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AFTERNOON OF CONVERSATION: YURI MILNER

Benedict Music Tent
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LIST OF PARTICIPANTS

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MS. BRADMAN: That was fantastic. I'm Kelly Bradman (phonetic) with the Aspen Institute and it's my pleasure to introduce our two next presenters. Ross Andersen is the senior reporter for *The Atlantic* and Yuri Milner, venture capitalist and physicist, will be talking about technology and space exploration. Let's give them a warm welcome.

(Applause)

MR. ANDERSEN: All right, thanks for joining us, Yuri. It's getting hard to write a concise biography of you. Your day job is you're a venture capitalist, but in recent years you've become known for these really ambitious science projects, really science fiction projects that you've been bankrolling, including a massive search for extraterrestrial intelligence and a probe to Alpha Centauri.

I want to geek out on those two projects in a little bit, but first let's start with Silicon Valley. Can you give us an idea of the mood there right now? Like I get kind of the sense that some people feel like the party of the last 10 years is over. Is that how it feels?

MR. MILNER: Well, I would say to some people maybe yes. But to give you the scale of the party of the last 10 years: there was $2 trillion worth of value created in internet consumer technology. Every five years there is roughly $1 trillion being created, and 40 percent of that value was created by new companies and new businesses.

And, you know, I've been very fortunate to have been able to invest in some of them like Facebook, Twitter and Snapchat and Spotify and Alibaba and so on. And to some people this party maybe over, but for somebody like me I think this trend will continue in a sense that every five years there will be another trillion dollars created in that space and probably maybe 70 percent of that in this country and probably 30 percent elsewhere in the world.

MR. ANDERSEN: When you look at the kind of entire landscape of tech, is there a particular subsector that's just really rich in good ideas at the moment the way social media was, say, 5-10 years ago?

MR. MILNER: Well, the -- I think what happened in the last 10 years is that there were enough capabilities created to accumulate huge amounts of information and of course now everybody is a participant in this creation. So the next 10 years I think would be more about analyzing this information and something that people call artificial intelligence, building intelligence agents and engines that would analyze this data that have been accumulated and is being accumulated at an unprecedented pace.

So my most recent experience was in Korea when I witnessed the machine called DeepMind -- because it's called AlphaGo, playing the game of Go against the strongest human being, which was from Korea. So the competition was in Seoul and the machine won 4 to 1. And this is probably one of the last games that was very difficult to master by computers because it's so complicated.

MR. ANDERSEN: Yeah.

MR. MILNER: And the mechanism that is being used is neural networks, the analogue of the neural networks. So this is the future.

MR. ANDERSEN: Yeah. When you look back at the last cycle, is there a particular startup success that surprises you -- something that you passed on and that now you wish you could go back and invest in?

MR. MILNER: Yes, there is a company called Uber that --

(Laughter)

MR. MILNER: -- we unfortunately missed. But we did manage to invest in the Uber of China and the Uber of

India, so we did not completely miss the train. But Uber is really one of those companies that can really change the way we move from A to B in the cities.

MR. ANDERSEN: What made you skeptical about it initially?

MR. MILNER: Well, the thing is that the first wave of companies were really built by hardcore engineers and -- but I think most of those companies have already been built. The companies that are being built right now -- and Uber is a good example of it -- is that it combines offline and online expertise. So there is a very significant offline element: Uber, you know, interacting with drivers and governments and majors of the cities and things like that. So there's significant offline element to it which we did not recognize unfortunately early on.

MR. ANDERSEN: I can't be alone in noticing that there's no shortage of space enthusiasts in the tech community. There's you. There's Elon Musk. There's Jeff Bezos. There's Mark Zuckerberg, who recently signed on to your interstellar probe. What's going on there? Why is there this kind of just really intense enthusiasm about space in that community?

MR. MILNER: Well, it's really a good question. I think that it's an exciting frontier and Silicon Valley of course is the place with a lot of ambitious people and people with big ideas and dreams. And of course space is one of those areas that really is sort of not 100 percent commercial endeavor, but rather something which lies in between commerce and non-profit.

And again, there are a lot of people in Silicon Valley who are very non-profit oriented and who spend a lot of money to change the world.

MR. ANDERSEN: I want to move now to this project that you recently funded to search for extraterrestrial intelligence. A few years ago I had a conversation with Elon Musk and he gave me his usual line about the possibility that we live in a computer simulation and he has got all kinds of arguments for this.

But one thing that I was really struck by was his -- he seems quite taken with the notion that when we look out into the universe we don't see any evidence of other intelligent beings. Do you share his surprise about that?

MR. MILNER: I don't and I disagree with him on this. I think in the last few years there was a overwhelming evidence collected by NASA telescopes, specifically Kepler, that the planets similar to ours are very widespread in the universe. And in fact it is a scientific number, which is undeniable, that just in our galaxy there are probably 20 billion planets like ours in a so-called habitable zone, meaning that there's liquid water on the surface.

And this is just in our galaxy. This number should be multiplied by 200 billion galaxies in the universe. And then the numbers are pretty overwhelming for us to conclude that all this real estate was created just for us. So I think it's a very aggressive assumption that is now almost mathematically incorrect. Because with so many possibilities and with 14 billion years of the existence of this universe, I think there were plenty of opportunities to develop life and probably also intelligent life. And that's why we are looking for the signals.

MR. ANDERSEN: Do you have any sense -- I mean when you bankrolled this project -- and I want to give the audience a sense of the scale of it. This is going to look at the million nearest stars, the core of our galaxy where most stars are and then something like the hundred nearest galaxies for evidence of intelligent life. And that's expensive. I think your contribution alone was something like $100 million.

And obviously there are always going to be people who say that money maybe better spent on cancer research or on the hunt for a Zika vaccine. What do you say to them?

MR. MILNER: Well, I tend to agree with these people and I think there are many more pressing problems that we need to solve other than looking for intelligent

life in the universe. But at the same time, it's a matter of scale. I think that -- and here I'm strongly convinced that we should spend a small fraction of one percent of all our resources to go after very ambitious goals and to fund these ambitious projects even though maybe they are very long-term.

So if we spend 99.9 percent of our resources on solving immediate problems, including cancer and poverty and everything else, then this 0.1 percent will really be enough to go after slightly more existential questions. But I think if we spend zero attacking those problems, then, you know, this is just going to be too boring, to be honest with you.

(Laughter)

MR. ANDERSEN: I have to ask, when you agreed to commit this money, did you stipulate that like you get the call if they find a signal?

MR. MILNER: Yes, of course.

(Laughter)

MR. ANDERSEN: So let's imagine you get that call and it takes a number of months, obviously, to verify and --

MR. MILNER: Yeah, there were many attempts before ours to look for the signal. What we bring to the table is a new processing technology that allows to get probably a thousand more information per second and analyze it. So we will be able to do the search that, you know, wasn't possible even a few years ago and the scale of it.

And the scientists who have been conducting the previous searches, they told me that they always had a bottle of champagne in the fridge in case they hear something. And when we launched our project, I basically put champagne on the table right away and I said let's drink champagne ahead of time so that we -- you know, we don't have this thing hanging out in the fridge.

(Laughter)

MR. ANDERSEN: Also, it could be a while. Imagine you get that call and then over a period of months the signal is verified and we are all convinced more or less and we go public. What does -- what do you think that does to human culture?

MR. MILNER: Yeah, I don't think we will be able to hold it for a few months, by the way. I think maximum a few days. And it will leak because of the social media and so on. But I think the significance of this -- although I would be the first recognize that this is a low probability project to be successful in the next 10 years. Although I'm convinced that it's worth doing because low probability is compensated by the significance of this discovery.

So I think that if we get the signal life will not dramatically change and, you know, you will continue to write your pieces and I hopefully will continue to make investments. But in a subtle way I think everything will change, everything. Because knowing that we're not alone in the universe is -- although it cannot be monetized is -- I think is existential question. And probably the most interesting questions are the ones that never lead to any profit. So maybe this is one of them.

MR. ANDERSEN: You don't always hear that from venture capitalists. So the SETI search was the first of your $100 million projects. The second is this Alpha Centauri probe mission. And I just want to give our audience a sense of how ambitious it is. Our current kind of flying fastest -- fastest flying space probes, they travel about a million miles a day and if we were to send one to Alpha Centauri, the nearest start, it would take tens of thousands of years to arrive.

You and your team have a mission concept for a probe that you say can arrive in 20 years and send back images that would arrive here -- images of any planets that might be there -- and that's an open question -- and send back images that would arrive here in 4 years, which is to say within the lifetime of people who are in this

tent. Can you give us a basic sketch of how that would work?

MR. MILNER: Okay, so again the amazing developments in technology makes it possible right now and I think our generation is very fortunate that we have this incredible opportunity to go beyond the solar system and for the first time ever reach out into the universe and send manmade probe, of course robotic, to the nearby star.

The way people usually think about it unfortunately is not going to happen because -- who are thinking about huge spaceships moving, you know, through the wormholes, something like Star Wars style project. And I'm not even talking about the cost of that, but we just don't have enough energy to accelerate those huge machines to speeds comparable to the speed of light. And we will not have enough energy for a very, very long time.

But what is incredible is that now we do have enough energy to accelerate a very small probe to about 20 percent of speed of light -- and small meaning a few grams. And the developments in the last 10 years allow us to build a spaceship which will be very small, you know, like maybe an inch big and will weigh a few grams.

So we believe that this can be done already today, and this little spaceship will have capability to take images and send those images back to our planet.

Now, the way to accelerate this probe is a very old one, which is go back to a few hundred years ago when we were travelling without fuel using the wind and the sail. So the only way we can travel to the nearby star is to leave the fuel behind, not to take any fuel, and to accelerate this very small probe with a very big beam of light. And we now know the technology how to create this big beam of light and use the so-called solar sail to launch this little probe to the nearby star.

MR. ANDERSEN: You mentioned images that it might be able to send back. What might those images look like? Like what kind of resolution are we talking about or what kind of features on these hypothetical planets

might we be able to make out?

MR. MILNER: Well, the quality of the picture would be similar to the iPhone quality, which is very good. And you -- if you fly by a planet -- and we don't even know yet whether there are planets there although it's the nearest star system consisting of two stars, so-called binary star. We will be able to send back images and some other scientific data like magnetic fields. We will probably be able to see if there are any signs of life on those planets and so on.

MR. ANDERSEN: The last time that you and I talked about this, you said something that really stuck with me. We were talking about the geopolitical complexities of putting what amounts to a massive laser cannon on the surface of the earth and you said that you weren't sure that we as a civilization were mature enough to take this on yet. Can you tell me a little bit more what you meant by that?

MR. MILNER: Well, this project if it happens in any foreseeable future -- and we believe that it is doable probably in 25 to 35 year timeframe -- this will require a global consensus no doubt. Because sending something to the nearby star is not just a small project that you can build in your garage and quietly do this. I think in a way you're representing the planet. You're sending something which is moving very fast and going very far with, you know, unknown implications.

So we will have to first of all agree on the mechanism on how we agree that we should be doing this and whether it should be United Nations or maybe some other organization that should be making this decision remains to be seen. But it definitely should be similar to the larger scientific projects that we have been successfully launching, for example, CERN, you know, the big collider in Europe.

MR. ANDERSEN: Before we go, I wanted to ask you: knowing you a little bit I know that this is not going to be the last of your science fiction projects. And since it's just us two talking here in this tent and

we're off the record, could you give us a hint about the direction of your thinking for what's next?

MR. MILNER: Well, I think this is big enough of a project in itself and I think if it is a 25 to 35 year project, then, you know, we can sit down at that time and see what else we can do. But I think that it's really to me very humbling and I feel very special that we are the first generation after a few billion years of evolution on this planet that can even conceivably think about doing something like this.

And if we in fact are capable of launching a spaceship to the nearby star, I think our century can be -- this is definitely one of the things that our century will be remembered for.

MR. ANDERSEN: Yuri, thanks for joining us today. This has been great.

(Applause)

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