

Berger: Can I ask, just as you're interviewing talent and all of that, how uncommon is it? How hard is it to find someone with that mindset?

Subramanian: To the places we go to, I wouldn't say it's uncommon or common. It's a 50/50 shot. Yeah, it's a 50/50 shot.

Berger: What about skills that you think will be less valuable, going forward?

Subramanian: Yeah. I mean, software developer for the sake of software developing. I think, I'm not saying it's going to be valuable. Architectural skills are going to be valuable, designing problems are going to be valuable, but, like, in low latency systems, understanding exactly what you're doing with lines of code and what it is doing at the lowest level is going to be valuable. Skills are valuable. But I think, as a career advice, I would say, don't rest your hat on skill sets. You need to go beyond skill sets; you need to be able to learn different things so that you can adapt. Be obsessed about the problem space.

Berger: Do you think universities are setting graduates up for what you're talking about?

Subramanian: I think American universities are setting up graduates for this, for sure—100%. Of course we can all do a better job, but I find amazingly qualified candidates coming through our doors and want to tackle very interesting problems in ways that we hadn't thought before.

Berger: I also have to ask, I mean, coming around, we only have a little bit left but, from where we started, about Ken finding the firm and him being a technologist himself: does that change, not just who you look for, but also the pressure, the pressure of the people going in, knowing that the man who started the thing—

Subramanian: You can call it pressure, or you can call it a worthwhile challenge. The people who show up at our place are motivated by learning, from being better, and being surrounded by people who can challenge you and learn from you, but that's what it is.

Berger: I think that's a beautiful note to end on. Thank you so much for joining, everyone. Please join me in thanking Umesh Subramanian from Citadel.