

# Marina Toeters

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**Lee Anderson (LA)** *I'm really interested in your view on fashion technology and the role that it can play in improving the industry or changing the industry. And then also your projects that involve extreme environments or the space environment. So just to lay the groundwork a little bit, could you describe how you got into this work? What drew you to fashion technology as an innovation and as a way to explore some of these themes?*

**Marina Toeters (MT)** So I was studying fashion design and found out that fashion pretends to be very innovative but actually doesn't innovate at all in the sense of material use or in the sense of how things are being produced. And that frustrated me, but also, later on, it inspired me to talk with technicians on how new innovations can then be applied into fashion, how they can be applied into new materials developments, or how new materials developments can be applied into fashion.

I'm also super inspired by technicians or technical engineers, very focused people that have worked on developments for decades, while fashion is very hard to describe—it's so on the surface, I think, and it's so quick, less focused.

And so in 2006 I started full time working on bridging the gap between tech and design. Especially

the inspiration that I gained from all the technical developments, that's what keeps me going and keeps me driving.

Also, I'm a bit frustrated that there's so much money going into the fashion industry, and people put a lot of value into it; they find it very important, what they wear, how they

**LA** *Could you describe the current state of the industry, and you touched on this a little bit, but from your perspective, whether it's the good things or the bad things that you think about when you're designing fashion products?*

**MT** I think fashion has a lot of power to influence people's buying

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look. But at the same time it also has a huge impact on the world. Can we do that a bit more sustainably? Can we do that a bit more neatly? Can we do that a bit more personalized, more relevant for our customers instead of just putting all this stuff on the market?

I think that the answers on all these questions is yes, we can do that. Through, for example, localized production, and also, we can make way more complex products than we currently are and they can become so much more dynamic than they currently are, and that's what I try to contribute to the world.

behavior. We really know how to seduce people, how to show good looking people that have good looking products that people really want to have. And I think that's very much a quality but if you use it in for the better instead of only for higher sales marks, then we can also make a super quick change in the world. We can in just a few seasons, everything can be changed. While, for example, in the car industry it's way more calm, it takes decades before you have to change there. So I think that's a quality that fashion has.

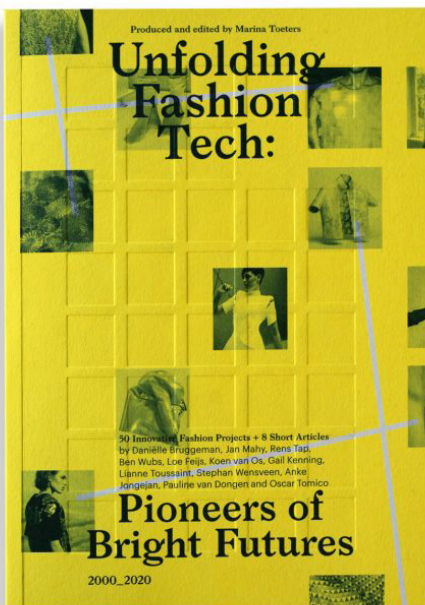
But we only innovate in a more economical sense. So how can we



make our garments even cheaper? How can we make them in even lighter materials? How can we make them at even poorer quality because we don't wear our garments until they are worn out, so we lower and lower the quality. And not only in the quality of the products but also in how they are being made and how we treat the people that make them, and with that, also the people that wear them. And I think that's a sad thing.

I think we can also value our customers much more, and empathize with them so that we can deliver them better goods. But empathizing with production stakeholders, too. In such a global market as it is today, that's super hard. It's already hard to empathize with your neighbors, so how can we empathize with the people on another continent who are making our stuff?

*LA I'm curious, because you've done a lot of multidisciplinary collaborations and it seems like your passion for the technical side and inspiration taken from that has maybe informed your practice, I wonder if you can*



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*Speak to some of the most successful collaborations with multidisciplinary teams, and maybe some takeaways that could impact this. Like, if the product development process, for example, could be kind of transferred into a way to think about fashion.*

**MT** Every project that I run is a multidisciplinary approach; sometimes it's like really opposite parties, sometimes it's—like currently, in March when COVID really kicked off we started working on this face mask [The Fashion Filter]. This is a team of three, so me as a fashion technologist and then two designers who are famous for 3D printing textiles and structured materials, LABELDBY. They are also designers so that's closer, but they have another area of expertise and are way better in marketing approaches and digital communication etc. so that is a little bit multidisciplinary.

But in every project, I'm working with a wide variety of people. The more complex it gets, the more people involved, the more complex the expertise, the better. I really love this—orchestrating complexity.

So, for example, to put it in a very commercial direction, we developed a blue light therapy device for Philips, so very much a commercial, global product. There, in the end, my expertise is really in the forefront of development, in the R&D processes. And then, in the end, it comes to market and you have to do all kinds

of sizing processes, and it's very much a global manufacturing approach. So you can imagine that those processes are with huge teams.

And then totally on the other side is, I think, a project for Ilja Visser which was about lights integrated into garments. It's very much high-end fashion so we worked with an atelier here in Amsterdam, integrating all the pieces by hand, very much the craft way, and it only had to look super pretty and everything is orchestrated.

So that's the total opposite, I think. And for them, I'm really the technical person, but, for Philips, I'm totally the designer—the fashion designer even. So walking in between those fields, that's typically what I do.

Moving over to the Human & Kind project for ESA, that was a super nice opportunity because they asked a group of designers, artists, theatre makers, et cetera to come up with concepts asking, if you can start living on the moon with bigger groups of people, what do you want to transfer to the moon, and what should stay here?

So really envisioning the future in a total non-design place, and it was nice that I could make it realistic by testing all kinds of materials on the environment that is happening at the moment. Looking at this huge variety of temperatures, and are these materials going to conduct this temperature or not? But also

the more emotional values, like do you want to still have the connection to history, to the past? So which kinds of materials give this kind of emotional thoughts? I think it's important to inform technologists about these kind of emotional things, and designers about these kind of factual things. And that's what I tried to do in that process.

In the end, we measured, I think, over 100 materials on a whole lot of

*environments, and how those could be created for space that may be spun-off to help in more sustainable living on earth. Because you just described a very speculative future design, I'd love to hear your thoughts on ways that those concepts can be brought back to earth and help us today.*

**MT** Well, for example, this ESA project was already 10 years ago. And because I developed this huge database of all the textile knowledge,

thing [holding up the masks made with LABALEDBY], where we just measure the amount of pressure—you become like this [gesturing tunnel vision], and especially now, as it's a bit of a scary time and people tend to close up. With these very open propositions you can look super positively into the future, and that gives so much energy.

**LA** *You talk about how we could infuse more value into our fashion products. I think this might go back to your comments earlier about making more dynamic and complex products and not just being about more sales. But maybe there's more to that. And in the examples where you do set out to make something that is going to be a commercially viable product versus speculative, what are some of the considerations, how do you approach that differently?*

**MT** Conceptually, not so much. But if you come closer to the markets, then availability of materials, producibility and linking it directly to the likes of people—that is then more important, I would say, than the needs. Because when you are far from the market, or deep in R&D, it's often about the needs: the need to be protected from the heat when living on the moon, and the need to be treated from this disease...that in R&D is a huge thing.

**LA** *I wonder if, in your work with the*

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different qualities. And then we made 16 prototypes out of the most extreme ones; so the most conductive ones, the most light one, the most heavy one. Not to say okay, this is what we're going to wear or what we're going to look like on a moon, but that this is the variety of possibilities.

If it's super important, for transport reasons, to make it light, then we have to go that way. But if we want to do exercises on the moon and you need a bit more heaviness, then maybe you want to go in another direction. And that was, for me, a good opportunity to spread out the total textile technology knowledge and also apply that into this example of multi-disciplinary work.

**LA** *You described your role changing in the different contexts, being the technologist or being the designer. I saw that you were involved in the 65th International Astronautical Congress and looking at architectural*

measured on all sorts of different parameters, now we are doing what is very much an applied project which is about—a little bit in the range that I talked about with the blue light therapy—we apply LEDs on the body here, also, and then you have a temperature issue. So, this is like one-to-one being directly translated from that research, and from those developments, and I think putting it in a certain extreme environment or certain extreme proposition gives you so much freedom of mind.

So, always being super applied, as we do now in this Fashion Filter

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*ESA or other space products where you are looking at this projected future and preferred future, do you see commercial viability to those products? And, if not now, then when?*

**MT** For years they've said that wearable tech is around the corner. Always popping up but never there. But I don't agree because when it's "tech", it's also something that you don't use, that you don't wear, and garments are something that you wear. Over the last decade, for example, you don't have to iron your blouse anymore because we have like these easy-finish materials; your socks won't smell that much anymore—there are all kinds of secret innovations.

And that's also a bit blunt of me in the beginning that I state like, okay, fashion is not innovating at all. I still think that the innovation is not being driven by the fashion labels themselves, but it is driven by textile manufacturers, by the production parties. And gradually, garments are gonna measure your behavior, your body, more and more.

First, of course, the smartphone came in so it was less relevant to have smart garments, and now we have all the smartwatches but we also find out that they are not that accurate and maybe also not that pretty. So we need new alternatives for those kind of developments as well, and we also start to feel how intimate garments are and that we have to design something in response to that.

**LA** *Could you speak a little more to the impact that fashion can have on culture, and vice-versa, when we're talking about wearable technology, like no-wrinkle shirts where you don't even think about the technology*

*because it seems low tech once it's in our hands, but the process to get there is much more involved. So how does that start to change or impact culture?*

**MT** Yeah, good point. I recently developed a paper ["Keeping the

that for the last 30 years, and a lot of funding is being put into sensing.

I think that the only way wearables are really going to be accepted is when they also start to do something themselves and not get all their information from us, put them in a

**"The only way wearables are really going to be accepted is when they start to do something themselves and not get all their information from us... to do something harmful with our data"**

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Data within the Garment: Balancing Sensing and Actuating in Fashion Technology"] where we address that. It also starts with all the discussions now going on in privacy related to wearable tech.

In that project, we compared five design processes where I was involved. What I see happening in the world of tech is that there's a lot of focus on the sensing part. So we are quite able to measure your heartbeat and your breathability and how much you move and your temperature and even your core temperature and it's all quite medical related and all gathering this data, but then we hardly know what to do with it.

What I think is a lacking field is that we also have to develop the devices into our garments way better. We have a lot of skin; we can use all the surface for doing something with it. But it's way harder to create vibration or give heat or cooling, those kind of activating things; it's harder than the sensing because we didn't focus on

cloud for Google or another scary name like Echo—because all of the US giants are super scary—to do something harmful with our data.

I think it's way more interesting if the garments themselves can start doing things. Of course, under our supervision because we are the wearers and we always need an opt-out option there. That's the approach that I take before it's going to be culturally accepted or acceptable to put those kinds of things on the market.

That is also where designers have to come in to think about the purpose, do we like it, and what is the usability for the wearer? Those kind of ethical questions. Because technologists are not typically educated in that field thinking in that manner. So I think designers can contribute nicely there.

**LA** *In that study from 2014 about in-situ manufacturing and ways that you can localize building habitats, I think this translates really well into fashion manufacturing also in space*

on Earth, whether it's using local materials or materials where you only need a small amount and then it self-reproduces. How does your work explore the possibilities of local manufacturing?

**MT** Not as far-fetched as what you are mentioning, but in September (2019) we started FashionTech Farm. One of my dreams is that the people from the neighborhood come up with their own old garments, get a cup of coffee, we do a bit of talking, the machine starts working, and after you've finished your coffee, you can leave with your new garment—preferably made out of these old garments or the next iteration is going to be made of old garments. That is the long-term vision.

And then, next to that, you're going to go out with these new governments that also keep you a bit better in balance because I saw that you are not sitting straight, whatever, and in the end you'll notice, "hey, I don't have back pain anymore."

That is the long-term thinking and that is also how we try to design this building. It's a collaborative workspace where people do their own expertise, all, hopefully, in the direction of FashionTech. And slowly trying to get this automated production process; so we need machines for these kinds of actions, or they need to be made three dimensionally in one go.

We need to get the old garments and the materials back so that we don't have this garment mountain that's super crazy. How can we put that into new materials and new garments again? That is something that we are actually working on, slowly.

**LA** I'm curious if you've ever been really surprised by what others have done with the technology that you've put out there, whether it's Solar Fiber or something else.

**MT** I do quite a bit of education. I educate one day a week in Eindhoven University of Technology for example; that's kind of my base currently. And the nice thing is that, in the very first week, you kind of say something about what's happening in the fields, what is out there, I show some of my projects; then during the semester or during the workshop week, or whatever kind of timeframe it is, in the end, you always get the projects back. And I think this is so much of the presence that you are referring to: That they take it to

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#### LINKS

Fashion Tech Farm  
by-wire.net  
Unfolding Fashion Tech:  
Pioneers of Bright Futures

totally different levels, and it's also the goals that, making their business from this one tiny idea, that is super satisfying.

But I cannot mention, like, this one idea that is the killer app—and I also don't believe in the killer app—it's going to happen slowly; no wrinkle shirts, sensing garments, no back pain dresses, warming jackets, those kind of slowly things. That's how I think fashion is going to change.

**LA** I would love to end with your role as an educator and why is it important to cover these topics in the educational setting?

**MT** I think there are huge innovation possibilities in the field of garments and in the field of wearables. Much more than the current army of FashionTech can do. We need way more power, this kind of innovation power, in this field of fashion. And then, well, I think the impact can be huge because garments are being worn every day, every hour of the day. You can have so much positive impact on what people wear, what people experience, on an everyday scale.

And in order to be able to do so, I think it is important that you learn to empathize and that you really want to deliver the best to the people that you are serving. And the best is, of course, not only in numbers; it's best fit, or, again, this wide variety where all can be improved. Don't hesitate to put something on the market and then improve from there. I think that is the only way to go. If you want to do this perfect-and-once then you're never going to have something on the market.