

CONTEXT: Interviews conducted as part of an investigation into the barriers to, and opportunities for, achieving Circular Synthetics. Research was funded by Business of Fashion, Textiles and Technology Creative Research & Development Partnership (BFTT CRDP—£5.5 million) led by the University of the Arts London, part of the UK Creative Industries Clusters Programme (CICP) funded by the Industrial Strategy Challenge Fund, and delivered by the Arts and Humanities Research Council (AHRC) on behalf of UK Research and Innovation.

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Interviewee: Senior project manager, circularity consultancy

1: Interviewer

2: Interviewee

1: Okay. Starting off with a general question. Can you tell me a bit about the background of [redacted] and your role within the organization?

2: Yes. [redacted] is a not-for-profit organization based in [redacted] and it aims to create or accelerate the creation of the practical and scalable solutions for a circular economy. The organization, there are different opinions there, but somewhere between 2012, 2014, and a textiles program actually started quite early already in 2014. That's a group of people within [redacted]. It only focused on circular textiles with the aim to create a zero-waste textile industry.

Well, basically, here, now currently at [redacted], we have this one mission of spreading the zero-waste textile industry and we have two different ways to do that. If you would say that we are facing a huge mountain of used textiles, we have two main components on how we try to tackle this. On the one side, we try to, that's what we say reduce the mountain of textiles to bring these materials, ensure materials can be brought back in the loop.

That's more of the, I always call it the trashy side of fashion that's where I'm focusing my time on. Some of my colleagues are more what I call the fashionable side of fashion who are exploring business models so concepts, this kind of things. My role is I'm a Senior Project Manager so I do projects.

1: You work specifically on the [redacted] or does your role cover more projects in that?

2: Well, before, it was almost only the [redacted] which ended in mid-March. Actually, we were supposed to have this symposium on the 12th of March which was canceled today before they announced the webinar. Anyone who's still interested, it still lives on YouTube so that's actually quite nice. There are also friends doing a research on the accuracy of the composition claims on care labels.

When your t-shirt says 100% cotton, is it 100% cotton? Now, we also scope some other projects who are more related to jobs and skills to employment effects of circular textiles. I work at [redacted] on a part-time basis because besides [redacted], I also started a social enterprise. It has a dutch name. It's called [redacted] and it's funded by the City [redacted]. My aim is to create a last resort for used textiles focusing on chemical recycling mainly, like polyester extraction of textiles.

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1: That sounds really interesting. Are you able to say a bit more about that or there's some information online about that?

2: No. I started in 2018 because [redacted] is a major port, it's a major transport and the Netherlands is actually a huge importer and exporter of used textiles. For instance, lots of the German textile is actually sorted here in this area and then exported abroad. I was mainly concerned about all the polyester garments because we know that there's quite a big share either that is sorted abroad so meaning that we don't really know what happens especially if they're non-re-wearable.

Also, the sorters actually export mixes of products meaning that well, it goes to a market so let's say 1/3 will be immediately sold, 1/3 might need to wait for the sales, and 1/3 might not be sold at all. If we could actually take those materials instead of them ending up in a landfill somewhere abroad and recycle them here and turn them into new resources, at least we know that something good happens to them.

When I started this initiative, the city was not-- They literally told me that textiles were not a priority so they were not very much convinced. Then I got some innovation funding and what I've decided to do is I didn't want to be a person with an idea so I started the pilots. I got textiles from the City [redacted] that were left behind at the marathon. Many people, it's shocking but they run a marathon, you want to be warm at the start.

You bring your even new jacket, everything and then they leave it behind. That was collected and the non-re-wearable share of those garments that were given to us. We asked the sheltered workshop, people in this the labor market to remove buttons and zippers. With a chemical recycler based in the US, [redacted] we did polyester extraction to also try out their processes. They recently started the pilot plant-

[phone rings]

1: Sorry.

2: -and turn it into yarn, and we're supposed to present the T-shirts start of April at the marathon.

1: Amazing.

2: [crosstalk] happened where the marathon was canceled, but the T-shirt is now on its way to [redacted]. We're still going to do a product presentation and launch either at next marathon if it happens in October or on a different occasion. The aim of this pilot was one to make everyone enthusiastic and a little bit nervous.

Because to really show that actually you can do something, even though it's only a pilot plant, to try out also these technologies, so this is one of them. We got married to them to just to see okay, how far are we along, and also to figure out what were the other missing pieces of the puzzle. What we found out is that technically this is all possible. Of course, you need to have quite a big scale.

When we talk to sorters, everyone has different opinion on what the actual composition is of their lower material, like the lower grade materials and their textile

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waste. That is now our next step will be with sorters here in the region to assess the composition of their textile waste or their lower grade textiles. Because if you want to invest in a big plant or if you want to create a business case for a big plant like this, you have to have some clarity on composition of your feedstock.

Because if we all go for polyester, and then suddenly the problem is not polyester but acrylic, you don't have your 50,000 tons facility--

1: Yes, that's really interesting. Do you have the product in hand? Have you seen the prototype or the-

2: It's on its way.

1: That's so exciting. What a brilliant project. It's quite funny, this is the brilliant thing about doing these interviews with so many different people. We also had a sportswear brand who told us about the use of marathons and big sporting events to collect sportswear back. It's such a brilliant idea, so that's really interesting that you mentioned that.

2: In sportswear, if you have polyester recycling-- There are different things about sportswear, so one it's almost all polyester, and lots of it is not suitable for the second-hand market because often if for instance, you have a running jacket or shirt, there will be some kind of sponsor on it or like skiing weekend 2018. These kind of things is actually what we got also from the second-hand shops. We try to sell the stuff.

Those things they didn't put them in store because they don't want to sell that, and also there's no market for it. Actually there's quite a big mountain of textiles. The only thing there is I would definitely not rely on manual removal of buttons and zippers especially for sportswear because the amount of zippers, for instance, they are able to put in sweatpants. You have zippers on the side, you have zippers on the back then you have like something to strap in it. That was really time-consuming.

1: From that project, I am presuming you do an economic review or validation of the costs that were involved. I imagine at that moment, it's not really an economically--

2: I do not know if not, because it did create a more of a theoretical business case and then you could even pay for a sheltered workshop, for instance, they are the business case. In theory, once is that scale for polyester recycling is that interesting that you would have some margin, for instance, to pay for labor, which might not be the most cost-effective one. But if you also have social agenda, that makes sense.

1: It seems that the hardware on clothes, different people have different opinions on it. Some people say they don't think if it was economically viable, then it wouldn't matter, you would be able to pay for those labor costs because it wouldn't make sense. Then another guy who was involved in the bottle recycling said it takes ages to take labels off bottles, so it's just the same. It's quite interesting to hear different perspectives on that.

2: Yes, it also depends on, for instance, this technology from [redacted]. In theory, it could process things with zippers and buttons, so it should not be a problem

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especially because most of them are polyester anyway. Then for the metallic ones, there are installations with the magnets that actually can remove it. It's like a chop and then all the heavy parts fall down.

Technically, that's possible, but now if you look at feedstock requirements, for instance, I also work with [redacted], so in relation to the [redacted]. There they do not ask to do trials with feedstock, they don't have any hardware on them. That's a little bit. Technically, I think that chemical recyclers should be able to process materials where this hardware is-

1: I guess as soon as they've started to be commercially viable, they can invest in machinery which will do it for them but at the moment, it's difficult, isn't it?

2: Yes.

1: Okay, great. That's fantastic. We may have covered a little bit of the other questions that I was going to ask but maybe if something else occurs to you and I ask them. What have your experiences been of dealing with circular synthetics? You've just talked about the project that you're working on now, but maybe in relation to the [redacted] as well?

2: Yes. In the relation to the [redacted], there the problem is that they're quite some cotton-polyesters and polyesters coming out of the [redacted] obviously as well. There the big challenge is that maybe on the long run, there might be a market for it. But currently, there isn't, so there is no very good destination for all these products, except maybe for some mechanical recycling.

That's also what they are now considering because the nice thing is that they can also, for instance, do color sorting, even of these textiles containing polyester. There are also here in Netherlands for instance, social enterprises that do mechanical recycling and then turn them in these laptop sleeves or these kind of things. Then if you have color sorted polyester garments that might be suitable feedstock for them.

That's also still quite early days because we can see that in that sense, [redacted] was a little bit ahead of its time.

1: Yes, of course. Then because this is one of the other interesting things that people have been saying that there may be like - how you would say - downcycling interim step for polyester before, just to extend that no energy for use phase. The laptop cases and things like that, how are they processing the polyester to make those? Is it nonwoven or is it just melt?

2: Yes, it's nonwoven and there indeed they do like a little bit of polyester because it very much strengthens the fabric that they create.

1: Okay, that's interesting. In terms of [redacted], polyester is quite easy to identify, isn't it? Is that correct?

2: Yes, it is easy to identify especially in combination with cotton that's where we saw that the [redacted] was very accurate along the 100% polyester. On the first hand, actually polyester was one of the fiber types that accuracy was lowest on. It's hard

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for the [redacted] to make distinction between polyester, polyamide. It was very much the man-made fibers where you saw that at first, there was some inaccuracy in the [redacted]. That improved, I still think that it is probably less accurate on those material types than, for instance, on wool or cotton.

1: Okay, that's interesting.

2: You can also find it in-- I can you the link if you want in the [redacted] factory. We have this table where we summarize the accuracy of the [redacted]. This is the final picture, but it's an intermediate picture where you indeed see that the man-made fibers were lower than the other ones.

1: Okay, that's interesting. It's that kind of a case for the blend because obviously, we have the different technologies that blended the poly-cotton blends. Some people saying that actually, we shouldn't be trying to get rid of those because they have quite a lot of potential versus 100% polyester as far as the sorting. I haven't quite got my head around entirely whether this is a good thing, but for some of the post-consumer uses of like rags, they can't use polyester so then poly-cotton is more useful.

2: It's more useful for them. Recently I visited a big sorter, The [redacted] here in the Netherlands. They're one of the biggest also in Europe because they do lots of German textiles, and they actually saw that the market for rags was going down that they were facing and demand, that was in decline for rags. They think it might be one of the effects of Corona where people prefer paper wipes to fabric or reusable ones, I don't know. That was quite interesting. I also always assumed that the rags market was of almost-

1: I guess it doesn't have to be rags in a way. It's what is that interim step that could extend that life?

2: Yes.

1: It might not be right. It might be something else. It's interesting to think about whether 100% polyester has one of those interim.

2: I think it's trickier. The nice thing with polyester is if you look for inter-technologies like [redacted] and of course, there are other ones as well. Here in [redacted] we also have [redacted] who now restarted their work on textiles. The nice thing with polyester is you can also just extract the polyester, and then indeed, the rest will need to find a different purpose.

I think there are quite some interesting ones in terms of isolation material. We want to assess whether that could be used in the paper and pulp industry because it's a cellulosic pulp that you have. It's definitely not the same as with [redacted], for instance, where they really reuse it and turn it back into cotton. The inconvenient thing is that cotton-polyester blends are also quite small. I think here in the Netherlands, we said that it was 18% of all non-rewearable textiles consisted of custom polyester plans.

1: Oh, that's interesting.

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2: We did the math if we would have [redacted] plant of 50,000 tonnes and then actually more textiles than is being discarded currently in the Netherlands to feed this one big plant.

1: That's interesting. It's really regional, isn't it? It's very dependent on the region that you're dealing with. Also, I think that the service industry obviously is a resource for those types of polyester rich fabric.

2: Yes.

1: Would that come through the [redacted] and break down? The numbers that you're getting through [redacted], would that include the service portion of waste textiles?

2: What would you consider the service portions?

1: Uniforms.

2: Oh, yes. Now [redacted] has mainly been sorting both consumer textiles. Indeed, or especially we did with the [unintelligible 00:22:51] of my social enterprise. We did a study on the textiles from the Port of [redacted] so actually from the port authority so it's really quite big. There we saw lots of cotton polyester, but also lots of polyesters with coatings on top of them, and also quite some coatings that were not suitable to check with [redacted], and were not suitable for their process.

Even with the upcoming technologies, we don't really have a good destination for those still.

1: Yes, that's really interesting. This next question, we talked about these already. If you could draw out the biggest barriers if you like, for circular synthetics, but also I guess, for effective sorting and knowing the content of textiles. What are the biggest barriers to that would you say?

2: Yes, oh, for the [redacted], we have a full publication on that. Just to be very short what we saw as the biggest barriers for technologies like the [redacted] is one, of course, you need to have a constant input of materials. There we really have to look at our collection schemes and also at the contamination of textiles that are being collected.

Because what we experience with these orders we work with is that actually, there's more and more contamination that comes with the textiles, meaning that they will get considered waste from the start. Those will of course not be put through the [redacted]s if they're contaminated because no one wants to touch them. That's definitely one that they are very concerned of, because it's upstream from what they do.

1: By contamination do you mean clothes that haven't been washed by the consumer or that have become contaminated after collection.

2: Waste. During collection.

1: During collection.

2: Because unfortunately, there are quite some people here in the Netherlands that put their household waste in the textile collection containers.

1: Yes, okay.

2: Especially by the way in cities where cities try to be smart and make citizens pay for their household waste, like the rest waste. Suddenly, there's a financial incentive to put your bag of household waste in the textile container because that one is free.

1: Okay, yes. Indirect structural damage.

2: Yes, and then on the technical side, the barriers were mainly also related to hardware removal, because if you have post-consumer textiles and recyclers asked for clean textiles, then that's still an intermediate step you have to make sure there is. Then the very well known discussion around reach compliance of using that. If at some point if you start using these textiles and you find out that actually there are chemicals in there that shouldn't be there, who's responsible? I don't know whether the EU is working on that?

Also, I do know that H&M and IKEA did a research on this. I think they started with the cotton ones. They found that actually the concentrations were so low that this is a non-issue. Then main concern I would say for the [redacted] was more the economic side because we discussed briefly already before, not all the materials have a demand. Currently, the [redacted] is able to sell 100% cotton, 100% wool, Woolrich garments, maybe some with acrylic in there, and that's it.

Especially when it comes to anything containing polyester, that's where they're struggling.

1: Yes, that's noted.

2: Unfortunately, to get wool, you need to sort quite a big volume because wool, the percentage is so low in post-consumer textiles. You have quite a big mountain of polyester containing textiles.

1: Also, how do you see the landscape in terms of investing in this technology to actually have [redacted]s, machines licensed out to different regions? Is that a barrier, do you think?

2: Yes, because if you would ask now, should I invest €500,000 in setting up a [redacted] like activities in a sorting facility? I don't think that you would have a workable business case because it will take a long time to recover your investment. That's also what we see, that the [redacted] that is now running actually is at [redacted] Textiles in [redacted]. That's a family company.

They've been investing themselves for 10 years in development of this technology because they were so convinced and are still very convinced that this is the right thing to do, the right thing to treat your non-rewearable textiles. We do see that several

sorters are now assessing the potential of the [redacted]s. It's not like they all bought one.

1: No.

2: I think that the [redacted] was a little bit ahead of its time.

1: Yes.

2: If it would have come in two years from now, then demand, like at the opening of the facility, demand would have rise to the sky.

1: Do you think there's a role for some subsidization of these types of--?

2: There should be.

1: Should it fall entirely on sorters to invest in this technology?

2: Yes, there should be and I think that actually the whole Corona crisis, it has different negative effects. There is one positive effect and that is that it really opened the eyes of sorters because also quite some sorters were a little bit old fashioned in the sense that they said, "Well, it's been going well in the first decade. Why focus on recycling? It doesn't really matter."

Now, suddenly when they felt the impact of their export markets closing down, and the fact that they were so reliant on those markets, there is more of a momentum now from them for recycling, but also from governments. Because suddenly these municipalities who before got reimbursed by their collectors for the right to collect textiles, suddenly there are all these alarm bells going off. Because their collectors, one cannot pay for textiles anymore. Two, some of them just closed down their collecting operations.

1: Yes, that's really interesting. It puts the spotlight on needing to be more flexible, and adaptable to the markets shifting, doesn't it? That's really interesting. The technology allows for that diversity, I guess. That's really interesting.

2: Yes, for sure.

1: Okay.

2: Okay. One thing I didn't mention yet is, to add to the case for polyester extraction technologies, there is also quite a big fraction that actually is not suitable for storing [redacted] because the [redacted] uses infrared technology. At the moment you have a coat, or a blazer, or something with a lining in it, or different kinds of fabric, you can imagine that it makes quite a difference where the garment is scanned. Anything consisting of different kinds of fabric is actually not sorted through the [redacted].

That's also where, for instance, polyester extraction could be a very interesting solution because if you only take out the polyester, it doesn't matter. For instance, you have a polyester lining in a woolen jacket, then you can take out the polyester

and the wool will just have a different purpose. These are garments that currently we cannot process at all.

1: Okay. The wool can't go in either, so they wouldn't be?

2: No. No, because there's no business case to remove the lining. It all comes down to--

1: That's interesting, yes.

2: And the fact that we have expensive labor, yes.

1: We're talking to a few people, and I've read the report. It's about the potential role of some kind of information flow which goes along with the garment so that you can-- whether it's RF tagging or barcoding. Where do you see that going within [redacted] but more generally as well?

2: I think it's a difficult one, and we also investigate as part of the labels research because we discovered that lots of these garment labels are inaccurate. They will tell you that your T-shirt is 100% cotton while in fact it's probably cotton-polyester. Then we also looked into alternatives to these physical sewn-in labels because our main conclusion was, one, labels are inaccurate but, two, they are also a very big barrier especially for mechanical recycling of textiles.

At the moment, you have a beautiful woolen sweater with a polyester label in it, and you're going to recycle it using mechanical recycling. Then you have maybe a dark green sweater but then suddenly, in your outputs, you have these little white polyester fibers. Again, there's no business case to manually remove all these labels. We do need to look also for different reason in these tagging mechanisms, but we also found that most of them are still sub-optimal.

For instance, with RFID tags, they are really big. Consumers most likely will cut them out. That is also a problem. Then that means that we can organize a beautiful system but if our behavior still is that we cut them out at the moment we buy something, then the whole idea of the RFID tag for the afterlife of textiles is basically gone. These are still things, I think, that we need to really look into, and also take into account the natural behavior of people.

1: Yes. Messing everything up, people. It's interesting. Okay. Where do you think the main opportunities are for circular synthetic textiles then? Where do you see the best uses of our investment and our time?

2: The potential for recycling technologies for polyester-containing textiles, it's my personal belief I very much see that as a much-needed last resort for textiles. If we can do anything else with them, or if they are a different composition, then beautiful, then that should be definitely something that we look into. I do think that we need to find a better, more sustainable, solution, and more circular solution for all these garments containing polyester.

Then of course, if it's non-re-wearable, non-reusable, then definitely that should be some kind of polyester recycling technology.

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1: Okay. Yes. Brilliant. Is there anything you want to say about-- I'm just thinking about also the regional aspect of waste and textile waste recycling. It's come out of some of the other interviews that this focus on regional information is quite important. Is there anything that rings true with you?

2: Yes. I think that we don't have any information. That's currently, I think a big challenge is that we don't really know the composition of our mountain of used textiles. One, because we just put it away. It's being exported. No one really sees it, and also we never very much took an interest in. So far the only question sorters answered was, "Is it re-wearable, yes or no, and for whom?" That's the only thing they did.

They never asked themselves and I think in that sense, [redacted] was the first in its kind to start asking, "Okay, but if it's non-re-wearable, what is actually in that garment?" and then depending on the composition, "What could be a useful next destination?"

It's very much a new way of thinking, but it also means that there's absolutely no information available from [redacted]. We are mapping the composition of textile waste in this region. As I also work at [redacted], we also at [redacted] have a quite a big ambition to start at least developing a methodology to do these sorting exercises, or scanning exercises to assess the composition of our mountain of used textiles.

1: Brilliant. It just occurred to me that in some of the other interviews we've talked about our post-industrial waste. Is there anything that you would like to say about that stream of material?

2: No. I focus on post-consumer textiles, and unfortunately, there are many claims out there obviously of manufacturers that they use recycled content. So far, we have not very much been addressing these post-consumer mountain because almost all those claims are based on post-industrial which, of course, is way simpler because you know what's in there, and there are no accessories or hardware that's actually the textiles.

1: Okay. You've already talked about this a little bit, so we can leave it if you don't have anything else to say on this. I have a question in here about how COVID has affected the industry. I don't know if there's anything else that you haven't already said that you would like to see about that?

2: No. I think indeed what I already said. I especially think that it made us all realize that also, at the end of the chain, that we have such an interconnected international system, and that we are quite dependent on situations in other countries to find a variable destination for used textiles. I hope we will not forget that easily, and it will inspire us all to start looking at more regional destinations.

1: Perfect. Okay. For this next part, as I said, I've got these garments from the RK study. What I'm doing, I'm just pasting a link into the chat on this. If you could just follow it, and I think it should take you to some Google Documents, just some slides that I'll write into as we talk, and then you'll be able to see. We've got-- Can you see them?

2: Not yet. Yes, there it is.

1: Okay. What we've got is a pair of running leggings with some ID on them like a embroidery, or it's printed, and a fleece. Both are polyester. Obviously, the fleece has zips, pocket, and things. Okay, first slide. I'd just like you to draw out what are the main features of the life cycle for these garments, currently. What happens now with these, from your perspective?

2: Yes. They're both 100% polyester?

1: They are although I imagine that even if they say it's 100% polyester, I imagine the leggings do have some sort of stretch component like elastic, and all.

2: There has to be, yes. Well, I'm afraid that the first one, the leggings, probably-- Now they could go to some kind of mechanical recyclers not textile-to-textile but rather that, for instance, make insulation material, or the interiors of cars. I think for the fleece, ideally, they would have the same destination but, considering there's a zipper in there, I think it very much depends on the recycler's requirements, where it's fixed up because I do know that there are also organizations that do not bother taking them off.

Then it means that there is absolutely no destination for this fleece. Also, I think on the second-hand market so that the leggings probably is accepted, it's a very expensive brand or very special brand, and there might be some second-hand market for it, but otherwise, there isn't. For the fleece definitely not. I also went to [redacted] Marathon saw it myself that all the fleece just ended up in the non-re-wearable fraction.

To be honest also if you touch a used garment made of fleece, very quickly it feels a little bit dirty which is very strange, but that's I think just what the material does.

1: There were issues anyway around fleece to do with fiber-loss. If it's so problematic, is there a case for saying, let's stop making fleeces out of polyester or do you think we just need to capture them better?

2: Yes, and we didn't even touch upon that part yet, but many fleeces say they're made from recycled materials, are actually made from PET bottles. That's I think a different concern because what we do see is that there is this focus of the industry on using PET bottles to create polyester for garments. My personal opinion is that we could consider downcycling, because you can currently turn a bottle into textile but you cannot turn textile back into a bottle again while you can turn a bottle into a bottle, into a bottle. In that sense, we're feeling the pressure of PET recycling.

1: Yes. I think that we may touch more upon the fiber-loss side of things when we speak to our interviewees again when we've done this work. We've kind of felt that we needed to cover these things first, but yes, okay. I'll just put other problems with fleece.

2: We all know what they are.

1: We know what they are. Is there anything else you got to add about this? I might just put in lining somewhere because that was something that you mentioned. Problems for sorting.

2: If you use automated sorting technologies, so the NIR, Near-infrared technologies, then they're not suitable.

1: Also, you said it also for mechanical recycling it's a problem?

2: That depends on your mix of requirements. If you can do mechanical recycling for the automotive industry, they currently use quite a mixed feedstock anyway, so then it doesn't really matter. For textile to textile, it's not suitable, because you want to have more of a homogeneous feedstock.

1: Okay, perfect. Then the next slide is what could happen in the future? Ideally, if we put aside some of the really big barriers that we're facing, what would the life cycle for these garments look like in the future?

2: Let's hope there would be more of a second-hand market for used textiles in general because I still believe that. Let's not put all our eggs in a basket of recycling, and recycling is still the last option there is, and it should never be the first one. Let's assume there is no market for used garments, then I would hope that both materials, either there's a good mechanical recycling technology for the both of them.

I don't believe there will be for polyester, only for downcycling to mechanical recycling of polyester containing garments, to then for a different, like a function outside of the textile industry, so what I call downcycling. I do think that for both these garments, we would then need to have a last resort being a recycling technology that is able to process polyester-containing textiles and either--

That means that then they're different options currently still out there. I do think that especially the ones that do polyester extraction, so that also don't need 100% polyester feedstock with anything. For instance, [redacted] in theory, at some point would take anything that has more than 40% polyester in it, in let's say their full feedstock, and then both of these garments would be ideal.

1: Anything about how they might be collected ideally, or how people treat them or--? I'm just thinking about some of the things you said like the contamination issue?

2: One thing on the how people treat them, I think that especially for the fleece jackets, I hope people will wash their clothes a little bit less because especially with fleece, that's of course, those bring some other issues. That whenever these garments are discarded they are really not re-wearable anymore, so they really were worn until they were broken, that evidence is also limited to the treating part.

We just treat our garments a little bit more as valuable products instead of getting rid of them after a year just because we had them for a year.

1: There's also a durability question there as well, isn't there? That polyester could be really durable, couldn't it?

2: Yes. In theory, you could wear it for 200 years, but that's the problem I think. Here we come back to consumer behavior if we don't treat them like they could last for 200 years but get rid of them quite quickly, and to have an urge to buy new ones, then we can create this super robust products. We don't really make use of that characteristic.

In terms of the collection, I do think that on the long run, there could be more of a role of brands taking in used garments again. The advantage of brands taking in garments is that they don't have to put containers on the street. This contamination issue is lower, and also, for instance, moist, because these containers, unfortunately, also are not always waterproof.

Meaning that it does happen that textiles that have been collected when they enter the sorters facility, they're wet, and then very quickly they will be also discarded as textile waste. I think there should be more of a dual approach where you do have brands collecting garments, and of course, there always has to be something from the municipality because they are responsible for waste collection. I'd rather have them collecting textile separately instead of they just doing household waste.

1: That's very interesting, thank you. Okay, we'll move on because we're running out of time. What I put on slide three--

2: Thanks.

1: That's a wiggly line, it's sort of like it's based on a road map that we use in the service design. We are just looking at the five to ten-year period. Just asking you again to draw out the main points of what you think needs to happen over the next five to ten years for circular synthetics to be a real thing?

2: Now I definitely think that there should be more of an interest into mapping, the composition, and characteristics of used textiles. Actually, basically know our problem, because currently, we might want to look into solutions, but if we don't really know the problem, we're not going to find the right one. That's definitely what I would put in 2020.

Then in the coming years, moving to making the business case for chemical recycling solutions. Then I would add local or regional in there because if we want to do chemical recycling solutions and we still put it somewhere abroad, then this whole dependence of other countries doesn't really change. I think we should very much also have something more regionally.

By 2025, I definitely hope that actually at least, one or two of the upcoming chemical recycling technologies will have an industrial plant somewhere.

1: That would be fantastic, wouldn't it? It sounds like the pilot project that you've done, it sounds really powerful. I wonder if in the short term, there needs to be more things like that. More demonstrations.

2: That's definitely something-- Maybe we can add it in the coming years as well, but there has to be more of a piloting to assess the feasibility of this upcoming solution.

1: It also sounds a little bit to me like it could have two other roles in its demonstration to attract investment in a way as well and also to communicate to people about what can be done and the public engagement, almost.

2: Yes, that's also why we started the pilot because-- let's say, next year, we want to have finished the full business case for one of these technologies in the region or the area of [redacted]. We did also figure, very quickly, that we want to do something tangible. Everyone can make a business case based on theoretical assumptions but you really need to know at some point what your critical unknowns are so you can move forward.

1: That's really interesting, so it's tangible-- Typing fast. Tangible--

2: Yes, it sounds really fast.

1: Tangible and-- What was I going to say? Practical. Perfect. Okay, that's brilliant. Anything else that you'd like to add? Or you feel that's--

2: No, I feel this is it. Let's aim for 2025. We have it all up and running, and then we're done and probably it will not be the case.

1: That's nice. [crosstalk] finished.

2: Yes, I do think that-- Already, if in the coming years we move in this direction, then that's already quite a big step ahead.

1: Perfect. Finally, and just really quickly, I sent you to these definitions for circular, so just one slide for these definitions that we're working on. We really just put down something fairly quickly to just get our 2s to respond to, and maybe at the end, we'll have something which includes everyone's viewpoints. That sounds hard but--

2: Well, I felt it was actually really quite nice. The only question I had was about waste feedstocks. Also, in light with what I mentioned earlier about the PET bottles because a waste feedstock can be textile waste, it can also be plastic waste from a different industry. Maybe that's on purpose, but also-- Yes, they're all up for discussion because equal or higher value than the waste is textile. It doesn't have a higher value than PET bottles. Yes, I think it will very much depend on who you ask.

1: I think this is one of things which is difficult to define because as you say it, its value is very much subject to -- To define it is a very difficult thing, but it's an interesting provocation.

2: Definitely, yes.

1: Okay, perfect. That's really interesting. Maybe the wording could be changed slightly to-- Maybe we need to take value out, or at least raise it as a question as well.

2: Yes, you can still deliberately leave it open, but I am just saying that this could be one of the reactions that you do trigger.

1: That's interesting.

2: Then, for textiles and garments, the only question I had was it doesn't say anything about environmental impact during use and that's more related to the microplastics debate.

1: Impact during use. Minimizes impacts during manufacturing. Minimizes impact during use. Yes, you're right, we talked about them during manufacturing but not during use.

2: Not during use, yes.

1: Perfect. That's great. I'm glad you picked that up.

2: Those were the only things. Already it's nice that we're moving towards more of a destination here.

1: I think we felt a little bit when we came across this work that when you come to look at synthetics on its own, there isn't very much work because, obviously, there isn't as much of an economic case for it, in the same way as cotton. We wanted to put down some foundations, if you like. Hopefully, we'll cover -- Hopefully, we'll cover, that's something useful.

Then, if it's okay to contact you when we've synthesized all of our work and come up with something which we can draw feedback? Is that okay?

2: Yes. Of course.

1: It'd be great to hear what you think of what we've come up with.

2: Yes, you, do. I look forward to it.

1: Perfect. Thank you so much for spending the time with me today. Good luck with your project. They sound fascinating and I can't wait to hear how the T-shirts turn out.

[END OF AUDIO]