Sabine Seymour, PhD

Founder at SUPA and MOONDIAL, Board Member at polypoly; Entrepreneur, Researcher, Professor, Investor

Lee Anderson (LA) *Could you describe your background specifically in the context of your work as an innovator and advocate for wearables?*

Sabine Seymour (SS) I started being interested in wearables in the early 90s. At that time, we were primarily working with Body Area Networks, meaning that there was no WiFi connection, there was no Bluetooth, because that came in 2000. WiFi came a little bit earlier than that, but still it was something where you had to use the body and its connection to the exterior very wisely.

For example, the first wearable I built was a helmet as a game controller, in 1996. At that time, Danny Rozin, who was one of the professors at ITP, had developed a plugin for Director and it was able to capture, through a camera that you would situate on the ceiling, an infrared LED that you carried, or wore, or added to a helmet. As you moved around the space, the camera detected where you were. There was no technology on the body other than the LED which interfaced with the camera. That plugin then controlled the three different screens in the space, so the body was manipulating the screens mediated through a camera. Early days (laughing).

I became extremely interested in using the body as an interface; I'm an athlete, and I was always very interested in clothing as well. Through my family history I was very in tune with, and understood, smart textiles, or textiles in general, and using "accessories" rather than calling them "computers." To me, a computational device was always

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something that you were able to stylistically use as an accessory or use as a beautiful item. That's why when Apple came out with the iPhone and other "gadgets," I was very tuned in because I love the fact that they became not just technical items, but they became accessories; they became beautiful objects.

That's the second wave in terms of wearables. And then Bluetooth came along. When the Bluetooth standard was coming out in 2000, that really brought an extreme boost to anything that we would currently consider

wearable. And then 2003, a lot of the smart textiles—Burton came out with what they call their Audex system. For the jacket they had worked with Sony first, and then with the iPod.

Suddenly you had a ton of

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programmers that knew how to work those sensors. You didn't just have coders that were doing software, but you had coders that were really into physical computing.

And then when Tom Igoe, my classmate at ITP, and the crew came out with the Arduino, that was another wave because that allowed everybody to start playing around with physical computing. So you had this really big emergence of Bluetooth as a standard, the Arduino board to start playing around, the accelerometer, the iPhone, and the rest is history.

All the hardware manufacturers were suddenly pushing out a lot of "gadgets" or wearables that were all about the accelerometer—Fitbit and so forth. Those were all coming out at a time when the accelerometer was really cheap. It was just housing the accelerometer in a piece of plastic, and, they all look the same, really.

What we're seeing now in 2020 are the wearables that really developed over the last five to 10 years and grew into market leaders. Some of them are still around because they also opened their software. They have either very simple and great API's to plug in—Apple, the Apple Watch, being one of them, if you are on the iOS operating system—but also others like Garmin and in the Oura ring. Fitbit also understood that becoming a data company is more relevant than being a hardware company.

LA *Early on, you mentioned this relationship between the body and the environment. And I wonder how you saw opportunity between all of these things coming to the market, the capabilities that were evolving, the skill sets that were evolving and*

how you could translate that into projects that respond to the current moment.

SS A lot is my personal background because I grew up within the design and the arts community, but at the same time I was taught to program when I was 12. The other thing is also being a female in an engineering driven environment. At the time it was definitely a hard thing. It still isn't easy.

But I think that perspective actually helped me quite a bit. It allowed me to create things that were unimaginable by others because either they came

and how it's a vessel for this kind of communication that you're talking about?

SS I think fashion is an amazing reflection of society; fashion is more social science to me than anything else. I truly believe that it reflects where we are right now, or where we were at a given time. And I truly, truly believe that, with technology, we enable. I always say, "technology is fashion's new accessory."

LA *So on that note about the sensorization of fashion and of our bodies, what would be the ideal future for fashion in bringing those two*

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out of the fashion, accessory and design world, or the others came out of the engineering world - I put them together.

My background in economics also helped because I was always very, very interested in creating something almost like a movement. That's why now I'm a data activist I guess. Because it is important to think about how you can leverage all that to create something that spurs another product, another thought process—that it inspires people. That's why I love teaching and being involved with the startup communities and with artists. Because I was able to, and I hope I still ignite.

LA *On that note, can you speak to the role that fashion has in culture,*

things together in our everyday wear, or whether it's special products—how do you see that playing out?

SS Individualism, I think. Of course, I'm into healthcare and sports so you need to have individual sensors, we need to watch individual biometric signals, environmental signals. So, again, very personalized, very individual.

Even though I love technology and we will need sensors, what about sustainability, what about energy? All these different items, we need to think about how they can actually be produced sustainably, recycled and or reused, or biodegradable.

Different types of processors already exist, they're just in the labs. So

there's quite a lot of research and lots of work already done.

And I would argue for regarding clothing as an emotional item. The more the clothing or what I wear is mine, meaning I identify with it emotionally and identify with it functionally, the longer I want to keep it. So I think that will definitely spur a new movement.

LA *When you're talking about fashion being emotional, and how the more you can connect to it as an individual and as a form of expression or a sense of self, that maybe the data that could come from that—which would be personal and protected—ideally—if you connect with that data, then you potentially start to have a different relationship with your own body that could originate through fashion and what you're wearing.*

SS Absolutely, yes. It's body awareness, it's awareness about the environment. And, of course, I'm very much into data privacy and data sovereignty, getting reimbursed for data you generate in terms of allowing somebody to access your data as a raw material, as long as there are mechanisms to protect you. I want to participate in the raw material that I'm generating, so I think that is also a very emotional thing.

LA *And you have a unique vantage point also from an international point of view on where we are with all of this. Can you speak on the difference between the US and how the EU is approaching this with the GDPR and the possibilities there for the individual?*

SS So there is definitely a huge difference. You have the USA and

also China where the large data collecting technology corporations are located. And then Europe in the middle, until recently, hasn't really played a big role.

The issue with that is that you have business practices and legislation that might not agree with European

standards - social standard, security standard, the way of life. So there's a huge requirement or necessity to actually create a European infrastructure.

And then you have GDPR, the General Data Protection Regulation, which is legislation that came out in May of 2018 here in Europe. And in January of this year, you got CCPA in California, which gives California residents the ability to regulate what you as a consumer want to give up. That is modeled after the GDPR, and you also have legislation in other countries modeled after GDPR.

The problem with that is very simple. It's a great first step, but in order to execute you need to have a huge legal framework, meaning expertise to enforce those laws. So from a pure business modeling perspective it's an amazing opportunity in Europe. Particularly now with COVID, you suddenly have things that are popping up left and right that are more interesting in Europe than they are in the US.

Data privacy has to be ingrained in the soul of the actual company. It is not something that you can just add on. I call that "privacy washing" like greenwashing.

The other thing that is very important to me is sharing the wealth. So if you are creating a data company right

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now in Europe and you have the ability to share the wealth and create business models, that allow citizens to reclaim their data. You create. You create what I'm doing right now as member of the board of polypoly, a pan European data cooperative. I'm also setting up a data cooperative for SUPA to democratize healthcare data. There are models that allow us to share the wealth, and do it in a way that allows you, as a data generator, to participate.

LA *What are some of the most important things you think we could be and should be measuring right now?*

SS Just in general, from a biometric perspective, we definitely want to understand anything that has to do with our blood, our temperature, our breathing rates, anything that has to do with the basic understanding of our bodies.

If you go to a big medical checkup, what are they checking? There's a reason why. If most of that can get checked with a wearable, perfect.

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On top of that we can measure the environment. That can be tracking vitamin D deficiencies because you're not in the sun enough, or you might have asthma because you live next to an airport. And also, what are the things that you do with your body in terms of exercise? How much do you move your body? Right now, we either have jobs where people sit a lot or stand a lot. We don't have a lot of jobs where you move a lot, literally move. There's too much steadiness in our work and that affects our eyesight, our back, and also very much influences mental health.

LA *Can you speak to some of the most promising ways that these technologies are being used right now? Whether it's in your work or others that you've seen?*

SS Very interestingly, you see that a lot of wearables are starting to pop up left and right to be used for COVID, early detection and so forth, from the Apple watch all the way to the Oura ring. But the Apple Watch is not going to tell you if you're sick or not, but it's going to read the symptoms, and then you still have to get a check up.

But that applies to pretty much for every wearable that is out there. What you really need to do is create a matrix of various aggregate data sets, then use those aggregated data sets as information to further train an AI to at least give you pointers. Those are the interesting facets, where you have a very diverse set of inputs from a very diverse set of people.

LA *What are some of the space applications that you see for the sensorization of individuals in space, or other ways we might connect Earth and space-based systems to enhance the value of our data?*

SS We were invited to NASA to showcase SUPA's research into smart textiles and the exploration of hundreds of smart sensor products from core temperature to oxygen level. Space companies are highly interested in biometric sensors because we can measure the effects of space travel on the human body.

LA *You mentioned earlier the idea of sustainability as well. I wonder how some of these measurements, or at least the technology, could help in improving that impact whether it's a supply chain question or just understanding how people use, purchase, and dispose of clothing.*

SS For the last 15 or so years we have explored different types of sensors that can be built on biological substrates or different types of materials that are sustainable. On top of that, you have to think about the manufacturing process so that it can be easily removed or repurposed. For example, we did a project where we used the heart rate sensors that you have in sports bras to create harnesses for pregnant women in Ethiopian villages to detect heart problems during labor in time to reach the closest clinic.

LA *How might we increase our awareness of that relationship between our bodies and the environment, and what we could gain from that?*

SS Clothing is a second skin. What you wear, an accessory, or even glasses. So you have an immediate possibility to become this very tiny sensor footprint, and then your friend is another one and their friend is another one. And within a very short distance, you have a lot of different inputs.

Look into micro plastics in the ocean, for example, along with surfers. If you want to measure microplastics, you basically have to grab it from the water and then send it to the lab,

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and you only capture from a limited area at a time. But what if you have a bunch of surfers where everybody gets a tube with a label to take water and a sensor that documents exactly where, exactly when, and then you can correlate the wind, the tide, and how much microplastic is there. Then you can understand where it is coming from. So, accessories, and clothing are amazing opportunities for sensors that can sense the body, but also can sense the environment.

LA *From early on in the 90s, or the early 2000s to now, what has changed in the business case that you've put forward for these technologies?*

SS In the beginning, you had 1,000 jackets from Burton Audex and they were $1,000 each, so there wasn't really a business case; it was more like the marketing budget. The early days of the wearables or the early days of smart textiles was like, "what's your marketing budget," "what's your innovation budget?" "Where can you actually use what we learned from that research in another product?" It was barely about the actual product itself. It was more about the learnings and the hype. The hype paid for it.

Then the price points fell on certain items, and the Fitbits of the world came out. You had companies that were basically diversifying their wearable portfolios, and others that started to develop their own applications on top of that. As a consumer you started to understand the benefit, and for that you also paid for the app development.

And then it all turned into what we now do with the data itself, because hardware is hardware. Now there are new developments with new sensors, new sustainability, new products,

new business cases, new accuracy of data, that's very important, because the sensors and the materials that we're using are becoming much more accurate.

LA *So that's sort of the business pitch, and then what's the pitch to the customer to the user? How do you get people on board with this mission?*

SS It's two things. We need to put forth that you can become part of a company. You're part of a data cooperative. With your help, we grow. And, you get paid for the access to your data and a dividend at the end of the year.

To me, we empower. A lot of people are not getting empowered. They feel helpless. They might want to do something, but they don't know how. So positive empowerment is one piece. And the other is really making

it cool to have a personal identity, and you're known for that one thing. Like Helmut Lang, one of the Austrian designers, only had white t-shirts and jeans. That was his outfit.

LA *In some ways, what you're describing is a forecasting conversation. So you're saying, here's what we want to get to, and here are some of the steps we have to take in order to get there. Can you walk me through some of these early steps?*

SS It is about positive empowerment and education. We have to encourage a 16 year old boy who is interested in sustainability and Fridays for Future. Or introduce girls to chemistry through role models like the two female Nobel Prize winners. Or empower people to have control over their data privacy.

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Sabine Seymour, Credit: Hannes Rohrer

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