



Stanford eCorner

Impact: Stanford Entrepreneurship and Innovation [Entire Talk]

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October 24, 2012

Video URL: <http://ecorner.stanford.edu/videos/3017/Impact-Stanford-Entrepreneurship-and-Innovation-Entire-Talk>

This special presentation features a panel of Stanford alumni reflecting on their personal entrepreneurial experiences at Stanford and in the vibrant Silicon Valley ecosystem. This conversation follows a presentation of remarkable results from the Stanford Innovation Survey, measuring the economic impact of Stanford alumni engaged in entrepreneurial activity.



Transcript

Good afternoon and welcome, welcome to the draper fisher jervetson entrepreneurial thought leaders seminar. Brought to you by the Stanford Technology Ventures Program and the business association of Stanford entrepreneurial students. This special event is archived for future viewing on Stanford's entrepreneurship corner website at ecorner.stanford.edu and by SCPD the Stanford Center for Professional development. My name is Heidi Roisen and I'm a venture partner at DFJ as well as an adjunct faculty member here in the department of management science and engineering where I teach 178 winter quarter please come! I just had to throw that little pitch in. Today, we are proud to be hosting some very special guest at ETL. As we discuss the entrepreneurial environment of Stanford and the results of the recent Stanford Innovation Survey, which sought to access the university's economic impact, based on entrepreneurial activity by alumni, faculty and staff. And of course, we want to acknowledge and thank Sequoia Capital for generously funding the Stanford Innovation Survey. To tee up this discussion, I would now like to welcome up the authors of the Stanford Innovation project -- Stanford innovation report, MS&EAssistant Professor Chuck Eesley; and Professor Emeritus from the Graduate School of Business, Bill Miller, to share some of the central findings and historical context of the results from the survey. Gentlemen? Well, Heidi, thank you very much for the introduction and getting us all started here. I just want to say one thing.

Here at Stanford we're talking about teaching young entrepreneurs to be -- young people to be entrepreneurs. You know you can be an old entrepreneur, that's okay. And I'm an old entrepreneur. And if you miss that chance when you're young, you still have a chance when you're old. So don't forget that. But I will put some context into this report. We talk about -- a lot about entrepreneurship and it's very big and you'll see here some results from Chuck that they're very impressive. But Stanford is about a lot more than just entrepreneurship; I just want to put that context. We have a lot of interest in the arts and then humanities and so forth and our students explore this in the first two years as an undergraduate, as most of you who are undergraduates know, you don't have to declare you major until you decide what you want to do. We think entrepreneurship is a career choice among many career choices, and some students will want to be poets, they'll want to be biologists, they'll want to be lawyers and some will want to be entrepreneurs.

And so, for those who want to be entrepreneurs, we have a lot of ways that we can help them. So it is a career choice and we help them on that career. As well we have workshops, we have courses like this, we have mentors who will help them develop their skills, learn the skills of entrepreneurship and get mentored on what it is they can do to become better entrepreneurs. So we've had a large number of them across the university, not just out of engineering, not just out of the school

of business. We have social entrepreneurs, and as Chuck I think may report that we've had a lot of non-profit started by Stanford graduates, almost as many as for-profits started by Stanford graduates. So we have a very broad sense of education. And that was always very important to me, because my father was a farmer, but my mother was a Classics professor. So I had to learn a lot of Classics and I felt that breadth was very important to me when I began to think about times like starting companies. I started a little bit later in life than many of you but that breadth of knowledge was very important. So getting that breadth we think is quite critical.

So now we're going to hear from Chuck. Here's Chuck, who is going to talk about more of the details of the report. Great. Thank you, Bill. So, this all started for me a few years ago when I first arrived at Stanford back in the summer of 2009, and like all of you, you start seeing the examples and hearing these stories about successful entrepreneurs and alumni and faculty going on to start companies out of their research and their technology. And so I began to wonder what's the overall impact of all of this? If we were to sum together, the aggregate of all of this entrepreneurial activity that Stanford is producing through students, through alumni who have passed through Stanford and been exposed to the entrepreneurial environment or have been exposed to some new technology, through faculty, what would the aggregate results of that be? And so, I set out to do a survey of all Stanford alumni, faculty and staff. And so this was a large undertaking, obviously; we sent the survey out to 143,000 Stanford alumni. So this covers across the schools, across graduation years. So we got responses from alumni going back from the 1930s up through graduates from 2010. And so we got back -- out of these 143,000 we got back 27,000 responses.

So this is both from entrepreneurs and from non-entrepreneurs. And so, if you use that data, which took a lot of time to crunch the numbers and add all of this up, you wind up with 39,900 still surviving companies have been created over the decades by Stanford alumni and faculty, which have created 5.4 million new jobs and annual worldwide revenues of \$2.7 trillion. So, Stanford on the whole is having a large impact on the economy, both locally and globally. And Stanford is on the whole importing founders into the State of California. So, just under 35% of the newly admitted students at Stanford are from California. About 45% of the alumni founders wind up founding their companies in California. So, I just want to highlight two other quick results and then there is a lot more in the report, which you can download from the website. But two other interesting results just to kind of peak your interest. One is, as students, you may be looking out at the various programs and business plan competitions and courses and wondering should I get involved in these? Should I work on my start up on the side? What should I do? And so, we asked people who responded to the survey, these are graduates going back in time, which aspects of Stanford did you interact with and more important in founding your venture? And so, we gave them various options for taking an entrepreneurship course, participating in business planning competition and so on. And so, as you might expect, those who were innovators, who produce some sort of patent, new business process, new product and those who are entrepreneurs were slightly more likely to take these entrepreneurship courses.

But the surprising result came when we looked at those who founded a company within three years of graduating and who had managed to raise venture capital in their firms. So, 25% of the innovators and entrepreneurs in the aggregate had participated in entrepreneurship course of some type. But 60% of those quick founders, who had been able to raise venture capital within three years, had taken an entrepreneurship course. And similar results for the programs and Business Plan Competitions, STVPs, Center for Entrepreneurial Studies and the d.school. The other interesting result comes around, we asked the founders if they had changed their business model? So, we asked them is the business that you're running now very similar to the business model, the vision that you had in the beginning? And we gave them several categories, did the target customers change, did the revenue model change, did the sales channels change. And so, we found that 60% of the founders indicated that they had changed the business model from the beginning. And in particular, only 13% said they had the same target customers as they thought they would in the beginning. So, the classic thing, look to your left, look to your right, if we look at -- if you look to your left, then probably if you're all founders the person to your left is going to wind up changing their target customer from what they think it would be. And if there are 200 people in the room, then perhaps only 26 of you are going to wind up choosing the right initial target customer in the beginning. So, we also looked at the performance implications of this.

And I'll tell you just briefly a couple of interesting results. So, when you look on the whole, those who had changed their business model have slightly lower performance than those who stayed with their initial vision. The differences aren't large, but median revenues of \$150,000 compared to \$200,000. So -- but when you look in particular at the software and Internet firms, those who had changed their business model in some way wind up having higher revenues than those who did not. So, about \$500,000 median revenues compared to \$200,000. So, I think that this shows, that one, it's perhaps more about the insights into their correct business model that you get than about a particular number of times or whether you've changed the business model or not. And the second thing is that there maybe some industry differences where particularly for software and Internet firms, where uncertainty is higher than there maybe more benefit from these changes. So, those are the quick findings that I wanted to leave you with. These are some of the early results. There is a lot more in the report, that's available for download and a lot more that we'll be looking at is as the research group continues with this going forward.

So, I'm going to turn it back over to Heidi. Thank you very much. I encourage you all to look at the report, it's absolutely fascinating. I mean, really, really amazing stuff here. So, I think what we're going to try to do now is put a personal face on the idea of Stanford and entrepreneurship and entrepreneurial alumni. And if I can ask our alumni guests to come up and join me here. And I think what we're going to do is we're going to try -- take a while to run through some questions that I get to ask first, because I'm up here and you're not. And then you guys can chime in with some questions before we run out of time at 5:30. So, what I thought we'd first do is, I'd like each of you to introduce yourselves, so. My name is Kit Rodgers and I am a graduate class of 1996 in product design.

Anybody study product design? Oh, my gosh, all cs -- okay. So I studied product design and came here being pre-med actually I think -- who here at least came being pre-med at least? Alright, a few. So, did that, was a walk on, on the football team, had never played football before, so that was kind of an interesting experience. And because of that entrepreneurial experience, which resulted in a lot of bruises and late nights, Tom Byers recruited me into what became the Mayfield Fellows Program and I ended up being in the first year of the Mayfield Fellows Program. I studied engineering management for my graduate degree, which was part of the industrial engineering department. And now a veteran of four start-up companies after graduating from there. Fantastic. Well, I also came here looking to be pre-med studied human biology for two years and then dropped out to start a biotechnology company, Stem Cell Theranostics. In the process have also founded an industry specific vertical within StartX called StartX Med to support other medical innovators coming out of Stanford. That's way more impressive than me.

I came, starting to think I was going to be in computer science then it turns out I was computer science. So, I'm also not super creative. I didn't pivot. I was class of '04 undergrad, '05 co-term. I also did walk on to the crew team, having never rowed in my life before. That was interesting and less than -- fewer bruises and more sore muscles maybe, but it worked out pretty well. Joined the Mayfield Fellows Program in '04, so Tom and Tina got me too. One of the better things I think I did at Stanford. And then actually stayed with my Mayfield internship full time after school for a while at Fortify. Worked at Microsoft for a couple of years then started a company with another Stanford CS grad and Mayfield Fellow Clara.

And we now run that company and with the generous help of Roelof's bank account. Thanks, Steve. Roelof? I am Roelof Botha. I'm originally from South Africa. I came to Stanford in 1998 to go to the business school and was attracted to come to Silicon Valley because of the promise of entrepreneurship. Living very far away from here, it seemed an incredible place of innovation and sort of a willingness to experiment and take on the world. Before graduating in 2000, actually then drop out, but I joined a little company at the time called PayPal, which was down the street at -- in the university avenue. Actually in the same office that Google had on University Avenue and I worked for them part time for one semester, before I joined full time and I eventually became the CFO to take the company public in 2002. And after that I joined Sequoia Capital, where I've been since the beginning of 2003. Invested in a couple of companies that include YouTube, Square, Evernote, couple of companies like that.

When I checked earlier today half the companies that I'm involved with have Stanford founders. And I've spend a lot of time coming back to Stanford University and certainly I've lived firsthand a lot of observations from the report in terms of the -- this part of positive feedback cycle and loop between industry, faculty and students. And I certainly attended this class just over 10 years ago myself. Great. Thank you. And I do want to state for the record that I also was a Stanford undergrad class of '80. I got my degree in creative writing. And then I went out into the workforce and I discovered that creative writing degrees were not super highly valued. But Tandem Computers was just getting off the ground and they needed someone to write their company newspaper and I only bring this up, because I want all of you who are getting English degrees or writing degrees understand that it really does have value when you get out there in the real world and you have to communicate. And when people say to you, what's been one of your most valuable skills from Stanford, I got to tell you writing and communicating has been tremendously valuable to me.

So, I did come back and get an MBA and started a company right out of business school with my brother who was a computer science guy, although from Cal. But that's okay. Somebody has to hire them. No, god. I shouldn't say that, I know I get in trouble. So, moving right along, Chuck mentioned that approximately 25% of the technical innovators said that they took an entrepreneurship course at Stanford. So, I'm just wondering if any of you, did you take entrepreneurial courses at Stanford and how do you think that influenced you in your entrepreneurial endeavors after that? And I'm just going through, I'm opening any one of you want to say something, anybody you want to tag on go knock yourself out. Sure, I'll start. I did -- I took this class, as much as that counts as an entrepreneur class, certainly entrepreneur focused. And I did Mayfield fellows and that was it.

But Mayfield fellow was three classes really and that was huge, that was probably one of the more formative experiences to me, both at Stanford and as a founder. We go back to that today, I was telling somebody earlier, I think John as we walked in, probably half of my best friends from college are from the Mayfield Program, in addition to my co-founder, four or five people at the company and most people who I turn to for support. Any of you taken any classes, share with Mayfield. -- fellow, also

before it was called Mayfield Fellows and very close with my classmates there as well. So that actually very much did expose me to the world of entrepreneurship. Before that I'm not sure I could have spelt it. Still I have trouble with it honestly. And it was a really great experience before that I would have become a doctor. And that would have been -- but I'm kind of opened a whole new world up to me and after that just have been four start-ups in a row, as I mentioned. So for me that was the one class.

Not sure there were a lot of other classes back in the mid 90s about entrepreneurship. Maybe there were one or two, but it's not like it is now. Of course, campus reputation today is huge as an epicenter of entrepreneurship. And the study also indicated that 55% of the respondents who became entrepreneurs in the last decade chose Stanford in part because of its entrepreneurial environment. For each of you, why Stanford? Did that have anything to do with why you chose to come here? I think in my case it was -- as I mentioned earlier, it was a huge deciding factor and I didn't really understand what it meant to be here. I'd never been in the United States before I arrived in August of '98 to come here, but it was a huge variable on my decision making. It's actually interesting, one of the things in the report shows that the percentage of people who o Stanford for entrepreneurship is increasing all over time. And that to me is sort of very interesting -- you get this self-reinforcing effect of the faculty that's here is entrepreneurially minded or interested in collaboration with industry. The students who come self-select and are selected for those attributes and then this whole environment, whether it's the classes, the people you get to meet and guest lecturers, your fellow students all just creates this infectious environment. And of course that's mirrored in the amount of concentration of venture capital also being invested in this area.

So it's a very virtuous cycle. Yes. Anyone else about Stanford and other choices? Why you did or didn't come to here? Absolutely. I chose Stanford because of its entrepreneurial environment. I think when I applied to Stanford I didn't really know what entrepreneurship meant, but I think its embodied like it was mentioned earlier, in all the students, in all the faculty members and to me it kind of means the sense of being open minded and this almost infectious personality type of people that just aren't afraid to take risks. So, definitely drew me to Stanford. In my particular case, it had nothing to do with it actually. I just kind of stumbled in here. The reason I came here three generations of my family went to Cal and so I was contrarian anyway and the vision one sports and great academics was something I was interested in. So, I came and I think the entrepreneurial environment maybe wasn't as well articulated back then as it is now.

But you just kind of get swept up and you kind of stumble from a pre-med class to product design to starting companies. And it was just the environment that enabled that to happen. It was not a conscious decision in my case. There is an important variable which I haven't been able to find in the report yet, which I think explains why lot of other people are here too and explains the success of Stanford, which is the weather. Yeah. So, the funny thing was I chose Stanford over MIT, and I was computer science and I went to do that and it was the two options and I kind of over-generalized probably, but thought of MIT as a research institution and Stanford as a business institution, because it was the dotcom bubble when I was making my decision and there's all these kind of guys and gals at Stanford that are in the front page of every magazine and paper launching these giant companies that are worth billions of dollars overnight and they're being very successful. But then this really cool technology, that was kind of cutting edge. And then MIT was always in the paper for Media Lab and like crazy stuff that wasn't going to see the light of day for a while, but was going to be very fundamental. I went and visited both, and the funny thing was MIT had much better weather during admit weekend. Great day in Boston and it was terrible and rainy here the whole admit weekend. But I came in here specifically because of the business and I think the thing that to me it wasn't -- I didn't call entrepreneurship or understand what it was at the time, but it was very much about the kind of generalist attitude of people at Stanford that was -- I'm going to go do lots of different things.

There were a ton of people who did really crazy academics and played sports, which I thought was really interesting. There was a ton of people who did a bunch of research and seem to actually be having a really good time in addition to working really hard. And so to me it was actually the fact that people did a lot of mixed discipline stuff. I was really jealous that the d.school started the year I left and not at the beginning of it, because I thought that was one of the kind of best examples of interdisciplinary studies that we've done in a real kind of like way. We might come back and touch on the interdisciplinary stuff in a little bit as well because I do think that's an important part of Stanford and the Stanford experience. So going back to entrepreneurship and entrepreneurial studying specifically and entrepreneurs, when I was here as a business school student in the '80s and my brother -- actually he hired me, I will state that for the record, because he will probably watch or he'll -- someone will tell him to watch this, and I will get in trouble. So he hired me in spite of my MBA from Stanford which he felt had no value in terms of what we were doing, but then my first act was to talk him into letting me co-founded as the CEO. So I will just let you be the judge of the value of that degree. But anyway back then, I remember specifically a classmate of mine saying to me I cannot believe you just spend all this time and money to get a Stanford MBA and you're going to throw it away by going to a startup and working with your brother for no money. So -- and I remember at the time it was very unusual.

I think one of the interesting things about being on campus today is when you walk into a classroom and you say who wants to be an entrepreneur? Everyone wants to be an entrepreneur and I know in my time as an educator here, sometimes people are just dying to be entrepreneurs, but they will admit that they don't really know what they want to do. They are just so

excited about being an entrepreneur, they want to be an entrepreneur. The point of this is, so we have a lot of entrepreneurship education, but probably everybody is not going to start their own companies. So what advice do you have for students in terms of what is the value of entrepreneurship education whether or not you're going to be an entrepreneur and how should you go about navigating what you think you ought to be doing? Roelof? I'll have a first stab at that, because it's something we've thought about a lot at Sequoia it's just -- the number of -- entrepreneurship is not synonymous with being a founder. And there's a pioneering spirit, an entrepreneurship spirit that pervades Stanford and I think a lot of the people who have that entrepreneurial drive go be employee number 5 or 50 at a great company and live out that entrepreneurship spirit, that willingness to take on challenges to question the conventional wisdom and then confuse that with necessarily starting your own company. Because if you don't have that right idea, then you shouldn't start it. If you're asking people for permission whether or not you should start a company, then you don't have the right idea yet. So be patient and join another company first. And to me at least if you look at the people that have spun out of PayPal over the years, many of them have subsequently become founders, but they weren't founders of PayPal. So the LinkedIn founders, the Yelp founders, the YouTube founders, they were all -- Yammer founders they were all at PayPal, but none of them were the founders of PayPal.

But they learned a lot, they clearly had entrepreneurial spirit and they took that to subsequently start companies. As any of you -- as you look to also hire and bring people on to your teams, do you think about entrepreneurial education or how do you look for that entrepreneurial spirit? We definitely look for it. And I can't honestly say that I think we're very good at judging it. We talk about it, we think about it, but it's not like we have a secret question that we ask. But I mean I think to your last point you don't have to be a founder to be an entrepreneur. And I'd say part -- most of our company, all of our company at this point, about 100 people, are entrepreneurs in the risks that they take and the way that they -- I forget Tom and Tina please don't come up and hit me with a ruler, but I forget the definition of entrepreneurship from Mayfield but it has something to do with basically doing extraordinary things within incredibly constraint resources. And when you think about startups, everybody in a startup has to do that for you to be successful. I think the most interesting question that I've heard people ask that I've kind of stolen has been 'why are you doing this?' like if you could kind of fast-forward, because a lot of people got -- I've seen get into that entrepreneurship because they see the big rewards and they see Kevin Systrom from Instagram, right. Like it's a great story, right, and Kevin's company was on Stanford and got acquired for this big thing, and people are like 'I want to go start a company because I want to be like that.' And it was an interesting question I've heard and some of our early employees asked Clara and I this, I thought it was really cool 'why are you guys doing this? Like what if you sold the company tomorrow, what would you do?' And the answer for both of us was 'start another company'. Right? Or keep doing this thing and kind of we'd take a week off and go and have a nice vacation and then work harder.

And it wasn't about 'oh yeah that'd be great, we'd be done and we're successful' it was kind of like 'we're doing it because this is fun.' If you didn't sell it, do you care? I mean, yes. But it's really about -- building a company to cool. Exactly. No, we care about, but it's not in place of cool. No, I think in my current company, I've been there for 9.5 years and we were acquired last year and all of us were still at the company. So we did it because it was the right business move at the time, it gave us the right platform to grow the business in a way that we needed to scale it and we weren't going to be able to do that on our own. But we're all still there and all intend to be there for a long time. So -- and we're growing like crazy now and as we bring people in, we're asking about attributes, like can you build the business inside of this framework and how do you be entrepreneurial within this framework and that type of thing. So it does bleed into our way of thinking as we're designing new products and bringing into market for sure. I think one of things we've talked about a lot certainly in our classes and I think we've seen the evidence of this is, any time an entrepreneur is financially motivated to be an entrepreneur, it's sort of a failing proposition, not that you can't think that if there is a pot of gold at the end of the rainbow, that's nice.

But anybody who is motivated, that that's their goal. In my experience, at least I've seen them fail over and over and over again because you just don't have the fortitude to stick through the difficult times and the reality is that, while we like to read about Instagram or whatever, I tell my students yeah and every week someone wins a lottery too, but that's not necessarily you, so -- but what's interesting also in this study, goes into this is there are a number of entrepreneurs who set out and build things never intending to make money and that would be the social entrepreneurs. The study, survey stated that some 30,000 nonprofits have been created by Stanford alumni. I'm just wondering whether any of you have had experience with those folks, have you done anything like that, do you think it's unique to the Stanford culture, do you think it's part of a move, I mean, what's going on with that? Yeah, so I'm involved with StartX which is a great nonprofit organization. And I think it -- the nonprofit organization mentality is really reflected in the Stanford community and that it's all about how can we help each other to move forward. And it isn't really kind of a selfish, what's in it for me. It's very much a pay-it-forward mentality, which I think is embodied by almost every single Stanford student that's here. Are any of you involved either at the board level or otherwise with some of these nonprofit? Yeah, I sat on the board of a couple of nonprofits in the area and have several friends who have started socially oriented companies and end up giving a lot of my money for those types of endeavors and drive an electric car and all that stuff. So when you're in this area, you kind of do it, I think, and it just becomes a part of your ethos. And when you are successful, you want to give back and do some things that are going to change the world in that way.

Yeah, I'm not sure 30,000 is a staggering number, I mean, that's really, really impressive. And I guess I'm not surprised.

Yeah. I know that I tell -- and I coach a lot of, particularly women, in terms of a learning entrepreneurship, learning corporate governance and one of the things that I encourage them to do is get involved with social entrepreneurship, get involved with that particularly at the Board level for a lot of these things to go in and roll up their sleeves and do something because you really learn a lot as well about interpersonal dynamics and all of the attributes of the startup, I think and even more so because certain avenues are -- in a way certain avenues are not available to you in terms of traditional financing and all of that. But in other ways I think certain avenues are opened to you and in ways that are very different and I think it's been a really great experience, I know it has been for me. Yeah, I think this region is a lot more accommodating for those types of startups than maybe some other places on the planet. So we're in a good place for all kinds of startups I think. So talking about this region, should Stanford do more for this region. Is there something Stanford should do as a member of the greater community here that it's currently not doing? Any ideas? So I'll start first, and I don't know -- this maybe a controversial answer or not. I'm actually a really firm believer in kind of focus and dedication to a single mission.

And so I would actually argue that no, Stanford is doing exactly what it should do, and it should focus entirely on building great people around it and not mix the rest of the kind of whether it's nonprofit work or community service work. Like let the people who are really good at that do that work and Stanford is really good at educating really bright students. So I would say no, it's actually really double down at mission. Good point. I would like them to allow dogs back at The Dish, but other than that they're doing a good job. And maybe take out a couple of the stop signs. Yeah. Yeah and more parking. Yes. Okay.

We're done, though. That's it. That's an interesting question, I mean, has Stanford benefited more from the businesses that have been started in the area or is it the other way around? I mean, it's a pretty synergistic situation obviously and difficult to be replicated anywhere else I think. It's an interesting question, what more could Stanford do? I mean one of the things Stanford does a great job of for example is allowing professors to break away from their professorship. They discover a cool technology and then go start a company and then come back and so that -- facilitating that kind of a thing is really, really cool. And I'm not sure if that's done other places or not, but I know a couple of examples here where that's been done. I think the other thing Stanford does and certainly I and Robbie and there's a number of us who are like this is Stanford welcomes people from the technical and entrepreneurial community to come back and play a role in the education here. And I know whether it's a more formal level like we do where we actually teach a whole quarter of a course or whether it's coming and doing BBLs or whatever it is, I think Stanford has been very open and welcoming. And I certainly always encourage alumni to come back and frankly I think because it's very energizing both for the alumni and the students, but I think it's something that I hope Stanford will continue to do is encourage people to come onboard here. So I certainly know, I've traveled around and being from Silicon Valley, I've been to Silicon Valley, Silicon Alley, Silicon Fjord, Silicon Prairie and certainly also Stanford has a number of relationships with important other educational institutions around the world where they're really trying to learn the best practices not only of our entrepreneurial education, but of the ecosystem that makes it work, the Stanford ecosystem.

And I think it's one other things it's very hard to capture, what you all think about broader than just Stanford, but the ecosystem in which Stanford plays a role here and if you would give advice to anywhere else, are there things that can be duplicated, are there things that can be not duplicated? If you were sitting some -- in Silicon Fjord, what would you do to bring what Stanford has to those places? I've certainly thought about this a lot and I get asked this question when I go back to South Africa when people look at the success that we've had here. And I think one of the first things I would tell them is think about it the same way you think about building a company, which is you have to start small and you have to start iterating. Because the truth is what we all benefit from today took a century to build. If you go back and lot of this is captured in the report, one of the first companies in and around this area was Federal Telegraph and Professor Terman who had a huge influence on Stanford's collaboration with industry worked there for a while before he became a Professor of Engineering. And then he taught Hewlett and Packard and a bunch of other very well-known industrialists. He funded some of them. Those companies then spawned successive companies. And then you have this whole phenomenon in the economic school clustering that's taken place in the Bay Area where you have not only the research institutions, Stanford giving rise to these wonderful innovations that can help spawn companies. But you have a whole ecosystem of the sort of people who go work there not just the Stanford professor or student who start something, but all the other people that can make it happen, whether it's financing or landlords that understand how to work with startups, or lawyers who understand to work with startups and you get a whole ecosystem developing and you can't transplant that. It's the same reason you can't just transplant fashion from Milan and plunk it down somewhere else in the world, or diamond cutting in Belgium or whatever the case is.

So if you want to replicate what is here, you have to very patiently start to build, and you need to create the right foundations, and including things like protection of intellectual property, very clean and efficient bankruptcy system and these are all things that are taken for granted when you live in a place like this and they're all necessary institutions for you to encourage the formation of new ventures. So I think it can be done. And a long time ago, Fleet Street in London or Savile Row were the top of the industries in print and fashion or suit-making and those have gone by the wayside as other people have innovated. So it can be done, but you have got to be patient, and you really have to make sure you get all the pieces necessary. I mean there's a sense here that you can fail and that's okay also and that is not shared in other parts of the planet. I mean, personal bankruptcy or company fails, I mean, in a lot of other cultures it's difficult to get back up from that and even

get a decent job at a big company after that. Whereas here, I mean, we may have a huge number of successful startups, we also have a huge number of failures probably more than most places. So, yeah, not you guys at Sequoia but -- that's right, yeah. But I think that's part of it as well, so there is an attitude about starting companies and maybe succeeding and maybe missing. The thing that I wanted about is can you replicate that? Because there was something very unique about the West in the late 19th Century about being a pioneer, it was a new place, it was a very nondenominational eco access and it's -- it really was a meritocracy.

I mean, I'm sure it wasn't perfect meritocracy, but where in the world could you find a better meritocracy and you look around the world and can you replicate that somewhere else? So there is a former Stanford Professor Paul Romer, who has been on an endeavor to both Charter Cities. I don't know how many of you're familiar with his plans for this and that to me in a way is actually one of the most interesting ideas of replicating what Silicon Valley has because it takes -- it gives you an opportunity to take a piece of land and really start with the clean slate. And maybe that gives you the opportunity to engender that kind of culture, but I think in many parts of world failure is such a burden on the individual that they wouldn't risk building a company. I wonder, I mean, I certainly know there has been successes of, if you will, colonizing entrepreneurship and I certainly know of a number of success stories in the '90s and 2000s of students coming here and seeing something like an eBay take off and say we're going to be the eBay of name your country, go there and do it and have tremendous successes. I'm very curious, the study, if the company was founded outside the U.S. but by a Stanford student were you -- did you capture that? Yeah. Okay. And what percent of the total revenue, I know it's not fair to really ask this, but I presume there is actually a significant amount of activity outside the U.S. by Stanford students. Yeah, we didn't calculate it. We do look into the effect of immigrants sitting.....

Right.on the course over the years. The number of immigrants getting into Stanford has been increasing over the decades and then the percent, about 15% wind up staying in the Bay Area. But you're right I don't have the number off the top of my head, but we could get back and calculate. I mean, the interesting question is anecdotally I at least know of a number of students who understood that coming here, learning the best practices and seeing what was generating escape velocity out in the marketplace, going back and doing it back in their own home territory, created some generous future donors for the university, I hope, right, created some great companies out there That's right. So an interesting question. Yeah, Heidi, some of the big new Chinese companies would be in the survey, and they were started by Stanford graduates. Right, right. That would be really interesting to know.

Just another little context about the size, I didn't mention it earlier, but the \$2.7 trillion -- \$2.7 trillion is half the GDP of China. Revenues and GDP aren't the same thing, but it gives you a context of how big that really is. Yeah, it's a big -- it was the -- it would be the 10th largest economy 10th largest economy. in the world, if it were. That's right. Stanford, the country of Stanford. There is a thought for you, it's fast, I mean, it's huge. It's huge, yeah.

So back to multidisciplinary, I want to touch on that before we go on. For me as a Creative Writing Major, my multidisciplinary endeavor undergrad was I took CS 106. And I grad -- and I passed. And I used punch cards, but maybe I shouldn't say that; last class to use punch cards, so I probably shouldn't say that. But anyway we talked about a little bit interdisciplinary and going and doing something different from your core area of focus. I love to hear from each of you or any of you, what was your most -- what do you remember as your best interdisciplinary experience? I guess, I will start. So at this -- I think the Stanford School of Medicine does a fantastic job of this. It's literally mixing like surgery with computer science, with mechanical engineering. I worked at the Stem Cell Institute for two years doing research. I think our most important breakthroughs and technological advancements were literally from other professors, from other departments coming in and saying hey, have you guys ever thought of attaching electrodes to those cells or have you ever thought about passing a current through something? And these are just things that I feel like individuals are so siloed in their own particular research areas that in any other institution, if you didn't have that kind of crosspollination of ideas and that constant dialog between people, you just wouldn't get those advancements.

And, it's physically obvious when you come here. Now, we were commenting before we came in. The buildings that are here that weren't here even 10 years ago and they're all right next to each other and they're physically facilitating cross-pollination between the different departments is amazing. I studied product design which is a hybrid of mechanical engineering and art design. And, at the time that was a really big deal and now it's those types of people working with people in the med school, working with people in the EE department. It's really fantastic. I think a lot of new businesses are going to come out of those types of opportunities as opposed to the more traditional siloed EE situation or CS-only situation; it's pretty exciting. Given the rigor of technical undergrads, I mean, did any of you really go off the grid? I mean, dance class, archeology, touchy-feely.....? I took a -- I took Poli Sci -- at the time Poli Sci 138. It was like national security strategy. But we literally spent the time doing three-days simulations of UN negotiations, totally unrelated.....

Not quite salsa, but..... It wasn't quite salsa. I'm really uncoordinated so salsa would have been bad for everybody. Heidi Roizen Yes. I was in a band, which is a little unusual here so that was fun. Yeah. Roelof? Answer the question elliptically with

another example? Sure. So, as I was at the business school, we were isolated across the street. It was a little harder to get access to the rest of campus. But, one of the companies we bagged was with a Stanford graduate who got a PhD in Electrical Engineering, undergrad in Physics, who -- Izash Kanazi, and his sister had a child that was born with a disease that killed the baby within a week of birth, in 2002.

And, he came back to Stanford as an Associate Professor and he spent over a year reading all the biology and genomics books that he could, access to faculty, and he used that cross-pollination of his EE training to solve problems in biology that the biologists and geneticists didn't have the insight for. And, today he has this company that enables thousands of people to have healthy babies every year. That to me is a fantastic example of cross-pollinating disciplines to come up with breakthrough innovation. I have to say from teaching here one of the things I love about the course that I teach, and I know this is true in many other places, is that will have freshmen with CS grad students with Sloan Fellows, all in the same room, talking about things. I really feel it's interesting because, when the freshmen come into the class, there is a natural inclination to look at the guy next to you, who is twice your age and think oh, my God, I'm at a super-disadvantage here because this person has more experience. And, then it turns out that the dialogue is really amazing. And so, I feel like there is also that opportunity to cross-pollinate people from literally different generations at Stanford to be able to do things that are really interesting. I think it's one of the great things we have going for us here. So, last question for me and then I'll love to open it up to the audience. There has been a great debate today about whether the whole higher education system is even relevant, appropriate, state-of-the-art.

Stanford is, of course, leading the way with a tremendous amount of online education, certainly a former key PayPal executive who might remain nameless has been talking about the fact that higher education might be obsolete and maybe you should all just save your money and not stay in school. That's the extreme view of that. But, it is a question. As I have students -- the pull of Silicon Valley, the pull to go -- stop out, take time off or take time -- leave and who knows when you're going to come back and there are students who say to me, well, you know that's what Bill Gates did and that's what Steve Jobs did and that's what Mark Zuckerberg did and so. And, once again I have to say, well, the chance you're going to be one of them is small, but anyway, the point being there is a lot of attraction to go out. There is a lot of opportunity for Stanford students to stop studying and go, do something else. How do you feel about that? What would you counsel someone who is a student here, stay in school, do that? What would you do today and what would you recommend our students do? So, how different is that than an athlete getting the same opportunity? It's similar I think it's -- for the right opportunity, it can definitely be worth it. So, I don't think I would be one to say stay in school no matter what and Stanford has very liberal policies about such things. So that's nice in and of itself. You have to be really passionate and really good at something in order for that path to make sense in my mind.

You have to be a bit of a savant in a certain area or really exceptionally skilled in a particular technical area for that to make sense. For me, I know I needed as much time as I could stay here to figure it out and I was here six years, counting the co-term and a seventh probably would have done me some good. So, it was good to be here as long as I could at the time but that was my pace so. I'm obviously a little biased because I did stop out of school after the first two years. I do agree that unless there is a right opportunity and something you're really passionate about and something that, if you're sitting in a classroom, all you'd be thinking about is I want to get back to that project, probably not worth it. But, I will say at least in my own experience, it's been an incredible set of other skills that I've learned outside of the classroom that I think are invaluable. And, again, Stanford does have really liberal policies on coming back to school. So, if the right opportunity presents itself, it's definitely worth -- if you're willing to take that risk and dive in -- definitely worth it. I think that's right. I've had a couple of people ask me this about 'should I step out and do this?' and my answer has always been I'm going to tell you 'no, you shouldn't' and you turn around and say 'I'm doing it anyways' then you're probably the right candidate to do this, right, which is like -- I think if it's the right opportunity you're going to be so into it and so headstrong that somebody telling you not to do it actually doesn't matter.

And so, on the flipside if you're like maybe I should, maybe I shouldn't and some random guy like me says don't do it and you don't, probably good you didn't. Any.....? Well I think -- and I've met many of the companies that are endeavoring to upend into the education system and, familiar with Khan Academy and love what they've enabled in terms of providing that sort of education at your fingertips. Again, having grown up in a country very far from here, it's wonderful to sit in Cape Town and be able to observe the lectures and learn from the best minds in the world in whatever you're chosen discipline is. And, I'm sure there are some changes that should be made at the margin with your standard curriculum and course of education because if you go back to the Renaissance, the teaching was essentially the same with -- literally, if you see pictures of what lectures looked like 400 years ago, 300 years ago, they haven't really changed. Clearly, there's an opportunity to incorporate technology to make it different. But, I'd argue the biggest opportunity is post leaving a university. It's the continuing education where I think is probably the biggest opportunity because so many people stop learning when they're 22 or 23 and they graduate. And that's terrible when you think about your whole lifetime and people just get stunted. And, I certainly got a lot of satisfaction out of taking one of the computer science classes that were offered through Stanford last year, Machine Learning class. So, I had a blast taking the course and programming again.

It was just fun to be able to test your limits. And, I wonder whether that's the real opportunity long term. I think the other

subtle thing that often gets missed when you just look at could you learn faster, could we all be in an accelerated program, skip summers and just blast through your curriculum as quickly as you can, but what about all those other social things that you learn along the way? Your ability to relate to others, your ability to work in a group as a team, to assume leadership, to be led, to negotiate with others because those are the sort of interpersonal skills that are hugely important to your success down the road. You're a business school student as well and the classes that have stuck with me the most, a decade later, have been the softer classes, things around leadership and human resource management and motivation, very subtle things around how to get the most out of people. I think to follow on, on that I think entrepreneurship is a team sport for the most part. And, if you look at the founding teams, the particularly successful ones, very often they met at Stanford or met at their places of education. If you hadn't been in the room with the other person all that -- all those times, would you have started a company with them? And, I think it is one of the interesting things I hear from the online entrepreneurs is how do I meet my founding team members because they don't have that experience. So, I think it's fantastic what Stanford is doing and the innovation that Stanford is trying to progress and doing it so much of it at no cost to the greater and to the world community and it's a really incredible thing. But, I would argue that, for students -- this is my stay-in-school-kids message. But, my argument is I think Stanford is really intelligent.

They have a very lenient stopping out thing. But, there is a point at which you've stopped out too long and you can't -- and you just can't do it anymore. So, I would just encourage people that I think that the connections that you make here, the relationships that you build here, the type of learning that happens and I do believe the degree has value in many other ways as well. I know for me I got tired of undergrad, and then I left, and then I came back to go to business school, and I really appreciated classes more when I was a business school student. So, I do think coming and going is a good thing. But, I would encourage you to come back. The other thing I think that is different today than certainly was when I was a student is, if you're an entrepreneur, you can almost get your entire degree done and focus on your company at the same time by taking all the courses in which you can explore things that are important to your company. And, I see a lot of students doing that where they literally line up their courses and say, okay, I'm going to do my marketing in this class and I'm going to do my development in this class and I'm going to write my business plan here and it's fascinating what you can do with Stanford and what they have to offer today. So, anyway, I'm going to open it up. We have about 10 minutes for questions.

And, yes, please go ahead. Hi. My question is a tangent off your last question, Heidi, about the 20 Under 20 program. I myself study Computer Science here and I had a -- one entrepreneurial experience of financing real estate. I'm also one of mentors -- fortunate enough to be one of the mentors of the Thiel Foundation's 20 under 20 program. My question is dual. One is entrepreneurship something learned or most of the reason someone is an entrepreneur is what they come with in the world? That's one question. And, second -- and I'm sure but not much. And, the second question I have is, with respect to Silicon Valley, obviously, there are a lot of things going on for us here including organic right? Wondering if wanted to replicate that in other parts of the U.S., what do you think are some of the considerations you need to... ? Entrepreneurs, can it be taught? It can't be taught.

That's an interesting question. I think for a lot of people that end up coming here and I'll just speak about my particular case. I hardly knew what it was when I got here so for me being exposed to entrepreneurship and people starting companies and doing all this neat stuff was the first thing. And so, whether that existed somewhere deep down that I didn't know about beforehand and then was just revealed because I was in this environment, I think is the -- my particular situation. The -- I am one of the lieutenants in my current company, I'm not the actual founder. And, the actual founder of the company is a brilliant technologist who's a little different than a lot of us and certainly different than me and he's special. And I think there is an innate thing in a lot of people that allows them to start a company when it's very challenging to make a living doing that and we, as a company, have had our backs against the wall a number of different times and then been successful coming out of that. So, for me I wasn't the entrepreneur but part of a founding team and a very early employee was kind of more the role that made sense for me. It's something that only would have been unveiled had I been in a place like this, so. I think to Kit's point, like you can teach a lot of the skills so you can go learn finance or you can learn marketing or hiring, whatever it is.

I do think there's something a little bit different. There is actually a really interesting book written by a Hopkins Med School prof. called *The Hypomaniac Edge: The Link Between (A Little) Craziiness and (A Lot of) Success in America*. And, the argument basically goes that entrepreneurs are -- there's a high correlation between the way entrepreneurs describe themselves and the way that hypomanics describe themselves. And, hypomania is basically a reduced version of manic depressive disorder. It's a really interesting study. But it basically says it's things like the ability to operate on very little sleep and lots of energy and the ability to consistently be told no and not believe that you're wrong, which by the way could be a really good or a really bad thing. But, there's a certain set of skills that you would associate with entrepreneurs and this category of being special, as Kit gently put it -- most people just call it crazy -- that I don't know that you can teach. So, I think there's some qualities that are very inherent and just you either have them or you don't and it's not a good or bad, it's just different. And there is a bunch of things you can very much learn about it.

Yeah you can teach frameworks, you can teach methodologies, you can look at case studies, see how other people have

done things but when it comes time to actually making your own company, you almost forget all of that. It's all in the moment. It's all about, like, how passionate you are. You'll have 30 people telling you, you can't do it but you're still going to push through. And, I think at that point pattern recognition becomes important, like, look, I've seen -- I've read case studies or I've seen other people hit these same roadblocks so I kind of know what not to do but, like, there is no book on how to make every single decision and how to go and when -- once you've made the decision to start a company, like, what is the step-by-step on how to make it successful. But, there are a lot of great entrepreneurs out there who I'm sure are not in places in the world where they have the ability to go out and start a company. The best pianist in the world may never have seen a piano, right? So -- who just has that innate capability inside of them. So, making sure that you're getting exposed to and aware of the ability to start a business, that's an important first step obviously. It's actually -- coming here I was just thinking about this, I don't know if they still do it. When I got my acceptance letter at Stanford, it came in this folder and the front was printed something along the lines of 'for all the nights you stayed up late to get something done, for all the nights you didn't go out with your friends to finish -- to go the extra mile on that project, blah, blah, blah'.

Like, all these traits they consider special in Stanford students. I still have this folder today. I read it and I was like, wow! Like, there was something inside of me that was, like, wow, that's really cool. It's very similar to a lot of the traits, I think, you'd consider inherent in entrepreneurs, which is maybe exactly your point with this study. There's something special about the way that Stanford chooses people or trains people. I think the other thing is why we are all here is because I've heard time and time again from students; they say, I wasn't sure I could do it and then I came and then I met and I listened to someone at ETL or in another class and they talked about their failures and they sounded sort of like I think of myself and then they went off and were successful. And so, I think a lot of times it is back to that pattern recognition. If you know that someone else who sounds like you did, did it, it gives you that moment to keep going and to do it. I want to say before we run out of time that you can find the study at bit.ly/stanfordinnovationstudy and I suspect if you search for it, you'll probably find it too. But -- yeah.

So, I think we have time for one or two more question. So, yeah? Yes. I have a question for Roelof about the Silicon Valley ecosystem. It seems like there is a tremendous amount of money from the venture community going into software startups and not that much into hardware anymore and then -- are you guys going to lose the hardware design DNA if that trend continues? It's a very strong risk that it'll lose it. I mean I'm involved with a hardware company, Jawbone, makes the Jambox speaker and a noise canceling headsets and they really struggled to find manufacturing talent because so much of that has left the Bay Area. So, I think the best hope that it'll stick around if -- there are a couple of people that have written about some of the hardware companies that are now innovating around the Bay Area, the core accessory companies, companies that are building hardware that accompanies a piece of software on your smartphone to help it do what it does. I think that's the best chance we have of some interesting hardware companies around here. One more question. Let's go right -- yes. Yes, you.

So, in the Stanford community there are a lot highly technically skilled innovators or people who are taking their research and making companies out of it. But then there are other people in other places in the world that might not even have a policy doing that, that are starting up businesses. I mean you guys start more business, clothing lines, bike shops, things like that. So I guess how do you find the balance between those two extremes? If you have a product in mind, how far do you try to innovate it in your head and try to be creative about it before you say, ""Oh, I can make a company out of this""? The way that we've done it, you go as fast as you can and go try it in the market, right? And, this is whether you read Eric Ries' The Lean Startup or one of the 37signals guys, Jason Fried or David Heinemeier Hansson once said, if you look back at the product you launched originally and you're not embarrassed, you waited too long to launch it, right? The market is always right. So, I think you go and you try to -- innovating in your head is easy and fun in a way but it doesn't really tell you the truth. It just tells you what you think. So I'd say go do it. And you're right; that's the interesting question about training. There's a lot of people who are entrepreneurs who have no formal training whatsoever. I think you can make it easier or better for you, just...

Stanford and Silicon Valley certainly hasn't cornered the market on entrepreneurship. It's alive and well all over the world. Our society and our cultures were based on it. And, I think we shouldn't -- as well as Stanford has done, let's not lose sight of the fact that competitiveness is global at this point and there is a lots of really exciting things going on, lots of other places by people who have that same attitude about striking out so. We are unfortunately out of time. I want thank our guests. Thank you for coming back to the forum.