How can a tool to harvest human materials, such as hair, explain the idea of ‘human as resource’?

What is my craft, what are my fascinations, and how can I apply these in order to improve this project?

How can human materials, with hair as example, be transformed into a valuable material?

How can a tool to harvest human materials relate to Digital Craft?

What is bio design and how does it relate to the idea of the human as a resource?

MY CRAFT

The essence of my craft is to investigate the characteristics of materials and to apply these characteristics in a new, valuable way.
Materials that cannot be controlled, that live their own life, fascinate me. I will apply this fascination to my project by using an actual growing material: hair.
In order to benefit from the characteristics of hair, I have to investigate the traditions and history of hair and its role in contemporary society. I also have to explore the biological process of hair growth to adapt the tool I am going to create in this process.

Another important element of my craft is the documentation of my process. During my research I alternate between theoretical and practical based research. This combination of writing and making I want to show in a research document. In this research document I am going to collect my research questions, material experiments, written statements and video stills.

‘Hair fallen out of the follicle can be seen as a source of value and can be incorporated into design and production processes.’

Hair. A material that we are all familiar with. A material that easily brings up discussions, as it is used to communicate rebellion and fashion sense. A material that has a rich history due to its role in religion and tradition.
For example, hair plays an important role in Hinduism. The Chudakarana, a baby’s first haircut, takes place to remove the hair from birth that is associated with undesirable traits from past lives. Traditionally, a Hindu girl never cuts her hair again after this ceremony.

While the hair of the Hindu girl gets longer and longer, she will find locks of hair in her comb, on her pillow and in the shower drain. This has nothing to do with the Hindu religion; it is a biological consequence of the growth cycle of hair. The first phase of this cycle, called anagen, is all about the active growth of the hair and the follicle around it. In the transition phase, catagen, the hair separates itself from its follicle. When the hair is fully separated from the follicle, it takes a rest in the telogen phase. When this process repeats itself, the old hair will break free to make place for a new hair. This process can take many years.

When the hair is still on the head, hair is beautified and used as a way of expression. Once it reaches the last step and it breaks free, however, it becomes a nasty piece of trash that turns the shower drain into a place you rather avoid.
An episode of Keuringsdienst van Waarde caused a lot of commotion. They revealed the use of human hair in the production of bread. The bread shown in the episode was sold in supermarkets all around The Netherlands. Even though the producers only used very small amounts of an extract of human hair, people were disgusted.

Women in the nineteenth century showed that hair removed from the head can be seen differently than trash or something disgusting. They used their own hair as decoration for postcards and hair ornaments, or hair from their loved ones who died in mourning jewellery to memorialize them.
With the upcoming of bio design this idea is taken to a next level. From a bio design perspective, hair fallen out of the follicle can be seen as a source of value and can be incorporated into design and production processes. Not secretly, such as the producers of bread of Jumbo and Albert Heijn, but openly and presented as an enhancing of the design process. In essence, this is what bio design is about: integrating biological processes in a design process without hiding the origin of the material.


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Human as Resource

How harvesting human materials
can help us to reconsider our current
industrial production system.

‘Bio design refers specifically to the incorporation of living organisms as essential components,’ William Myers explains in his book Bio Design. According to him, the pressure of the degradation of the environment demands recognition of the fragility of nature. This is a huge contrast with the 20th century, when mechanization was used in order to overpower and control the forces of nature.

Using nature as source of inspiration is not new. In the nineteenth century, Art Nouveau already revolved around the imitation of nature in the design of objects and structures. However, the imitation of nature only offers superficial likeness to the natural world; it merely concerns itself with the decoration of objects. This design ‘language’ does not go further than symbols and metaphors.
On the other hand, bio design tries to achieve qualities of natural forms, such as adaptability, efficiency and interdependency. These qualities can be achieved by exploring the biological processes of living organisms and placing them in a design context. Thereby, one creates awareness of the fact that design in the twenty-first century should not only, or even not at all, be about decoration. Design is expected to perform in new ways and focuses on its impact on worldwide energy and resource cycles, by incorporating cycles from nature instead of cycles of industry and consumerism. And even by incorporating living organisms.

When biological processes have to replace industrial or mechanical systems, it is necessary to stimulate cross-disciplinary collaborations. In this case, such collaborations will be between designers and scientists. This asks for a reconsideration of the role of the designer within his new collaboration.

On the one hand, you see the designer who focuses on the usage of life sciences in their contemporary design objects. They dive into the world of science and try to find a specific biological process or organism that can be applied to their design process. Designers focus on developing their idea by facing the difficulties of production by actually doing it. They show that you do not have to look into the future to see the possibilities of bio design.

Suzanne Lee, for example, grows pieces of cloth from cellulose using the recipe of kombucha, a natural and fermented green tea. After meeting with a biologist, the fashion designer experimented with green tea, sugar and microbes that spin tiny threads in the liquid over time. After a couple of days, a layer of cellulose forms on top of the liquid. This layer can be modelled into a three-dimensional shape. When the material is drying, it will knit itself together.
‘With synthetic biology, we can actually imagine engineering this bacteria to produce something that gives us the quality, quantity and shape of material we desire,’ She says. What excites her is the efficiency of the microbes; you only grow what you need, without producing waste. It can therefore be a smart and sustainable addition to our increasingly precious natural resources.

This project, called Bio Couture, shows not only that bio design has a lot of possibilities. It also shows that bio design is still in its infancy. Lee admits that the garments made from kombucha are not water resistant. That is, the garments need their water-absorbent characteristic to grow and become the material Lee was looking for in the first place. In order to make the material water resistant, it needs chemicals. This proves that bio design, despite its potential, is not ready to replace the contemporary industrial system.
Or should we ask ourselves the question if we should adapt to the characteristics of the material, instead of trying to shape the material to our expectations? This way of thinking seems to contrast with our current attitude towards materials. However, when it comes to replacing the industrial system, a system adjusted to the expectations of consumers (or the expectations businesses think consumers have), we should also consider to replace our own mind-set.

The role of the designer as the asker of uncomfortable questions, by focusing on the social issues of bio design instead of the technical difficulties, can be helpful for answering the questions mentioned above. Rodrigo Martinez, a researcher at Ideo Boston who focuses on life sciences and synthetic biology, says: 'There is an opportunity for designers to not just help with the packaging of science or technology, but telling stories about what it is that it does and how it does it. Especially in an area like synthetic biology where it is not easy.'
Synthetic biology sees DNA as something to be manipulated and rearranged. This power brings responsibility with it. It is not only about the possibilities but also about ethics and oversight. It is important to ask the right questions. How can we ensure that this knowledge is used for the greater good? How should it be regulated? And by whom?
As William Myers mentions in the book Bio Design, in the designers' ability to collaborate with scientists and therefore design 'life', lays power that they should protect and cherish. That is why it is so important to not only look at the possibilities and ideas and how it can be achieved, but also to look at the accountability of such an idea.

We therefore should not only discuss the question what we can do, but also what we should and should not do. An example of a scenario where this question was asked was reported at The New York Times. The article is about a group of scientists and ethics who paused their work on a new genetic technique, called Crispr-Cas9. This technique enables DNA to be edited so physicians can alter the human germ line, including the eggs and sperm. Although this technique would make it possible to cure genetic diseases and enhance physical or mental traits, it would also contribute to permanent changes to the human gene pool and alter the nature of the human species in order to create 'designer babies'.

Alexandra Daisy Ginsberg is a designer who explores these concerns and visualizes them. She sets her mind on asking the right questions about the ethics of synthetic biology. In her project The Synthetic Kingdom, she explores the question of how we will classify what is natural and what is unnatural when life is build from scratch. In her video, she explains that synthetic biology is about picking a feature from an existing organism, locating its DNA code and inserting it into a biological chassis. She explains that these synthetic organisms are no different than other life forms, except that we invented them.
Even though biotech promises control over the natural world, living machines still need controlling.

According to Ginsberg, biology does not respect boundaries or patents and that is why it is relevant to ask if simplifying life to its molecular interactions might degrade our sense of self.

The Synthetic Kingdom can also be seen as a visualization of our desire to shape everything to our expectations, even our own DNA.
This seems to be a logical consequence as our contemporary production system is based on consumerism. It is based on what companies think the consumer needs. And over time we got used to the on-going stream of materials, energy, food and products. Machines are created to keep this fast-going stream going and resources are degraded to feed these machines. If we can adapt the cycle of production to our expectations, why not change our body to our expectations?

However, in case of a bio design process, it would work the other way around. We look at the behaviour, ability and speed of the biological process or living organism and as consumer we adjust our expectations to this system.
In her TED talk, Suzanne Lee talks about telling the microbes what to do; which shape they need to make and how many. What if we let the microbes tell us what they can do and how many they can make? Only then are we truly bio designers.
Gidion, quoted in the book Bio Design, seems to agree with this production cycle, or, more aptly said, non-production cycle: 'We need an attitude turning radically away from the idolatry of production.'

In order to turn away from the idolatry of production and to be able to adapt our expectations to the cycle of nature, we have to explore this cycle first. We have to understand the cycles of biological processes, investigate their time schedule and behaviour.
And were can we start better then with ourselves, with our own bodies? Everybody undergoes daily cycles of their body. If you drink a lot, you have to pee. If you exercise, you will sweat. The biological processes of your own body produce human materials, such as urine, sweat, hair and blood. These processes we cannot escape. We have to adapt ourselves to them. Therefore, it can be very useful to integrate human materials into design and production processes. A biological process such as the growth of kombucha is something not many people really understand and can relate to themselves. Therefore it is easy to expect that the cellulose can be pushed, degraded and edited in order to perform in ways we expect from it. But pushing the human body is a feeling we all know. Hold in your pee, because it is not the right moment to go to the toilet. Sitting too long in front of the computer because you want to finish your assignment, although you feel your back is complaining. We all experienced the effects of pushing or degrading our bodies. This makes the barrier to push the body in order to produce more and better materials higher, just because we can relate it to ourselves.

One example of a human material is urine. For most people, urine is a liquid to flush down the toilet, but for some scientists and designers it is a very useful material. Ruben Verwaal from the University of Groningen researched the role of urine in the development of medicine in the eighteenth century. And other studies show that in the late nineties, the Stockholm Water Company diverted urine from four housing projects to a grain farmer. The scientists connected to this project concluded that urine could replace quick-acting mineral fertilizers. They also calculated that one Northern European adult's urine contains enough plant nutrients to grow fifty to one hundred percent of the food requirement for another person.
Urine appears to contain nitrogen, phosphorus and potassium. These are also essential plant nutrients that are usually mined from the earth or extracted from the air. The Rich Earth Institute in Vermont collected almost four thousand gallon of pee. This 'urine depot', collected from friends, family and volunteers, served as testing material to replace chemical fertilizers.

The human fertilizer made from a urine solution was sprayed on some hay fields and shown to be twice as productive as unfertilized fields.
Pee does not seem to be the most likable material to water your fields with, but as Jay Bailey, owner of Fair Wind Farms, says: ‘With the cost of fertilizer these days, I would certainly give it very serious consideration.’

Urine is sterile when leaving the body. However, there are some exceptions in cases of bladder infection or salmonella poisoning. The Rich Earth Institute proved that either solar pasteurization or long-term storage in a warm greenhouse was very effective against the risks of pathogens. They now also try to trace the left-over pharmaceuticals that can end up in urine.

Another problem with using urine as valuable material is the so called ‘ick factor’. Only a chosen few would be willing to collect their own urine with jugs and funnels. A much more realistic option would be a urine-diverting toilet. The ‘Not In My Backyard Toilet’ of Henriëtte Waal is such a urine-diverting toilet. It is an installation that maybe does not collect as much urine as the volunteers of The Rich Earth Institute, but one that does show the concept of collecting urine and turning it into something valuable. She introduces ‘pee-cycling’ with a toilet that uses fermentation in order to use the urine as fertilizer for gardens. It is an installation that does not force its resources, in this case the users of the toilet, to produce more materials. Instead, it just uses the amount of pee that is delivered. In this case, the toilet is used as tool to harvest the urine. When put on a strategic location, such as a place where a lot of people urinate in public, it can collect a lot of urine.

Mika Rottenberg is a video and installation artist who also involves human materials in her projects. For the video ‘Cheese’ she was inspired by the Sutherland Sisters. These seven sisters from the nineteenth century were known for their ankle-length hair. Mr. Sutherland came with the idea to sell a hair tonic with the family sign on it and the family became millionaires almost overnight. Rottenberg saw this way of designing a product based on the long hair of the sisters as ‘milking their own hair’. It was not about the product, but it was about selling their image. ‘Cheese’ shows images of women who milk their floor-length hair to make cheese. In her videos, Rottenberg researches what our bodies are capable of doing and how it can create a product. She creates small factories based on typical features of the body and blows this up. She is interested in what our bodies produce and in what these products can be commodified.

And that is where we come back at the cycle of hair growth. In my project the idea of ‘human as resource’ is based on hair. However, it goes beyond the sole use of human hair. By incorporating human hair in my design process, I also had to adapt my design process to the growth cycle of it.

Felting, spinning and weaving experiments with hair allowed me to consider the possibilities of turning hair into a valuable product. I was inspired by traditional Indian fabric techniques, such as Jamdani weaving and Sisha embroidery, which can take years to finish a piece of fabric. I felt this kind of handwork is in line with the slow process of hair growth and loss.

After this I wanted to explore what kind of tools could be used for a design process adapted to the growth cycle of hair. I focused on a tool for harvesting the hair that most people use daily: the comb. A comb makes it possible to collect hair that is removed from the head caused by a biological process of the human body, without pushing or degrading the body.

I explored the possibilities to turn the comb into a tool that would present the idea of ‘human as resource’. I also tried to relate it to Digital Craft, and discovered that it was important to ask myself the question: in what kind of context do these combs make sense?

What kind of tool is relevant for Digital Craft?

An object that is introduced into everyday life as a ‘virus’, rather than an user-friendly and practical object. By subverting it, people should be able to participate in the story and explore the boundaries between what is and what might be. The object does not have to be useful, but it must enable people to imagine the object in use. In order to achieve this, the object should allow complex interactions between reality and imagination.
(According to Hertzian Tales.)

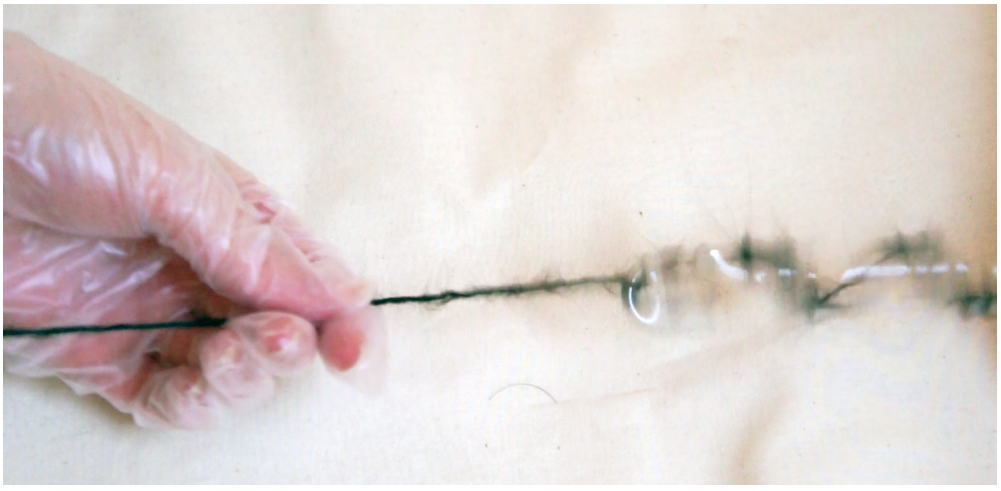
What ‘virus’ do I want to introduce into everyday life and how enables it people to participate in the story of ‘human as resource’?

The tool as ‘virus’ should introduce hair as a human material that can be harvested and turned into a valuable material. In order to do this, the tool should refer to familiar (electronic and non electronic) objects that are made for collecting, harvesting and caring. Different parts of these familiar objects have to be brought together, to trigger interactions between reality and imagination. These interactions should lead to the understanding that the tool is part of the bigger idea of ‘human as resource’.

How can interactions between reality and imagination lead to the understanding that the tool is part of the bigger idea of ‘human as resource’?

The tool should be placed in a modeled scenario to create a conceptualized reality around it. In this case it is a video that shows the environment in which the tool would be used: an experimental factory where the human is seen as a resource that provides materials for production. The production must be adapted to the biological processes of the human body. That is why the hair in the video should be derived from humans under unforced circumstances and is collected and processed by following the cycle of hair growth and loss.

‘In a world ruled by fictions, the writer’s task is to invent the reality.’
- J. G. Ballard



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