Sara Beckman is Earl F. Cheit Faculty Fellow at the Haas School of Business where she designs and delivers courses on design, innovation and product management and a Teaching Professor in the Mechanical Engineering Department in the College of Engineering. Her 25 years of experience teaching design and innovation-related topics at the Haas School of Business culminated in creating a course, Problem Finding, Problem Solving, which draws from design thinking, critical thinking and systems thinking literature. Professor Beckman is the Faculty Director for the Berkeley ExecEd program, Product Management. Sara Beckman discussed design thinking, merging design and product development, creating transformative customer experiences with ExecEd.

ExecEd: Today our podcast is with Dr. Sara Beckman, who is an Earl F. Cheit Faculty Fellow at the UC Berkeley Haas School of Business where she delivers courses on design, innovation, and product management as well as being a teaching professor in mechanical engineering department in the College of Engineering. Sara's twenty five years of experience teaching design, and innovation related topics at the Haas school of business culminated in creating a course problem finding, problem solving, which draws from design thinking, critical thinking, and systems thinking literature.

Dr. Beckman's recent research focuses on the role of learning style diversity on design teams, and on the pedagogy of teaching design. For the past two years she's leveraged her teaching in research experience, and serving as the chief learning officer of the recently founded Jacob's Institute of Design Innovation within the University of California Berkeley's College of Engineering. Sara directs the product management program for UC Berkeley's center for Executive Education, serving three hundred and fifty product managers from around the world each year.

Before joining Berkeley Haas, Sara worked in the Operations Management Services Group at Booz Allen & Hamilton, and ran the change management team at Hewlett Packard. Sara received her BS, MS, and PhD degrees from Stanford University in industrial engineering, and engineering management. Welcome Sara, thanks for joining me today.

Sara Beckman: Thank you Joanne, nice to be here.

ExecEd: We're going to be talking about design thinking, and innovation but I thought before diving right into that topic it might be interesting and really relevant to maybe get a little bit more about you, and your personal sort of journey, or evolution in the world around design thinking. Your education and work has blended the world of industrial engineering, design, and management with the world of business strategy, and business models. How has your background and your personal story played a role in helping you evolve your focus, and your work, and in what you teach?

Sara Beckman: I'm an industrial engineer by training, that's as you suggested what my degrees are in. Industrial engineering is really about optimizing, manufacturing, and operations, optimizing supply chains. When I worked at Hewlett Packard I worked a lot in that space doing supply chain optimization and those kinds of things. We began to realize that in order to be able to make something, it had to be designed so it could be made. People call that design for manufacturing. We started to kind of work our way back into the research and development organization, and try to understand how they were going about developing new products, specifically with that original interest of having them design products that we could more easily manufacture.

Once we got back there we found out that, and this was in the 1980's, we found out that the new product development process wasn't actually being managed in a very efficient fashion. This was back in the days when the RND people would work on a

product until they thought they were finished with it. As you well know today, you have to have it finished by a certain date and time, or ready for the Consumer Electronic Show, or whatever the case might be. We began to say, "Gee, we think we can be helpful in optimizing the process that you use as well." That's kind of how I got backed into new product development.

I ended up working with a bunch of faculty from Universities around the country, MIT, and Harvard, as well as a bunch of companies. We started writing books about how RND, and how new product development could be managed more effectively. That ultimately led to starting a class here on managing the new product development process, which I've taught jointly with Alice Agogino over in mechanical engineering, and the California College of Arts. We had engineering students, design students, and business students all taking an idea through to first pass prototype in the course of a semester. That's kind of how I backed into design and new product development.

Sara Beckman: In 1993 I had an MBA student who had taken my operations class, I was teaching all of that stuff I just talked about, inventory management, and quality management, and all of that. She came to me, she was a fashion designer in New York before she came back to business school. She came to me at the end of the operations class and she said, "Shouldn't design be a part of the MBA curriculum?" I said, "Yeah, why not?" I said, "Why don't you start a course on design?" We started a course called, "Design as a Strategic Business Issue," and we had all these really big named designers, Jerry Hirshberg who ran Nissan Design International, Sara Little Turnbull who's very well known in the design world, Bill Moggridge who co-founded IDO, a whole bunch of really ... Phil Condit who became CEO of Boeing, and they all came in and spoke in this class.

They brought their thirty five millimeter slide trays, and showed visuals of design that they had done in their practices. That's how we got as a business school, we've

been doing design stuff here for a couple of decades actually, well before the whole current fad around design thinking. We've been deeply immersed in how do you manage new product development processes, what role does design have to play in that, how do you do customer focused design, et cetera. That's kind of the evolution to how we ended u where we are today.

ExecEd: It sounds like it was more of an organic sort of evolution, and you know, with help from a very smart MBA student at the time. Was it a concerted effort at that time to start calling it, I mean a lot of people had said David Kelly at IDO kind of coined the phrase, how did it evolve to actually become this thing that we study or that we use and apply in a business called design thinking?

Sara Beckman: Yeah, I mean I think, frankly design thinking was created by IDO and the Stanford D school as a term that encompasses stuff that designers at large have been doing for a very long time. If you go back and you look at, there's various types of design, right? There's industrial design, there's graphic design, there's architecture, there's engineering design. We didn't really talk about business design in those terms, although arguably that's what people did. If you look at ... step back and say, at Haas we talk about problem framing, and problem solving. That these are sort of two distinct activities in which you engage. If you go back in history and you look at things like the quality movement, and Demming, and Crosby, and all of these players in the quality field, they describe being very focused on the customer in order to define the outcomes you want to achieve. They talk about asking why five times to get to root causes or underlying patterns. They talk about generating different ways of solving a problem, and then experimenting with those.

Which is kind of the same thing as design thinking. What's happened with the quality movement, they both grew out of the same fundamental problem framing and solving structure. Quality went off in a direction of minimizing variability, and when you start to try to focus on reducing variability you get away from the

possibility of having many different answers. The design thinking folks said, "Wait a second, in fact maybe it's better to increase variability because we want to have a lot of different options and ways of thinking about solving the problem." They've sort of evolved out of the same, how do we go about ... what is the problem we actually want to solve, and then what are all the different ways we might solve that problem, and then how do we test and figure out if we got that right, if you will.

It grew really out of, what happened is that there was a movement in sort of human computer interaction, and that began to draw from the anthropology and sociology fields to say, "How do we actually go about understanding people, and their interactions with, in this case, computers." That's sort of grown into a broader movement around, "How do we understand interactions between people, and any kind of solution that we might want to put out there. Whether it's a product, or a service, or an experience that we're trying to create." That's sort of the evolution into the so called design thinking space.

ExecEd: Then if I'm hearing correctly, if you were to talk to business leaders today and sort of cut to the chase of what is it that we've learned from technical, and design thinking, what is it that they need to take from that and apply to their own problem solving, or to their businesses? What's at the core. Is it the problem? Is it the target audience? What's the key?

Sara Beckman: I would say there's sort of two ways to answer that question. The first is the way that design thinking is sort of tightly defined, and that is around creating a customer focused organization. There's literature that goes back, in fact I've done research in this space as well. There's literature that goes back that looks at failure modes of new products in the marketplace, and the number one reason for the failure of new products, and this has been true at least as far back as the 1970's if not before, where people have done research actually studying failed, and successful products. The primary failure mode is lack of understanding of customer

and user needs.

This is not a new problem, and arguably we've just never really figured out how you embed customer focus deeply in an organization. Most organizations today make their decisions on the basis of numbers that sometimes have nothing to do with whether or not they're satisfying their customers. How do we increase market share, how do we reduce costs, these are all things that don't have to have a direct link. They might, but they don't have to have a direct link to end customer satisfaction, and therefore on customer loyalty, and therefore ultimately growth of the organization. The number one question is, how do you anchor your organization in doing things to satisfy customers?

The second piece that I think is really important that most design thinking literature doesn't really talk about, is that what is the right frame for this problem I'm trying to solve? How do I get to why so I can be very customer focused, and only understand things like, I'd rather have a pink version of that than a purple vision. That's a very feature focused attitude, if you will. What I really want to get to is what I call meaning based needs, what are the outcomes that customers are trying to achieve, and what's standing in the way of them achieving those outcomes? Huggies Pull Ups came about not because I was re-engineering the tabs on the diapers, but because I understood that parents were nervous about toilet training. They want to be a good parent, and they're not really sure how to attack this first big hurdle that kids go through. That's a meaning based need.

I think the second important thing, again, not called out in the design thinking literature, but is how do I get to that meaning based understanding? The third thing is this notion of getting wide, before getting narrow. Now I've got that frame, parents need help with toilet training, right? What are all the ways that I can help them? Is it a different diaper design? Is it training for parents? Is it a community for parents to ... I can think wide before I narrow in, so that's sort of the third key

precept in the design thinking.

Then the last one is, as you're trying to converge, don't try to do all of it in your own head, take the ideas back out to the community and test, or experiment with them, right? That's one frame for design thinking. The other frame to me or sort of a bigger frame that you can use internal to companies, not just focusing on customers. How do I go about understanding the people who work in the company? How do I go about understanding the partners I have external to the company? You can use all the tools of ethnography to actually understand the human beings you work with, as well as your customers. Inside the company, if I've got a problem to solve, whether or not it has to do with customers, I still want to ask why, I still want to get to the underlying patterns of behavior that are driving that problem to exist.

Diverge, converge, what are all the ways that I might solve this problem, and then experiment. To me this sort of problem framing and solving cycle is valuable not only in interactions with customers, but as a way to frame and as a way to really run an organization. The world is getting more complex, and all of the old mechanistic models that we have of organizational design like command and control, this information flows across the ORG chart in the following ways, right? Those are giving way to what some people call complex adaptive systems. Think about metaphors in biology, well how do I have an organization behave as a complex adaptive system if I don't have this sort of learning cycle going on inside it?

This is what Amy Edmonson talks about in her book on teaming, she talks about teaming is the engine of organizational learning. That cycle, if you will, of deep understanding, asking why, diverging, converging, and experimentation is really the engine of those teams.

ExecEd: I want to focus again, you talked a little bit about ethnography, and understanding your audience, and asking why. My question for you is, consumer

researcher has been out there for a long time, anyone watching Mad Men knows that Don Draper was always thinking about, and Peggy was thinking about, what's the problem, what are they trying to solve to create the advertising? Then you're talking about the way teams are setup. Was there perhaps a bifurcation of how traditional consumer research in RND were done. One was happening, in consumer research advertising was being created with consumer in mind, is it a blurring of the lines of where the research needs to start earlier with the product development?

Sara Beckman: That's a good question. I think we could play out potentially some examples right? If you start with Silicon Valley, and you look at how products have been developed. I'm going to use the word products even though, back up one step on this, right? Pine and Gilmore have written a lot about the experience economy, in which they argue that industry has evolved from extracting commodities, to making goods, to delivering services, to staging customer experiences, as sort of the means by which they're creating and capturing value in the market. They argue that there's another phase, which is guiding customer transformations. My favorite example of that is Con Academy, the organization that puts education online, Sal Con started. He tells this great story about a guy, he had gone to high school, done very badly in high school, and got a college degree in music, played Saxophone for awhile, but said, "You know? I really don't want to do that for a living, I'd rather be a computer programmer, but then I'd need a computer science degree. For that I need math, and I was really bad at math in high school, so what do I do?"

He went on Con Academy and he said, "You know, there isn't a human being in the world I could have paid enough to answer the same question twenty times, but I could watch those Con videos twenty times if that's what it took." He did that, and he learned math, and he got into university, he got a computer science degree, and he works as a ... this notion of guiding transformations is important in the answer to your question. If I'm just making goods, then I could go out and see what kind of

Shampoo should I put in your shower, and should it have the bottom open, or the top open to squirt it out? What's the best way to get the rest of it out of the container? I can do fine doing that, right?

If I'm going to guide a transformation, I have to actually much more deeply understand people in their lives. There's that big picture around your question which is, we've moved away from cranking out things that look the same. If you look at consumer products companies, they have historically been pretty focused on the numbers. They know, take the Huggies example we just talked about. They know how many people buy Huggies, they know if the moms or the dads buy them, they know what sizes they buy. They haven't actually talked with customers, or they had not at the time talked with customers to figure out, "Oh that toilet training thing?" In fact there response to toilet training was, "Oh, that emotional stuff? We don't do that."

In the consumer products world they kind of were stuck in that making goods space. In Silicon Valley, where it was historically been very technology driven. Hewlett Packard for example where I worked, they made oscilloscopes, and Volt Meters, and Signal Analysis Devices, as far as I'm concerned used for door stops, I don't know what you do with any of it. The idea was that they were making instruments that would be used by them. If I'm an engineer in a lab at Hewlett Packard, I make an instrument that the engineer sitting next to me would use. That was called the next bench syndrome, they had somebody sitting. Then when HP started to make printers, or computers, or calculators, that next bench thing didn't work anymore. They had to figure out how you go out and talk to normal people who don't know as much about technology as the people who were designing all of those other devices.

Silicon Valley has historically had very much, what I call, a technology push agenda. There's still some amount of that, right? "Oh, I can do this cool new thing, certainly

somebody will want it," as opposed to, "How do I actually deeply understand the marketplace in a different way and meet the needs of that market?" That's, I think an answer to your question, why things have evolved overtime.

ExecEd: How does that relate to innovation than? Are they one in the same, are you talking about a framework that innovation is about customer centric, or is it about the product?

Sara Beckman: I think that's what we're talking about. I mean, if you look back in time at the percentage of research and development dollars, and how they've been invested, the percent of dollars that were invested in new to the world, or at least new to the company, declined pretty significantly in the sort of 80's, 90's, because there started to be this focus on very fast time to market. I can put something in the market once every three months if I don't make it a very big change in my existing product. As a result we ended up with a lot of companies that weren't designing in the sort of new to the world, new to the industry, or creating new segments. What's happened is that companies are trying to come back up that cycle and figure out how you invest more in that, in that front end. How do I think of new things?

Of course technology is now changing at such a rapid rate that we have to think differently about what we're doing. Take Uber as an interesting example in the transportation industry, and what's happening there. I've got Ford, and Chrysler, and GM, I've got a bunch of big car companies. Certainly somewhere in the depths of their research and development organization they're working on self driving car technologies. What really pushed self driving car technologies forward was Google saying they were interested in playing in that space. Then along comes Uber and they say, "How can we structure the way you get from point A to point B differently?" It's not a taxi, it's not a bus, it's a personal car, so they make a relationship with Carnegie Mellon and they get self driving car technology, now they're flying helicopters to get people to the Sundance Film Festival.

They're breaking a bunch of molds, so we're now at a point where we have to start innovating entire systems, right? Listen, there's a lot of issues with Uber, there's no question, that's important to this conversation as well because we have to decide with these new economic models, who gets the value from them, and how do we deliver value back to the people who have participated in creating that value, et cetera. There's business model innovation that needs to be done about it, but until self driving cars actually could drive, we've sort of pretended like the same old would work. Now all of a sudden all of the car companies have innovation labs in the Bay Area, right? In the last few years they've all moved here because they're trying to access what's Tesla doing? What's Google doing? It's an innovation system that is creating that kind of change.

ExecEd: Interesting too when you talk about Uber, I can think of other examples that relate to what you talked about earlier with the experience. I mean it was innovating and experience, much as say Starbucks. Do we all have to go into Starbucks? Thirty years ago there was no Starbucks, there was no experience for getting your latte.

Sara Beckman: Yeah, in fact Pine and Gilmore use coffee as their examples. We used to have coffee beans, that was the commodity. Then we ground them up and you had Folgers in your cup, that was a good. Then we began to serve it at Denny's, or places that serve coffee. Then Starbucks said, "No, don't just come for the coffee, come to hangout, the third place." That trajectory got followed in the coffee industry and Starbucks clearly was a leader in creating, at least in the U.S., there were coffee shop experiences in other countries. They moved them along that trajectory.

ExecEd: I want to go back to what you were saying just a second ago about the money being invested by the me too's, or the companies that now are trying to get on the same playing field. There's a quote, and I know you've probably heard it,

from Steve Jobs about innovation he says, "It's not about money, it's about the people you have, how you're led, and how much you get it." What does that mean in terms of what we've been talking about?

Sara Beckman: Yeah, people ask a lot about Steve Jobs relative to innovation. You know, I think Steve's, there are multiple ... people also say about Apple that they don't believe in talking to customers, they believe in that old Henry Ford, "If I ask people what they want, they'd say a faster horse." I think that's absolutely right, you're not supposed to ask people what they want in that sense, you're supposed to understand the outcomes they're trying to achieve. If you indeed ask them, "What do you want?" They're going to say, "A faster horse." Steve was good at a few things. First of all he just personally had a deep sense of what life should be about, if you will. His meditation, his Zen work, he deeply took into things that matter to us. Things like simplicity, and beauty, and he was firm that those things should exist in the solutions that his organization provided.

I think, he didn't get that from talking to people like you and me, he got that from a deeper sense of sort of the human condition, or human nature if you will. He held that deeply, Daniel Goleman talks about the focused leader, you need to have inner focus, other focus, and outer focus. Steve clearly had inner focus, he had very deeply held beliefs that he, second thing that he did then, was he was willing to put a stake in the ground and say, "Let's go for it." A Macintosh on every desk, he didn't always get it right. Next computer doesn't exist anymore, he learned from it, and he carried that forward when he went back to Apple. Pixar, there are a whole bunch of mistakes made in the evolution of Pixar after he took over the organization.

The iPod, the sales on that were flat for a very long time before he put the iTunes ecosystem around it. His willingness to say, "A thousand songs in your pocket," right? Outcome that you can all imagine wanting to achieve, and then put that stake in the ground and stick with it while he was learning what worked and what didn't

work. The third was his willingness to break down barriers. "Oh well we can't get music." "Well we need it, so we're going to get it." How does one go out there and actually do that. You know, those are the things that I think ... he surrounded himself with people who were willing to buy into that vision, and were willing to work with him to make it happen. I think that's when he talks about it's the people you surround yourself with, that's a piece of ...

ExecEd: You were one of those, I know you knew him personally, you could probably share some wonderful stories about Steve Jobs so you're speaking from personal experience.

Sara Beckman: I got to watch the start, and ultimately the demise of next. Where he put a stake in the ground, and so fully believed in it. [crosstalk 00:30:46] Here's how far his aesthetics ... he insisted that all of the equipment in the factory that made the next computer be painted the same color. He would issue paint, he had people issue paint to the vendors of that equipment. The factory was stunning, it was gorgeous. That's the level at which Steve operated, he had this deep sense of what things should be, and then he made sure that every detail of that was executed.

If you think about things like your experience in the Apple store now, when you buy an Apple product, the sales person stands next to you, swipes your card, and someone else brings the product out of the back of the store. The entire time you're not standing there by yourself saying, "Oh, I just swiped my card for X hundred, or X thousand dollars." That you're standing next to somebody who's saying, "What are you going to do with your new computer? How are you going to use it?" This is design at the absolute detailed level.

ExecEd: Genius.

Sara Beckman: Right? It's like this is the experience you want to create, and it takes

attention to that level of detail to create that experience.

ExecEd: Is it something we've talked with others about? This idea of is it the leader in the vision, in other words what is happening to Apple without Steve Jobs? Or is it a framework, something, the design thinking something that is embedded in the organization and they can move on because they have that. What's your thinking?

Sara Beckman: I think leadership matters a lot, all leaders in part their own character to the organizations that they, particularly the organizations they start, but also the organizations they run. I think without a mindset at the top of the organization, and particular that the experience that the customers of that organization will have is the most important thing that they can be focused on, then you won't get that behavior, and you won't get the attention that Apple pays to those details. We'll see what happens at Apple down the road, they're still a pretty strong ethic there that was imbued int he organization by Steve, and Jony Ive, and the people who ...

ExecEd: Let's turn now to more of the concrete practical pragmatic part, you teach executives about developing a business model canvas, and there's been a lot written and talked about that. Can you just kind of distill for us, I mean what's at the heart of that? Creating the business model canvas, how's it linked to product innovation?

Sara Beckman: Historically, again because of the trajectory of goods and services, innovation has focused a lot on the product itself as opposed to on the entire customer experience that surrounds that product. As we move to designing entire experiences, the implication is that we have to design all the elements of the business that touch on that experience. Take Apple again as an example, Tesla's also potentially an interesting example today, where yes, the product itself is sort of at the heart of the experience. Although, we were doing research on teenagers and music and we found a teenager who was wearing the white Apple ear buds, and the

end tucked in his pocket. He didn't have anything, it wasn't plugged into anything. He had basically no functionality, right? He wanted to be apart of the Apple story, he wanted to be a part of a bigger story.

I sometimes joke and say, "Wouldn't you like to have a story that people want to belong to so badly that they'll forgo the basic functionality of the product?" When you think about all the elements of a business model, I've got who are the people I'm serving, and what value am I providing to them? Not what features am I providing, but what value, what benefits am I providing to them? That's where again, Steve held that very clearly in his mind. The other boxes are, so through what channels will I reach them? Do I own my own stores so that I can completely own that experience, or do I give that out to other people, other channels? What kinds of relationships do I want to have with my customers? Is it arms length transactional relationships, or do I have a place where I can interact with them?

That's sort of the outbound side, on the capturing value end there's how am I going to price these products, how am I going to drive my revenue or my income from them? Which also has to fit with the rest of that. That's all the pieces you have to think about to design what I'm actually delivering to the customer. On the backside I've got to think about key activities, what do I need to do? Do I need to do manufacturing on my own? Where do I get that beautiful titanium case that's on the computer, or do I form a partnership with someone who will do that? That whole backend has to get designed understanding the value that I'm trying to create for the customer.

HP for many years, Hewlett Packard, they did their own plastic injection molding because they couldn't buy four color plastic injection molded key caps for the calculator. If you don't injection mold the plastic, then over time it wears off. They didn't want HP calculators to ever have the numbers and the symbols on the calculator pad wear off. Overtime companies outside began to be able to do that,

and so they were able to outsource it. All those decisions are linked to what I actually want to deliver to my customers. Apple sort of clearly said, "I want to control that entire experience. I want to own my own stores, I want to manufacture stuff," increasingly they've outsourced.

That's why the business model matters. I think it also matters today because we talk about sharing economy, or collaborative assumption economy. There are a whole bunch of ways of thinking about, if I'm thinking about I'm trying to define the value that I want to deliver, then I have to create that value, I have to deliver that value, and then ultimately I have to capture that value in some way, right? Those are the three core elements of a business model. There's a whole bunch of other ways of doing each of those centered around understanding the value I actually want to deliver. That's what we do.

There's another tool that's actually very interesting as a companion to the business model canvas, and that's what we call ... Lucy Kimbell who wrote The Serve Innovation Handbook talks about innovation ecosystem maps. Think about Uber again saying, "Who are all the players in the transportation ecosystem?" Recognizing, it's kind of a duh in hindsight, but recognizing that you and I have cars sitting around not doing anything a lot of the day, that might well be used. Now all of a sudden I can become a taxi, or a rental car company without owning that resource. The ecosystem map says, "Wait a second, there's a set of resources and capabilities sitting over here that I can leverage in order to build my own business," right? That's how Uber ended up with a different business model than a taxi company, was in part because they looked at this ecosystem and said, "Where might I get that resource in a different way than I've gotten it today?"

ExecEd: I'm interested on your thinking of what you've termed disruptive technologies versus sustaining technologies.

Sara Beckman: Yeah, it's related to that conversation we had earlier about the

amount of investments I make, and new to the world versus incremental innovation. The argument is that breakthrough, or disruptive innovation feeds the development of platforms on which I can generate a stream of derivative solutions. The Apple store was disruptive when it was first introduced because no computer companies, for the most part computer companies didn't sell their products through their own stores, right? That created a platform for them to then iterate on different forms of retail presence, like the Genius Bar and different things that they could put into the stores.

The question is sort of, where does that disruptive innovation come from? Historically if you look at the research on innovation, disruption has come from new entrance, new players in industry, and the encumbrance in the industry tend not to do that. That's largely thought to be that it's because companies get entrenched in sort of their routines, if you will, and are unwilling in effect to cannibalize their own capabilities in their own marketplaces. The question is, and this is back to your other question about sort of why are companies taking this on today, taking on so called design thinking, or innovation. In part it's because they've got to learn to disrupt themselves, and get out of things.

You may have just heard that Auto Desk is making a move to the Cloud, so they're having to simultaneously let some number of people go, and hire new people. That's what it's going to start to look like in a lot of organizations because they've got to take on this, go back to my business model, I have to shift out the resources I'm using today and replace them with resources I need in order to play differently in this rapidly changing world of innovation and technology. Who knows what will happen to car companies going forward, will they want all the same resources and will they want to do the same activities they've always done. Or are they going to start to look more like Google, or some other player? How is that going to look?

By the way, just to be clear, Clayton Christiansen defined the term disruptive

innovation in a very specific way. What he means is innovating in the sense at the bottom of the market. Companies tend to follow their customers by adding more, and more, and more, and more functionality to solutions. Christiansen's definition of disruption is someone who comes in and basically undercuts that functionality, and therefore delivers still what people want but at a lower price. Where as if I'm tracking my leading customers all the time I tend to just keep adding functionality without thinking about it. I was using the term more broadly just to talk about how do I engage in innovation that not only will disrupt the market, but will disrupt my own business and how I operate. I think that's the core challenge that organizations are having, and that's back to why this sort of dual way of thinking about design thinking or problem framing and solving, one focused on a customer but there also has to be one focused on, how do I actually change how my organization works in order to respond to that customer world that's out there?

ExecEd: Does that mean that sustaining is not good enough, it's innovate or die?

Sara Beckman: In the end that's right. Think about an existing platform of a solution, right? I can keep putting new features into that, but ultimately somebody's going to come along and say, "Oh, there's a completely different and better way to do that." If it's not me, then I'm going to ultimately die. I can't just keep incrementally changing the thing I'm doing now. Taxi companies could keep incrementally changing what they're doing, that's not going to get them to an Uber model, or a Lyft model. How do I at some point say, "Uh oh, there's a totally different way of doing this and maybe I am going to have to take that on."

ExecEd: This may not be the best example, I'm thinking of portable hand sanitizer. I mean, there's still Dial soap you can get and you have it in your bathroom, but then there's portable soap.

Sara Beckman: Yeah, so it's just thinking differently. If you have a mental model that the only place you can wash your hands is at a sink with water and soap, then

you're not going to get to a model of, "Oh, what if I could wash my hands all the time on the fly?" That's a disruption to the soap companies.

ExecEd: The soap companies are still there selling their dispensable soap, or the bathroom ...

Sara Beckman: That might be a case where the disruption isn't going to effect the entire process, right? That would depend on us having a totally different way of getting clean, right?

ExecEd: A whole topic for another day. You speak also about sustainable competitive advantage. Do you want to share a little bit with what you mean by that?

Sara Beckman: Yeah, sustainable competitive advantage actually comes out of kind of the old models of strategies. Michael Porter is sort of the famous strategy person with the five forces models, and all of that kind of stuff. Those models assume that you can position yourself within the bounds of a well defined industry. Today, that isn't actually the case, which is why those models are sort of giving way to these more, do I understand the industry or innovation ecosystem in which I operate? How does Google start making cars, and making thermostats? That's not because they are positioned in the car industry, or in the thermostat industry. They don't think in terms of this, what does sustainable competitive advantage mean? They think instead of terms of in their case, sort of information, and how do I gather it, manage it, et cetera. Which leads them to then jump into these other spaces.

They're not drawing a box around themselves and saying, "How do I compete against, A, B, or C?" They're playing in this bigger ecosystem. Which arguably, I don't know if Steve Jobs did that so much, but he did to some extent, right? He didn't say, "Here's an iPod and that's just like a Sony Walkman." He said, "No, the iPod has to

have music with it." He thought more broadly than, "I'll just compete against the Walkman," which didn't have a music ecosystem around it.

ExecEd: It gets back to your comment about experience doesn't it?

Sara Beckman: Ultimately those two go hand in hand, right? If I say, "I'm a car manufacturer," and I put a box around myself, then I'm going to limit myself to designing cup holders in cars, right? That's not quite fair. I'm going to limit myself to designing cars, right? If I think about the entire customer experience of getting from point A to point B, then I'm going to notice that people are sitting in traffic all the time and that's not so much fun. I'll begin to think about other things that I might design, or I might even start to think more broadly about, what if people don't actually want to own their cars? Then what business do I need to be in, and it might be something beyond selling cars and having those whole infrastructure to do that.

Absolutely, if I actually look at a customer experience then I might define my industry in a different way.

ExecEd: Right, I'm interested in your experience with the auto industry and Holt Navigation system too. It used to be it was a big deal, "Oh I have a GPS system in my car embedded," and now everyone has their phone and they use that.

Sara Beckman: They plug their phone in, right.

ExecEd: What do you think?

Sara Beckman: If I'm thinking about the customer experience and I'm understanding the resources and capabilities that each actor in my ecosystem has, then I would know that my customer already has the capability to find their way somewhere with the GPS on their phone, and I might think instead of building it into the car. I don't want to speak for any given auto company, here's my guess is

that there was a conversation about, "How can we get more money out of the sale of a car?" "Oh, we can get a stream of revenue for doing updates with our GPS," or whatever the case might be, right? Which is a different model than thinking, "What if we formed a partnership with Ways, or some of these other players, what might we do?" The mindset of we are in the business of delivering this thing is different than here's this whole experience, we only own pieces of it, but we better work with the other players that are part of that experience. That's a very different mindset.

ExecEd: What does all this innovation, all this breaking the mold mean for the actual organization? Do you break off, like Google has Alphabet, [inaudible] and different set apart ... they've made it very separate entities of their organization. What's your thinking on that, does it work best as a separate, should it be integrated?

Sara Beckman: I think it's going to have to be integrated in the long run. This is part of what Charles O'Reilly, and Michael Tuschman talk about in the Ambidextrous Organization. Ambidextrous Organization, I think of it as there's the innovation engine, and there's the execution machine. Particularly in organizations who have heavy manufacturing components like cars, or diapers, I've got this whole research and development capability over here and they can crank out ... a lot of companies will say, "We have no problem with ideas." I can crank out ideas over here, crank, crank, crank, and then over here the execution machine says, "We can't make that." The machines that make diapers are massive, right? We have all the rules about what we can and can't make, and what's happening is those two sides are having to learn how to achieve the right level of flexibility in order to be able to church out ideas.

In the software industry it's easier, right? They can turn out code, and issue it very quickly, and say you find a much more agile kind of process, which is also part of why organizations are becoming more capable at faster innovation. Yes, the

organizations are going to have to change as well in order to be responsive to the speed with which things are changing today.

ExecEd: Is that the same than for organizations that don't sit in Silicon Valley, that don't sit in technology, that they need to apply these lessons learned?

Sara Beckman: Yeah in fact arguably some of them are struggling even more to do that. We've picked on the car industry a lot but think about insurance industry, or healthcare industry where I've got an insurance organization, I've got the providers, I've got the patients, I've got all of these players. If you've ever seen a map of healthcare, it's unbelievably complex. The ability to change that system is really low, [crosstalk 00:52:43] it's very, very hard, exactly. How do we become more agile with some of these big systems? Transportation system, I mean look what the so called ride sharing, the ride selling, Uber, Lyft, look at all the discussions they're in about regulations, look at all the discussions they're in about how much they pay their workers. These are big systems level conversations that need to start being able to have.

If I'm in an industry or a company that has run by a set of rigid rules in a complex network, it's really hard to change.

ExecEd: Right, I guess we get to my last question would be about change, and what you might advise some of these companies that aren't used to that kind of disruptive change?

Sara Beckman: I think it does work to have small groups in a company take something on. When I worked at Hewlett Packard I ran the change management team, and we spent a lot of time talking about this question. At the time HP was organized into a bunch of different divisions, so we never tried to change the whole company at one time, we always started with one division that was willing to come along for the ride. We would kind of prove out what could work. I think that may

still be the way to do these things, I think you're seeing a lot of change through acquisition, right? Maybe I acquire an organization already doing some of that stuff, like Google acquired Nest, it didn't just start making thermostats. There's lots of ways of kind of reaching outside the bounds of the organization to either form partnerships with, or acquire, or play in different ways.

I think that's why a lot of big sort of established U.S. companies are setting up innovation labs in the Bay Area, which still yet to be proven as successful as well. They're at least reaching out and saying, "How do I look at the dynamics of the world in a bigger way?" They still are going to attach that back end to the original organization, and the jury is out as to whether or not they can really do that.

ExecEd: Sort of creating their own incubator within their ...

Sara Beckman: Some of them are incubators, some of them are just outreach. Silicon Valley continues to sort of be a hot bed of technological innovation, so they're just reaching out to find out what's going on with the idea of feeding it back. Some of them are trying to connect to Universities like Berkeley, sort of saying, "What's going on there so that we can be on the cutting edge of understanding new technologies and that kind of thing, and then bring that back." Others of them are saying, like City Ventures in Palo Alto is also an incubator. They're saying, "How do we actually do startup activities that will ultimately feed the organization but will give them a little room to do that outside the reach of the bureaucracy or the sort of regulated environment of the bank."

ExecEd: In your mind would these so called incubator groups, or innovation labs, or whatever, would they be plucking people from across the companies? Not just RND scientists, engineers, but perhaps marketing, and other people that work in areas that aren't typically thought of as that? What would you suggest?

Sara Beckman: Yeah, you know the design firms have made this clear that

innovation is the result of mixing disciplines together. In fact there's research that shows that diverse teams, whether diversity in gender, ethnicity, or background, or experience, or discipline, they either statistically significantly under perform homogeneous teams, or outperform them. They under perform when they apply biases, "Let's let the women take the notes," they put everybody in a predetermined bucket. Or they ignore the diversity on the team, "We're all Cal Bears here," right? On the other end of the spectrum, the teams that outperform, they understand the diversity that's on the team. "Oh, you grew up in such and such country, how would this solution fit in there? How would you think about this problem?"

If you take that research and apply it to the answer to your question, you don't want a bunch of people who have been trained as mechanical engineers as the only discipline represented on your innovation team, you want to have a more eclectic group. Absolutely, it's clear that innovation requires that we leverage diverse backgrounds, diverse experiences, et cetera. When I used to do work at HP on product development teams we would at least say, at least somebody from RND, somebody from marketing, somebody from supply chain, "How do I make sure that all those functions are represented on the team?"

You know, we'd call T shaped people, this is a notion that's been around a long time. I have deep understanding in this space, but I'm able to talk across those disciplines.

ExecEd: How does ethics play a role in design thinking and perhaps disruptive innovation?

Sara Beckman: That's a really good question. I'm teaching a course on collaborative innovation with the theater department and the art practice department at Berkeley right now, and this comes up a lot. The question comes up as a values question, so what value are we in the business school trying to create

versus people in the theater department, versus people in our practice? There's multiple levels of an answer to this question. Probably the highest level has to do with that inner focus, do I come from a place of believing in a set of values? We all come from a place of believing in a set of values, the question is sort of what those values are. You can name companies where you have a sense that leadership has better or less good value. It's really important to have that leadership level to start with.

Then you can go down to the sort of I'm sitting at my CAD sketching, my computer aided design terminal sketching out stuff and I have choices to make. In my case I ran environmental health and safety, should I have the plastic in the computer be able to melt at a given temperature so that I can recycle it, but if it melts at that temperature it will melt if there's a fire in my desk and it will hurt me. How do I make that trade off? Some of these trade offs are not as obvious as you might imagine, how do I make that choice, particularly when I have very small probabilities to play with. Clearly these are a lot of the trade offs we have to deal with in this new economy.

People calling it the "Gig economy," I have all of these players like Uber drivers. Well, they don't get benefits, and they may or may not make minimum wage. Who should worry about that? Who's decision is that? We sort of collectively as a society are going to have to really pay some attention at that micro level, right? I'm designing a car, when is the car safe enough to actually be on the road by itself? Is it when it's as safe as human beings are when they're driving the car? Which is not nearly a hundred percent safe, right? Does it have to be way better than that? These are decisions that are going to be made at policy levels, at CEO levels, and at the desk of a product designer. They're not easy questions to answer.

ExecEd: Doesn't that relate to values of a given organization? That the culture of the values have to be stated and understood?

Sara Beckman: Yeah, I think that's right. I'm thinking about Volkswagen and all of the stuff they're going through right now. Then I have a really big company, did I state the values clearly enough? I know from working in corporate, in large organizations that you can't say something often enough. How do you get it heard? Then in the end, there's a great book written by Ben Hamper called, "Rivet Head." Ben Hamper was a contemporary of Michael Morris and he worked on the GM truck and bus line in Michigan driving rivets. He told the story of the quality cat. Somebody would walk around the shop floor in a cat costume saying, "We build quality cars." He says in the book, "Everybody knew that quantity trumped quality, at the end of the day it was the number of cars we built, not whether or not we built them right."

If a choice was made by the person driving rivets on the shop floor, it wasn't going to be about quality. When you talk about communicating from the top, here's the top saying ... this is a very old story. Here's the top saying, "Quality cat get out there and get everybody to do quality," well everybody knows that's not really ... in fact they would steal the cat costume, put it on, and run around and be quantity cats. I totally agree that you have to have values and they have to be clearly communicated, but it's a very complex to communicate them throughout all the parts of the organization, yeah.

ExecEd: Where does lean startup fit into all of this innovation discussion that we've been having?

Sara Beckman: Yeah, I used to call this management by fad where you've got the design thinking thing going, we used to have Six Sigma, now we have lean startups. To me they're similar, they're the same process in essence. In design thinking you start with customers and you just go out and live with them for awhile, then figure out what you want to do for them. Lean startup tends to start with an idea, "I'm going to make an app that, blah, blah, blah," right? Then they go out and they talk to

customers and they figure out if they've got it right, if you will, or not. Then they frame and reframe the problem.

I think that in a sense those two communities are loudly yelling at one another over in a sense that the same sort of notion, which really brings to the floor that you don't have to start in just one place in this innovation cycle, right? If I have no idea what I want to do, then maybe I go out and I just live in the world with people for awhile and say, "Huh, these look like interesting problems I might work on for them, here's a bunch of ideas." I might have already kind of lived it myself and I say, "You know what? I'm really unhappy with this aspect of my life, and I think I could fix it by doing X." I can start with the idea, then I say, "Well let me go out and figure out if that idea works or not."

I think lean startup, it's fascinating to watch because it's been applied largely to entrepreneurs, now big companies are starting to say, "How do we do this lean startup thing internally?" It's a way, a mechanism for companies to even think about this sort of innovation cycle and the kinds of changes they ...

ExecEd: I was going to ask you to talk a little bit more about the innovation cycle, I think there's three anchors that you've ...

Sara Beckman: Yeah, the innovation cycle, the way we do it, all day long we learn and we toggle between being in the concrete world, and being in our heads in the abstract world. We toggle between doing analysis work, I like to think about that as the asking why, and asking how. Now I have a two by two, right? In the concrete world of asking why I observe, and I notice, which I don't do very well if I'm walking with my cellphone. Right, so I pay attention to what's going on in the world around me, that's just being present with other people, and their lives. Whether they are my employees, or whether they're my customers, right? Then I have all this data that I've just entered into my mind, so I have to step back and sort of get to the why. What are the interesting patterns? What have I really noticed? Have I gotten

underneath the dynamics of what's going on?

That leads to the frame of a problem, parents are concerned about toilet training. That came from hanging out with parents, and as they finished the interview parents would go, "Can I just tell you one more thing? My neighbor keeps coming over and saying oh, is your child still in diapers? No? Break my heart." That observation led to a frame that I could work with parents on toilet training, right? That's all the why side.

The other side, now I have to say, "Well what ideas do I have to deal with parents and toilet training?" That's diverging, converging, I'm coming up with ideas, but those are all still in my head. A lot of us in the academic where we live in our heads all the time, I can blah, blah, blah about those ideas, as they say, "Til the cows come home." At some point I have to make them real. "I have this idea, I could do a different type of diaper." Well, why don't you go make one? I can make a Huggies Pull Up, or I can go design a service. That's the innovation cycle that we talk about which really comes out of the learning literature and is the same cycle of the scientific method and is the same cycle as quality management, but design thinking is sort of the new way to bring it alive.

ExecEd: Is the end result then a transformative sort of experience? Is that the goal?

Sara Beckman: If you are paying enough attention when you're observing and noticing to get to a deeper understanding of people beyond, they like a pink button more than they like a purple button. If you're getting to young parents are really nervous about toilet training, then I can put a frame around a problem that potentially leads me to transformation level solutions. In paying attention to the entire customer experience at Apple, not just here's the product, "You can come in our stores, and you can just play. I won't try to sell you, you can just play." That's an experience, that's noticing what people do and don't like when they go into stores, right? I frame the problem around education rather than promotion, that's a

different problem frame. Then I design a store that allows for that kind of engagement.

ExecEd: If you had a crystal ball and long term view, what do you think twenty years from now corporations will look like?

Sara Beckman: I think there's a lot of signs that are aiming to much more fluid boundaries of organizations. People move into and out of them much more quickly, so they sort of create teams and disband teams around the different agendas that they want to achieve. There's, I don't know where this research came from but there's research that shows that college graduates today will have something like twenty nine jobs in their career. Which to me is a really good indication of what we're talking about. If I move from hierarchical command and control structures for organizations to this complex adaptive systems model, then you think about places like Google where I bring in Nest thermostat. I'm not convinced Nest will be part of that company in the long run, right? Excuse me. Once sort of information in the home is being managed in different ways, there will be lots of not just thermostats, but refrigerators, and coffee makers ... the internet of things will distribute a lot of that.

I think that what we're going to start to see is, I want to move to this new kind of technology, I'll get the people together to figure that out, but then when I need to move to the next one that group of people will disband and I'll draw a new group of people together. There will be these much more fluid boundaries around what we know of as corporations today. Part of that simply because if you go back in the literature on organizational structure and organizational design, the old mechanistic models, which we still teach them in business school. Those old mechanistic models are just not agile enough to move in this new environment.

There's a guy named Jay Galbraith who wrote a book called, "The Information Processing Model of an Organization," and in it he argues that organizational

structures are all aimed at moving information as fluidly as possible across the organization. If you look at how people are moving information today, it's not, I go to my boss, who talks to his or her boss. It's, I found it on Reddit, or I was in a Facebook group. The information is moving in very different ways, so now we've got this fluid information flow, then what's the value of hierarchy? It has less value, so I think that's where corporations will go. It might be a painful process for some of them, I don't know.

ExecEd: Thank you Sara, this has been fascinating talking about design thinking, it's definitely thought provoking and I thank you for spending the time with us today, thank you.

Sara Beckman: It's a fun space, thank you.