[SQUEAKING]

[RUSTLING]

[CLICKING]

HANNA ADEYEMA: I'm extremely happy to present Professor Eric von Hippel here. He's actually one of the PIs on this grant project, and he's a great supporter of MIT boot camps. And as we like to say, he's a father of user innovation, philosophy, approach and trying to bring this to the world. And he kindly agreed to Come today and present even though you're actually right now in California. Yeah, but, yeah, couldn't miss this. And so we're happy--

ERIC VON HIPPEL: Can you hear me, by the way?

HANNA ADEYEMA: Yes, we can hear you. It is fairly good. Everything is working. Yeah.

ERIC VON HIPPEL: All right, good.

HANNA ADEYEMA: Eric, so please take it on.

ERIC VON HIPPEL: OK, so Hello, everybody. I hope you have your feet up on the tables and are acting entrepreneurial. I can't actually see you, I wish I could. But, Hanna, I don't know if you can swing that other camera around so that I can see the audience. Can you do that?

[LAUGHING]

OK, I know that room.

HANNA ADEYEMA: I can do something. Actually, we have another computer. Maybe I'll use that and login into the Zoom, but you can go ahead.

ERIC VON HIPPEL: OK, so first of all, hello, you look as though you are really entrepreneurial. I can tell from looking from behind. So what I want to do is tell you about how to get user-developed innovations in the space of substance abuse.

So it's as Hanna said, I study user innovation. And in the course of doing that, we see all sorts of innovation in the substance area that is negative as hell. Like, how do you get around a urine test?

That's all user innovation. There's no producers that come up with that. Hanna, can you hear me? Is everybody-- am I doing all right? Yeah, OK.

So what I'd like to share with you is some research and some ideas about how you can find innovations, not that you develop based upon the needs of people suffering from substance abuse, but the solutions that they have developed to help themselves. That's where important things often come from. As you may know, Alcoholics Anonymous did not come from clinicians or producers. It came from alcoholics trying to help themselves.

OK, so let me share my screen. And by the way, during the course of this, I will ask you for your own examples of user innovation that you may have observed because I find that unless you try it out on your own experience, you won't really remember a lot of this. So let's see here.

OK, so I know that you're working in this very important area of substance-use disorders. I mean, it's a terrible social plague, and we're all worried about it. And so it's wonderful that you're thinking about it.

Let me now say, well, should you be looking for unmet user needs? Or can you also look for actual prototype solutions developed by lead users? The latter is the approach I focus on. And as I'll try to show you, there's some pretty amazing results that come from this particular approach.

So let me begin then with conventional wisdom. Conventional wisdom is-- whoops, wait a minute here. Conventional wisdom, it's all the fault of Schumpeter, is that Schumpeter said, 100 years ago almost, that, oh, it's the producer who innervates and consumers are educated by him as necessary.

Now, in marketing research, economics, and the rest, what came out of that was this producer innovation and diffusion model, namely, what you as a producer or somebody trying to supply a solution does is you do market research. You talk to the users not about their solutions, but about what their problems are. Then you say, aha, I will invent a solution to that unmet need.

That's why, in marketing research, they often say, find a need and fill it. Then I will do R&D, I will do production, I will do market diffusion, and I will sell you the solution to the problem that you have. Well, that's one way. But there's another way that I'll describe to you here that I think you can use to more effectively find the product or service that you want to commercialize in this space.

So first of all, it turns out that Schumpeter's wrong, that users, in the population, innovate all over the place. We now have 10 of these national innovation surveys, nationally representative ones. And what we see is that a lot of people in the population innovate in a lot of areas, including medical.

So to choose the first column there or the second column, the first study we did was in the UK, and we found that 6.1% of the population developed something for themselves, to solve their own problem. They didn't sit around and say, oh, I wish a manufacturer would survey me and help me. No, they said, you know what? I can help myself.

So the number of people in the UK doing these kind of innovations-- and we did elaborate work to make sure about what their innovations were and were they truly innovative and the rest. It was 2.9 million people in the UK who did this. Now, there are only 23,000 product developers who are working for commercial firms in the UK.

So what you immediately see here is that user innovators outnumber producer innovators by over 100 to 1. So then the question comes, how do we go about understanding whether what they develop is any good? How do we go about understanding whether their innovations, in fact, can be used by others?

So again, the traditional pattern and one you might well be in as you try to develop a solution to the substance-abuse problem is you go through that Schumpeterian user producer-centered paradigm. Namely, you look at users. You look for improvement possibilities of which they may not be aware.

Let me interview you. What problems do you think you have? Let me do a survey to assess commercial potential, to see if your needs are widely shared. If I see a potential market, I will develop a solution to your problems.

Well, that innovation history belies the facts. User hacks, user innovations have always existed alongside producer innovation. A wonderful example is that, in 1908, Henry Ford introduced the Model T, which you see there.

Right away, customers got to work hacking it. So what you see here is a user conversion of a Model T Ford into a farm tractor. They used them to power sawmills. They used them for all sorts of things.

The only response of the Ford people was, wait a minute, you're going to void your warranty. But users were the ones who, for example, built the pickup truck. That was the first of a long line of what has today become a huge market segment-- pickup trucks. Users did it. They took the body off their Model T and built a pickup body.

Here's a snowmobile that they developed. Again, as you can clearly see, based upon the Model T as a platform. But a user innovation-- snowmobile, nobody ever thought of doing a snowmobile before.

Race car, Well, why not? And then user hacking still goes on today. I couldn't resist this.

So here are some examples. People were always hacking VW bugs. So I put a jet engine in my VW bug because why not?

And you can notice-- I think that's a J58, or something like that, jet engine. And you can notice that the driver's window is open. There's a reason for that. And the roof is open.

There's a reason for that. Namely, jet engines take in a lot of air, and you really want somewhere for that air to come from, or you'll end up with a vacuum in your car.

My VW is made out of LEGOs, sort of. My VW's actually a Rolls-Royce. You probably are familiar with all these things, but what it is is user hacking, which, in volume, actually exceeds car producer investments in R&D.

So now, we all know that user innovation to enhance or hack substance abuse exists. Usually, this is seen as a negative because the users are the ones figuring out how to practice their substance abuse without interference. So look at the huge inventiveness users display in developing methods to defeat substance abuse control.

Oh, you want to test my urine, do you? Give me 15 minutes, and I'll invent ways to get around that. Users, not producers, developed ways to adulterate, substitute, dilute urine samples. These are the common ways to beat urine-based drug tests, says Google.

Common household chemicals such as laundry bleach, table salt, toilet bowl cleaner, and so on have been used for many years as adulterants of urine specimens. Again, this is not something that manufacturers do. This is something that users do because they have a direct need.

Carrying a bottle of drug-free friend's urine is a common strategy for substituting urine samples. In fact, you can even go and find yourself videos on how to beat drug tests. Nothing more convenient than that.

But there are also positive innovations that users make, and this is very important. And this is going to be the source of field-tested ideas for innovations that you yourselves may want to put into the market. So there were many and are many substance-abuse disorder programs developed by experts for users.

In fact, that is the standard commercial protocol. Find a need and fill it. So what happens in these things typically is you go and you interview some users, and you say, oh, my gosh, you're suffering. What can I do to solve your problem for you? And they say, get lost.

But really, within that large population-- and you're unlikely to find them by just random interviewing of users-- there are users who have developed positive solutions for themselves because they have a high need, like Alcoholics Anonymous. You wouldn't find those people in a survey of drug abusers because they've gotten themselves out of that category by their own means.

The user innovations are often more successful because users can experiment on themselves in real use conditions. Users who do succeed are not advertising their solutions, typically. The Alcoholics Anonymous people were an exception.

There's no incentive to say that I was a drug user, and now I've figured out how to solve it. People will not trust you. They will not hire if you were a drug abusers. So entrepreneurs often miss these non-advertised solutions. If you have a method for finding them, you will have a way to recognize their commercial potential and be first in that category of commercializing user-prototyped innovations.

So here's a method for systematically finding user innovations. In the UN, it's always the case that aid workers and others are saying, oh, my god, look at this problem. These kids, they're just not-- I mean, their development is being stunted.

They don't get enough nutrition. This is horrible. Let's go interview them and see how we can help them.

But Monique and Jerry Sternin, who were aid workers in Vietnam, came up with a different approach. They said, OK, the population we're in-- let's say we're in a village-- consists of people who largely have kids in difficulty. But maybe there are some people in this population who are doing better. Their kids are actually healthier. Let's find those people.

They're the positive deviants. Let's learn what they're doing to help themselves. Let's figure out how to diffuse their solutions to others.

So an example that comes from their experience is, again, children in this village are malnourished. I'm going to find the children who are flourishing best. I will ask their moms how they do what they do. What are they doing different? And I'll see if I can apply that solution more broadly.

So specifically, what they found that, in the families that were doing better by their children, they were making pots of Soup just like everybody else in the village. But instead of just using the rice that they grew, they were also scooping up the crawfish and insects and so on and so forth that were in the rice paddy and putting those into the soup as well. In effect, what they were doing was using what normally was regarded as trash and something to avoid in food, and figuring out it was a protein source and mixing it in their soup.

Now, they did not talk to other people about this because that would be considered bad behavior. What? You're Feeding your children trash? But in fact, their children were doing well.

And it took these people, Monique and Jerry Sternin, to find these parents and convince them to tell them what they were doing to help their own children. Then one could start to think about, well, how can I, in general, develop this approach so as not that we have to ship in protein powder, but that we can use locally developed protein sources that are being ignored?

Now, here's what I want you to do. I'm saying-- and for a moment, we're going to take a break and we're going to have a discussion of innovations that you know, user solutions that you know. The reason I want to do this with you-- I want you to take five minutes to chat amongst yourselves about what they might be. The reason I want to do this is because unless you derive from your own experience a realization that what I'm talking about is real, by finding examples, you won't believe it. And you'll go on from here.

Because standard procedure, again, is to ask for unfilled needs and solve the problem yourself. Now, I'm arguing that it's better if you find solutions from users because they have actually developed something which works for them in the field. They've prototyped it, so it's bound to be a better solution than one that you come up with, that, once you get it into the field, may or may not work.

So now can those of you who are in the audience get next to somebody else? I mean, you'll have to shift chairs. I know this is just horrible.

Who could do that? But get next to somebody else and say hello first. It's always considered a wonderful thing to do.

Just say hello. And then start sharing experiences. Think about user innovations in the area of substance abuse or some-- you can't think of those-- that you have either done yourselves or have encountered.

OK, talk together for five minutes, share your stories, and then we will ask you to give us feedback, a few of you, who have cool ones. So five minutes started now. It is now 1 o'clock my time. So I guess it's 4 o'clock yours.

Now, this is super cool. Who has an example they want to share that is just really cool that would give us all a feeling? You can volunteer others if you want. You can say, ah, Jeremy, yours was fantastic. You want to hear from somebody, who?

HANNA ADEYEMA: Anybody? Oh, can you speak here so Professor von Hippel can hear?

AUDIENCE: Hi, I'm Ray Denny, and an end-user observation that I've noticed is individuals withdrawing from opioids tend to self-medicate with psychostimulants to treat their withdrawal symptoms and vice versa. So individuals withdrawing from psychostimulants, such as cocaine or methamphetamines, tend to treat it with opioids, like heroin or fentanyl.

ERIC VON HIPPEL: That's fantastic. And what do you think about that solution. Is that a viable one or not?

AUDIENCE: Well, for them, it's what they have access to, and it works for them. But a viable solution, I'm not sure what you mean by viability.

ERIC VON HIPPEL: Well, in other words, when you see that, do you think, oh, that helps them it appears, their positive deviance. Somehow, if we could spread that info, others would benefit too. Or do you think, jeez, that's a dangerous idea, don't do it.

AUDIENCE: That's a dangerous idea, but it may give some insight into how to treat withdrawal.

ERIC VON HIPPEL: OK, all right, all right. That's good. So you're observing a user innovation, which is not just a thought experiment, as Schumpeter would say.

Oh, tell me your needs. Oh, I have to withdraw. It's like, they're trying stuff. And they're trying stuff because they have a desperate need.

AUDIENCE: Yeah, no one wants to withdraw. Very uncomfortable.

ERIC VON HIPPEL: Exactly. Yeah, so fabulous. Good one.

AUDIENCE: Thank you.

ERIC VON HIPPEL: Thank you very much. Anybody else have a cool one?

AUDIENCE: Gabapentin is important because that's very helpful.

AUDIENCE: Thank you. So I was commenting on patients with substance-use disorders for whom controlled substances are not prescribed tend to abuse other medications such as gabapentin or even for that matter, quetiapine because it sedates them and calms them. But then it becomes a problem because then they become addicted to it, and they begin to use it compulsively. So that's an end-user innovation. I would not recommend it, though.

ERIC VON HIPPEL: OK, all right. Thank you. Thank you, very helpful.

So you're the one, you look at it because you have clinical experience. And you say, some subset of these innovations are really good and worthy of development. Other ones, eh, not so good.

So let me now go back and say, I'll tell you-- we'll go back to the slides for a moment. And then, at the end, we'll have another chat for a minute. But what I want to show you is that there are now methodologies for finding these innovations in big data.

So this plan to say, oh, well, if 1 out of 10,000 users has come up with something amazing, how do I find them? That difficulty, that practical difficulty is now being eliminated, and we're working on methods with Ipsos where you can find them in 90 seconds through big data. So it can be a really cool solution for you.

So let me go back to-- not that you haven't already thought of brilliant ideas, and you don't want any from those damn users, but anyway. Let me go back to my talk. OK, so you did this. You are virtuous.

Now, I want you to notice that, whether it's a product or an activity, what the user develops is much cruder than a commercial product. You are not standing there expecting them to come up with something finished that you can test for marketing tomorrow. Here's a wonderful example.

There's a guy named Hans Bernd, who I work with. He's in Sweden. And you can actually-- on that left-hand thing, he was-- we were talking, and he's in his attic, and you could see we're Zooming together. I'm on the screen there.

And he said, damn it, my back is starting to hurt. Von Hippel, my back is starting to hurt. So what are you going to do? He said, solved it. So he picked up the chair he was sitting on, put it on the table, and made himself an instant standing desk.

Now, that tests the principle. And of course, he was not the first to do it. That tests the principle at 0 cost. But you can see, ah, if it helps my back, then maybe it's worth making the investment to make the kind of fancy things that you see on the right-hand side.

You often cannot just take the user prototype, whether it's drug self-administration or whatever, and apply it. You've got to then figure out how to make it more reliable and safe and so on. So the reason maybe that a company would never do that hack that you see on the left-hand side is because, oh, there are all sorts of hypotheses.

What if a kid came along and pulled down that chair on top of himself or herself? Et cetera, et cetera, et cetera. So you end up with huge investments to make things like on the right. But the critical importance is you do it because you've learned from that quick and dirty thing on the left that something there is going to work.

OK, so here's what we have. On the bottom, you see that Schumpeter's principle, producers innovating. On the top, what we now see is something I call the free innovation paradigm. That's users innovating for themselves.

Unlike producers, users are self-rewarded. That is, they're doing it because they want to avoid withdrawal, for example. And then if they do it successfully, others see it who are close to them in some way, whether or not they're advertising it, and they fix it up for themselves. They improve it and so on. And then you get peer-to-peer free diffusion.

Now, it's free, and producers, the bottom line again, which is what you guys presumably all are, wanting to be or are, can pick up these designs-- see that downward curving arrow-- and actually figure out how to make a product out of it. Somebody was mentioning the FDA. One of the advantages in medicine is that users can innovate and share without FDA intervention as long as it's for free. So I can do anything I want to myself medically, and I can tell others about it because of my First Amendment rights.

You only get into the issue of oh, OK, we better figure this out in terms of the FDA is once you start to produce something. So for this reason, you've got enormous amounts of medical experimentation amongst users because they don't have to deal with the FDA, and it's free. So what we have studied, we found a million in our national surveys, a million patients innovating to help themselves, often with chronic diseases.

For example, patients are innovating to improve their administration of diabetes drugs and so on. Patients are innovating to ease their pain. When you think about the fact that medical clinicians deal with me, if I have diabetes or some other chronic condition, deal with me once a quarter for 15 minutes, I've got to innovate. The real innovation process is going on invisibly in that top arrow.

OK, so are these innovations for free? Yes. So when you look at these surveys-- this is, again, three, but we have 10 now-- you see, do any of them protect their innovations? No, because they are benefiting from helping themselves, not by expecting to sell these things and because IPR, that is, Intellectual Property Right protections, costs money to establish, users just give them away.

They say, fine, if you want to use my method for withdrawal management, be my guest. Happy to have you do it. And this applies also to companies who might pick it up because companies say, hey, there's no protection here. I can start to produce it, add improvements, copyright those or patent those, and be off to the races commercially.

So lead users, in fact, are the pioneers for functionally novel innovations systematically-- this is all research we've done-- because, at the start, there's no evidence for a market. So why would producers do it? So for example, the heart-lung machine, it was developed by a surgeon. No manufacturer wanted to touch it because they said, well, you haven't developed any operations that it can be used for. How we know there's any market?

So the story was a surgeon who was trying to-- his name was Heysham Gibbons. Forget his first name, but Heysham Gibbons was the last name. He was dealing with patients' children who had rheumatic fever and then ended up with heart defects. And he was trying to save them. And he realized that he could put in new valves and so on if he could just stop the heart temporarily.

He went to medical firms and said, hey, can you make me this? They said, no way. We don't know if there's any demand. So he did it over 10 years with charitable help.

Then what happened? The signal of commercial interest began to grow. The first thing that happened was that other surgeons came around and said, hey, I hear you're having success. What are you doing?

He showed them. And then they said, oh, can we have a roll of your drawings and go back to our technician and build one of these? This is really cool.

And then, eventually, enough evidence of a market developed so that producers began to enter. But users only need to know that they're getting benefit themselves enough to motivate them to hack, which can be very cheap. Manufacturers require evidence of a market because they spend a bunch more money making this thing through the FDA, et cetera. So this is the pattern you get. This means, in turn, that there are a lot of innovations out there that, in fact, are down the curve and that you could pick up and commercialize if you knew how to find them.

So we are doing research on how to identify innovating users using big data. And my colleague in this is someone named Sandro Kuulartz who works in a company called Ipsos. They are commercial people who do market research and so on. And Sandro and others are really good at the big data story, and we're working on that.

So again, they identify lead users. Lead users are the ones at the leading edge in that previous curve. And as I said, manufacturers find this product-- you can see that Sandra's slides are much better than mine.

[LAUGHING]

OK, so what is the process we use? And we studied it first in a field called kitesurfing. What we do is we collect content on the web, massively, massive scan of the web.

We do a relevance audit automatically. We're looking for things like, say, in kitesurfing, we're looking for text messages and so on that say things like, I had a problem, and I solved it. And then we're looking for innovation diffusion. Let me illustrate.

I'm not saying that you could do this right now, but you must know that this method exists so that, next time, you can. So what happens here? You do user-generated content collection, lead user innovation filtering, expert validation-- in other words, is this mass data you've screened, in fact, containing innovations? Then trend analysis. I'm really jumping here.

So here, I don't know if you know what kitesurfing is, but it's a way of having a kiteboard, and you have a giant sail that you use to pull yourself through the water. So manufacturers of these make a fairly standard product. So what happened here?

Well, when we did this kind of analysis, again, rapid analysis, what we found on the top row is innovations related to improvements to kitesurfing. For example, a kite seat for disabled people, an improvement in the control lines, a hard-shell harness, something that-- that kite is pulling really hard, and if it's pulling on a rope on your back, that really hurts. So making a hard shell to distribute the force is a good thing. All of these are user innovations that will be helpful for manufacturers in that field.

Now we also found really radical innovations, in other words, things that are outside the normal marketing research view of companies in that field. We found people, users, making electric hydrofoils for themselves, a user-developed innovation. You may have seen commercial ones by now.

There's something called foil pumping. And then there's drone surfing. What is drone surfing? Drone surfing is saying, I'm sick of being held by the wind. I'm going to be pulled instead by drones.

That way, I know where I'm going, and I can adjust it for myself. Users built it, not manufacturers. The one on the far left, again, users built it. Why the hell should I have either drones or a kite when, in fact, I can just put a little trolling fishing motor on the bottom of my board and go whipping along that way?

Now, so we found these innovations by our survey across the web, hosted comments. Then what happened? Well, we found out where they're coming from. We analyzed them, as I say. We had experts in the kitesurfing field say, is this really new?

And then we did something important for you. We said, fine, this may be a new thing, but is it going to grow like the case of the heart-lung machine? Or is it going to be something of only minor interest?

So what we did was we studied the social mentions, how many people were talking about, for example, the electric hydrofoil? How many people were searching for that design before it was commercialized? And what you saw was quite a lot of activity.

In other areas, you didn't see much activity. And those things like, for instance, the drone one never took off. So where were we here?

Yeah, so looking at that-- first, we find them. Then we say, fine, are other people adopting them? Is the early part, the user part of the diffusion curve showing promise that might be commercially converted? So I want to just tell you then that this is the story, and it's possible to do. So comments or questions most welcome.

[APPLAUSE]

Damn, I can't hear a thing about that wonderful applause. That's terrible, Hanna.

HANNA ADEYEMA: I am so sorry.

ERIC VON HIPPEL: Oh, my god, you guys, I couldn't hear. I could see your hands, but I couldn't see the applause.

HANNA ADEYEMA: Anyway. It was round of applause that--

ERIC VON HIPPEL: There you go.

HANNA ADEYEMA: It was amazing.

ERIC VON HIPPEL: I saw it, standing ovation. It was amazing.

HANNA ADEYEMA: Yeah.

ERIC VON HIPPEL: OK, so are there comments or questions?

HANNA ADEYEMA: Orlando.

AUDIENCE: Where can we find--

HANNA ADEYEMA: Oh, wait. He won't hear you.

AUDIENCE: Where can we find the methodology?

ERIC VON HIPPEL: Well, there's a paper on it. Hanna, can you distribute it that I did with Sandro?

HANNA ADEYEMA: We can.

ERIC VON HIPPEL: And what we're trialing this spring in a student course is a very user-friendly method that people can use. So I would say you'll get the idea of the methodology if you're skilled at analysis of big data. The present method will work for you. If you are saying, hey, I just want to get in this and do it in 20 minutes, then you got to wait. You can join my course in the spring.

HANNA ADEYEMA: And I just wanted to say that Orlando here I think is a user innovator. Do you want to share what you you're working on?

ERIC VON HIPPEL: What did you do?

AUDIENCE: Well, we collect quite a bit of data on hospital.

HANNA ADEYEMA: And who are you?

AUDIENCE: Oh, well, first of all, I'm Orlando Wright. I'm with the University of Maryland, Baltimore, in the Department of Addiction Research and Treatment under the leadership of Dr. Eric Weintraub. Give him a shout out all the time.

But most of what I'm interested in is looking at big data for our patients who are coming through our treatment centers, and in particular, those who are experiencing social determinants of health. And you were speak-- you're music to my ears because I got quite a bit of information that I'm collecting and hoping to find ways to access that information through our health information exchange.

ERIC VON HIPPEL: Fantastic. I mean, you will find that normally people look at the people with problems, but if you look at the positive deviance, that's where you're going to find the innovations. So my daughter, who is in public health, did a survey of cancer patients, women, breast cancer, who often, afterwards, have sexual function difficulties.

So they're innovating. No doctor's going to discuss with them what to do. They have developed innovations that can help others like themselves. And it's totally something that's not diffused but could be because people like you could find it in the data. So thanks for your comment.

HANNA ADEYEMA: [? Praneed. ?] And introduce yourself because-- oh, sorry.

AUDIENCE: Hello, Professor Hippel. My name is [? Praneed ?] [? Chan. ?] I'm a data scientist by training. So my question is along those lines.

So you talk a lot about user innovation. And what my head went towards was how adverse the problem is. So for instance, when your back hurt, you had to put it on a chair so that it won't hurt anymore. Or talking about withdrawals, you're trying to solve a problem there, which is in the situation of adversity, so if you had alternatives available, you would not pursue it. So in your research--

ERIC VON HIPPEL: Yeah, I can't hear you now. What?

AUDIENCE: Yeah, so sorry. There's some echo technologies. So in your research, I wonder if you've taken a look into a variable for adversity. And if that led to the success of an innovation or a user-driven innovation?

ERIC VON HIPPEL: Do you mean adversity? You mean the intensity of the need?

AUDIENCE: Yeah.

ERIC VON HIPPEL: Yes, the more intense-- that's why lead users do this. The more intense the need, the more you're going to struggle for a solution. So what we find is that user innovators with the best stuff are widely distributed in the population. So you have to have a method to search for them.

So for example, I suspect you would find doctors who are addicted coming up with better solutions than laypeople in some instances. So it's a matter of saying that they are there in the population, but once they've solved their problem, they're probably not advertising it. You wouldn't want a surgeon who said, oh, yeah, I was a drug addict last week.

So you have to have a systematic way of searching. And it's there. That's what we know. We've studied this a lot.

Important innovations largely are developed by users. So the methods to find them are what's at issue here. And that's what we're working on now.

AUDIENCE: Yeah, thank you so much.

ERIC VON HIPPEL: But you could be a lead user and develop better methods than us. And please share them.

HANNA ADEYEMA: And please introduce--

AUDIENCE: Hey, I'm Kelly Clark. I'm a psychiatrist and an addictionist. And this is a very innovative population, people who suffer from substance-use disorders or the disease of addiction.

But what we are discussing is the way that they innovate is your example was excellent, how to cheat on a drug test. How to get a-- use RC Cola to make an abuse-deterrent formulation injectable. One of the biggest innovations that people with addictive disease have really driven is the use of the dark web to get drug delivered to them 24/7, wherever they are.

So the innovations that are coming from what you were saying by user, we didn't hear any examples of positive innovation there, other than your earlier one about AA. Using fentanyl to treat heroin withdrawal is using an opioid to treat opioid withdrawal. That's not what we want to do, and if you were to be looking through this population. That's the innovation that you're primarily finding.

But then I looked at your other example, which was, for heart-lung machine, and you redefined user. The user's not the patient with the disease. The user who did the innovation was the physician. The people you were treating that was using that device--

ERIC VON HIPPEL: In that instance, yes. But they were users of the machine.

AUDIENCE: Yes, exactly. Exactly, so I wanted you to maybe speak a little bit more to-- so that we don't all walk out of here thinking user means person with the disease of addiction. User means customer for your product or service. I just wanted you to--

ERIC VON HIPPEL: Well, no, user of your product or service. Or now if you go to end user, the ones that are out there dominantly-- because, in fact, a lot of people have a lot of money invested in addicting more people in the rest, you will see primarily negative innovations. But you don't need thousands of positive innovations.

What you need is the few scattered throughout the population, like Alcoholics Anonymous. Those will be diffusible and testable. So it's not the general noise that you're looking for.

It's the small positive signal in the noise, and I guarantee because we've done it in everything from aerospace to patients. I'll guarantee you that it's out there in that population. So it's a search issue.

AUDIENCE: Absolutely, there is some innovation in the patient population that's positive innovation, yes.

ERIC VON HIPPEL: Yes, that's the point. And the advantage of a patient innovation that's positive is they have developed it in the real circumstances of use and found it still works. It's not something hypothetically developed by somebody else that might work.

AUDIENCE: I'll just go heart-lung machine.

ERIC VON HIPPEL: So thank you for your comment, by the way. Thank you very much.

AUDIENCE: Could I just make a comment and maybe a statement?

HANNA ADEYEMA: Can you--

AUDIENCE: Sorry, could I just make a statement about the user population? So I do some work with a colleague in Vancouver, and they have very progressive laws around controlled substances there. And one use case that we were discussing was that they have testing sites for controlled substances and that dealers go to those sites oftentimes to make sure that their products are not fentanyl laced or counterfeit.

So they're using that as a value proposition. I mean, I'm not saying that it's not nefarious, indeed, but it is a value proposition that people are not dying from that supply. And I think that was the value proposition that Silk Road was actually trying to make back when they were still in operation.

ERIC VON HIPPEL: Yeah, I think what all of you would enjoy is something-- a website, started by a colleague of mine, called patient-innovation.com. So that has been supported by the UN and others. It has thousands of user-developed innovations.

And the reason that Pedro Oliveira and I set it up was we're trying to get around this issue that innovations by patients are not often diffused, even when they're successful, because the patients, once they've solved their problem, they have no incentive. I wonder maybe-- Hanna, do I have a second or not?

HANNA ADEYEMA: You do. You do. You have as much time as you need. We've been pretty lax with time. Yeah, there's more questions too.

ERIC VON HIPPEL: All right, let me get this one.

AUDIENCE: All right, hi, I'm Jeremy Guttman. I run a company called Biomotivate. We are working on ways to use technology to help people to stay in recovery for substance-use disorders. And our current methodologies have used wrist wearables and virtual reality.

And Dr. von Hippel, I'm glad you mentioned positive deviance. I've actually been a huge fan of that methodology for a long time. And in the couple years that I've spent exploring this space, I've tried to pay attention to positive deviance stories, and I was struck by how the examples people gave were kind of-- I don't know if it's negative deviance or just positive deviance in a not fully positive manner, so I thought I could share some of the things that I have heard people talk about.

ERIC VON HIPPEL: Please do.

AUDIENCE: One is someone told me that they listen to motivational videos and paced around their house for hours and hours every day, and now he's 10 years sober. So it was repetition and a certain type of audiovisual stimulus that he found. I've talked to someone who had a little pebble that they put in their bag, and it was some kind of tangible, physical reminder for them that always helped them to stay on track and keep in mind what their goals are.

I talked to someone who put little tchotchkes and motivational quotes, and I think it was like maybe NA-AA phrases all over their entire dashboard of their car, and there was like 300 different things all over them in their space to remind them. And I've also thought that treatment centers have sometimes figured out really good ideas that they don't share. I've always thought there was a lot of gold that had the potential to be mined from what they've figured out since they've spent so many years trying to help people.

And there's very mixed long-term success with some of the methods they do. A lot of them are perceived to be not evidence based. But I've always heard about techniques that seem promising, and I was always surprised people weren't studying them more.

I mean, one that's becoming more known as EMDR, Eye Movement Desensitization and Reprocessing, where you neutralize the intensity of your negative memories. And I've heard some treatment centers using something called brainspotting where you use your mind's eye to find a spot that feels triggering and then desensitize that. And so there are positive things that I've heard about by trying to pay attention to them. And I'm curious if you have any suggestions on-- if there could be some kind of crowdsourcing initiative for SUD-positive deviance methods that we could even initiate, starting with this group, if you have any suggestions for that.

ERIC VON HIPPEL: I think it would be excellent. I mean, good for you because, once you see somebody doing something like, for instance, the motivational, self-motivational stuff, you have a basis for saying, what's the principle here? What's going on? How do we turn that into a general method?

So it's not that your role is simply to copy what they're doing. Your role is also to say, what's going on underneath it. I see that it works.

Now, let me show you something. And thank you for that. Let's see if I can do it. Share.

Yeah, so this is patient innovation. It's a website. Can you see it? And you notice they're saying, you can either post a solution or search for a solution.

So these are innovations that users have developed, or their caregivers, for themselves. So for example-- and they can be simple or complex. Let's see here, search a solution. Here's an amazing one. Let's see if I can get it.

Yeah, so this is an amazing one. This is a guy who had Marfan-- he's a patient. He's a hydraulic engineer, actually. And he's a patient.

And basically, the solution given by surgeons was, well, we operate on you. Your aorta gets thinner and thinner. We cut it up and we et cetera, et cetera. And eventually, you die because it's just too thin, and it breaks, and you bleed out.

So he said, listen, I'm a hydraulic engineer. We don't treat leaky pipes by slicing them. We add a support around it. And so he-- and this is an extraordinary one.

He developed the idea of these kind of Dacron supports that wrap around an aorta. They're specially designed for each patient. And he convinced his surgeon to put it in.

And now this is a new approach to that particular problem. And again, he's the innovator right. So anyway, you should take a look at this thing.

There are about 5,000 innovations. And it's an attempt to get around the issue of, where do you find stuff? Well, this particular website has doctors vetting it so that stuff that's dangerous is not posted.

And there are many patients who are willing to post their innovations. And, yeah, free source. So patients do have some incentive to post.

But in addition, there is this general search process we're developing. So bottom line, again, is it's out there. It's positive deviance, just as my previous commenter said.

And it's a fantastic source of things that work in the field that you can go to and screen for new product ideas. So that's what I wanted to say, and I know I'm keeping you late for lunch or whatever I'm doing evil.

HANNA ADEYEMA: It's dinnertime.

ERIC VON HIPPEL: Dinnertime.

HANNA ADEYEMA: But we have another session before we go there. Are there any more questions? Should we wrap it up?

OK, so, yeah, I feel a lot of response in the audience. Definitely neurons firing up.

[LAUGHING]

ERIC VON HIPPEL: That's good.

HANNA ADEYEMA: We've confused them enough with all the different ways you can go about things. Anything you would like to say before concluding the sessions?

ERIC VON HIPPEL: Are you talking to me?

HANNA ADEYEMA: Yeah.

ERIC VON HIPPEL: No, I'm just a huge fan of what you're doing, Hanna, and of what the people here are doing. It's clearly an enormously important problem. And all I'm doing is saying oh, there's another source of potential solutions.

Don't focus on the people who are saying, oh, I'm helpless, and I'm doomed, and I'm wrecking things. Go and look for the small subset who have said, I'm in a terrible situation, and I managed to figure out a way myself nonetheless. So that's my ending rant, and I wish you a good dinner. Bye.

HANNA ADEYEMA: Thank you.

ERIC VON HIPPEL: Welcome.

[APPLAUSE]