# Fashion Futures & Societal Sustainability, possible directions from scenario development

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**Abstract**

**Purpose:** to explore possible directions for future development in the fashion industry, especially targeted at sustainability.

**Design/methodology/approach:** we executed a design exploration by means of future scenario development. Five student groups (master level Industrial Design Engineering) developed future scenarios for the clothing industry for around the year 2050 and designed product and service concepts that matches these scenarios. These ranged from a local circular economy of urban flax farms to an ingenious system of smart DIY clothes-enhancers, spurring the fulfilment of life-goals.

**Findings:** the five future concepts show very diverse possibilities for more sustainable alternatives to the current practice. Remarkably, within the concepts the actual design of garments plays a subservient role. Although these are only five examples, this made clear for us that a more sustainable future for the clothing sector is highly dependent on the adoption of sustainable behaviours, rather than the clothing products themselves.

**Research implications/limitations:** because of the exploratory character of the study and the level of uncertainty in the chosen future scenarios, the presented concepts are to be regarded for inspirational purposes only.

**Originality/value:** the Scenario Development method that we present is not new, the application in the fashion context however, rendered highly innovative design results. The value of these design results lies in the presentation of plausible future arrangements that take the social and societal context into account.

**Keywords:** Scenario Development, Sustainability, Society, Technology, User Scenarios, Futuring

**Introduction**

This paper presents concrete examples of possible directions for a sustainable future of fashion. Sustainability is a complex issue that affects all aspects of the fashion domain. From growing and sourcing cotton, to recycling fabrics, to second-hand-clothing, to even less polluting cleaning methods. Key factor that all these aspects have in common is in our opinion the behaviour of the consumer. Will the consumer be willing to pay more for biologically produced cotton, or use eco-friendly washing methods? This makes a sustainable fashion future into a societal issue, where the effectiveness of new initiatives is largely determined by the embedding of sustainable alternatives in an equally sustainable context. Therefore we decided to execute a design exploration in our Industrial Design Engineering master course "Create the Future", in cooperation with the Dutch ngo "Eerlijk Winkelen" ["Fair shopping"] (Stichting Eerlijk Winkelen, 2018). This course is built around using explorative context scenarios (Fahey and Randall, 1997). We adapted this scenario technique to the aims of product design, emphasizing the structure and visualisation of the scenarios (Eggink et al., 2009). The resulting method consists of six successive steps, finalized with designing a future product or service within the future scenario context (Eggink and Albert de la Bruheze, 2015).

Five student groups delivered future perspectives for the year 2040, each centred around different intersections of fashion and society. One project presented the incorporation of digital sensor technology inside the body, connected to adaptive actuators in clothing and shoes, envisioning fashion and the (cyber) self. Another envisioned fashion and technology with future fabrics. The third project focussed on fashion and service design with a leasing system for clothing, that seduced the consumer to participate through a fully automated delivery and recovery system. Straightforwardly characterised as a robotised laundry basket. The fourth showed a future for fashion and production with a local circular economy of city based flax farms. The last project we present elaborated on the important aspect of fashion and identity, presenting an ingenious system of smart DIY clothes-enhancers, spurring the fulfilment of life-goals.

In the following we will elaborate on the scenario development method that we used to develop the future designs. After that we will describe the project outcomes in more detail. We conclude with a discussion on how this way of working contributes to a better understanding of future developments for a sustainable society. Our conclusion is that we should not only design or produce sustainable fashion, but rather also design sustainable habits and contexts. In other words; from product sustainability to societal sustainability.

**Scenario development method**

Product design is always future oriented, but often the time horizon is limited. Therefore several techniques have been developed to stretch the time horizon beyond the common sense. These include trend-analysis, Delphi studies, expert studies, simulation and scenario writing (Porter et al., 1991). Scenario-development is considered one of the most powerful of these techniques (Fahey and Randall, 1997). The advantage of scenario development is its flexibility in the time dimensions, details and imagination, and the possibility to include the results from other methods. By writing multiple scenarios and therewith sketching different future contexts, designers can also take into account the inherent uncertainty of contemporary developments

(Schwartz, 1991). In our method we work with so-called explorative context scenarios, developed within 6 consecutive steps:

Step 1. The Future Scenario development process starts with choosing an actor within the sector that will be researched. The chosen actor serves as the central focussing point for the development of scenarios, product concepts and strategic issues of the actor. The actor can be a commercial company, a government body an NGO or even a special interest group. However, it is essential that it is likely that the actor will be affected by future developments.

Step 2. Once the sector and the actor have been determined, it is important to map the problem definition and the question of the actor, who acts as the principal of the forecasting study. This question, for instance "How will we acquire new clothes in 2050?" is the focal issue that frames and guides the foresight study.

Step 3. Analysis of an industrial sector, commercial market or societal field (in this case the fashion industry) by mapping main actors, critical factors and main drivers of future developments in an uncertainty/importance matrix. Items in this matrix that are identified as both important and uncertain, are the building blocks for the different scenarios.

Step 4. Development of a two-dimensional strategic space, which axes represent the key long term uncertainties in the future of the field. An example of such an uncertainty for the fashion sector could be the extent by which the production and consumption of clothing will really be guided by sustainable values. See figure 1 for an example of such a strategic space.

Step 5. Writing three scenarios that fit with balanced developments and extremes in the strategic space. Scenario writing includes systematic analysis of how certain typical developments will work out for the specific combination of uncertainties indicating by that scenario, as well as creative writing and imagination.

Step 6. The last step is presenting the scenarios visually. One can use traditional collages, mood boards and timelines, but also online newspapers, blogs, advertisements or even examples of future packaging. The challenge is to present the information appealing, accessible and consistent. It is also important to present multiple scenarios, because especially in the comparison between the visualisations of the different scenarios, the actual atmosphere of the future contexts becomes clear (figure 1 and 2).
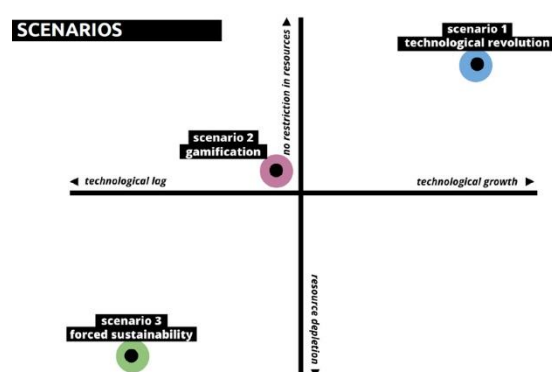
*Figure 1. Strategic Space (left) and an accompanying visual from scenario 3 "Forced sustainability" envisioning a future with a strong collective sector, a growth of alternative energy sources and an emphasis on local production because of high transport costs (Knijn et al., 2017).*



*Figure 2. Visual from scenario 2 "Gamification" envisioning a high rate of individualisation and a strong government that is pushing sustainability with rewards (Knijn et al., 2017).*

**Fashion futures**

When the set of scenarios is developed and visualised, one of them will be selected to serve as a new future design context, posing specific requirements for the chosen actor. The actual design process is not in any case limited and can be derived from either theory or practice, as long as the designers are aware that they are making their designs to fit in the envisioned scenario context. During the design it is important not to try to 'solve' the chosen scenario, i.e. try to 'design out' aspects of the scenario that seem unwanted from a present day perspective, but to stay true to the envisioned future and its requirements and demands. Incorporated in the scenario development method is the choice of a specific actor and focal issue. That means that the student groups were free to choose an actor, related to the fashion theme, to serve as an imaginary client for their project. Two of the teams had chosen Nike as their actor, however due to a different focal issue, the resulting projects were also completely different. In the end, all the projects covered different sub-topics within the overarching fashion theme.

**Fashion and service (leasing/BOL)**

The first future concept to be shown is from the "Forced sustainability" scenario, mentioned in the previous chapter. The student group chose to make a design for the forced sustainability scenario, combing resource depletion and technology lag from the axes of the strategic space with fast fashion. The principal actor of the project was Bol.com, a very large player in the Dutch online retail spectrum. Because of the sustainability issues of the scenario, the group wanted to make a closed loop in the fashion system to limit the influx of new clothing production (figure 3), however maintaining the high cycle speed and accompanying high level of consumer choice of fast fashion.
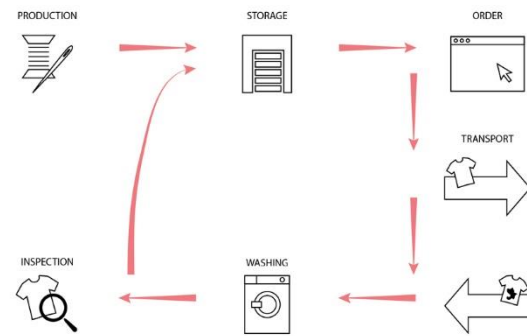
*Figure 3. The sustainable future for Bol.com. Closing the loop in the fashion system (right) requires a change in user behaviour.*

They introduced a leasing system, based on a future version of the internet platform, where the consumer would select the clothes he or she wanted to wear and at which occasion. To help the consumer in choosing the right outfit, the platform sported a networked inspiration application as well as physical service centres (figure 4).
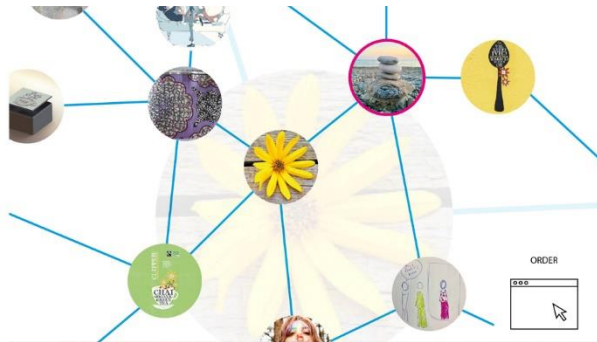


*Figure 4. Envisioned Bol.com service stations (left) and a networked inspiration platform for choosing the right clothing to lease.*

To seduce the consumer in using the leasing system and having the clothes turned in onto the platform when they were not in use, the students introduced a clever extras to the design. The 'automated laundry basket', that would be bringing the clothes back-and-forth from the home to the service stations with the aid of a robot vehicle (figure 5).



*Figure 5. The automatic laundry service basket in the living room and on the streets.*

With this combination of services in the system it becomes plausible that people will be using a clothes leasing system in the future. Although the identity value (Davis, 1988) of owning your personal clothes is

compromised, this is compensated by the fact that users do not have to take care of them; that is done by the system. In this way the same clothes can be worn by a lot of people, instead of hanging useless in the cupboard. And at the same time the choice of clothing for the individual user is enlarged.

**Fashion and the self (cyber human/Nike)**

Two groups chose the Nike brand as their actor. One of them addressed the focal issue: "How can Nike balance sustainable production and smart clothing innovations?" (Li et al., 2017). From their developed scenarios they chose the one with a high level of technology development and a low level of sustainability awareness, which they named "Superhuman". In the scenario they foresaw the commercial adaptation of nano-robot technology, currently being developed in the lab. This resulted in a daring concept which sported an implant in the head that would communicate directly with the eye, in order to present an augmented reality-like overlay to the brain (figure 6). This type of interface is of course highly controversial now, but the group was able to show with the aid of a technology roadmap the likeliness of the development of these kind of human-technology relations.
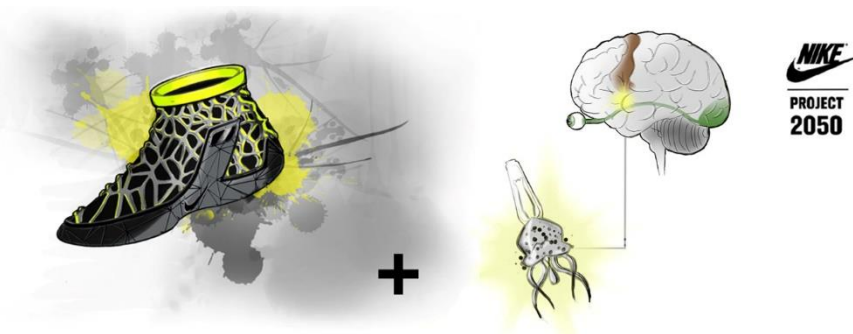


*Figure 6. Future shoe concept for actor Nike. The actuators and sensors in the shoe would be connected to a nano-implant in the heart of the brain (right).*

The nano-bot interface would serve as a platform for self-monitoring and self-development, aimed at improving health, performance and achievements. The augmented reality overlay would for instance show the strength and strain in your own muscle system, providing direct feedback during sports training sessions (figure 7, right). They also presented a high-tech shoe with stabilizing effect. It was envisioned that sensors in the shoe, together with the implant, would control active fibers in the sole that would constantly adapt the stiffness of the material. In this way, the shoe would be able to correct imbalances in the gait in real-time (figure 7, left).
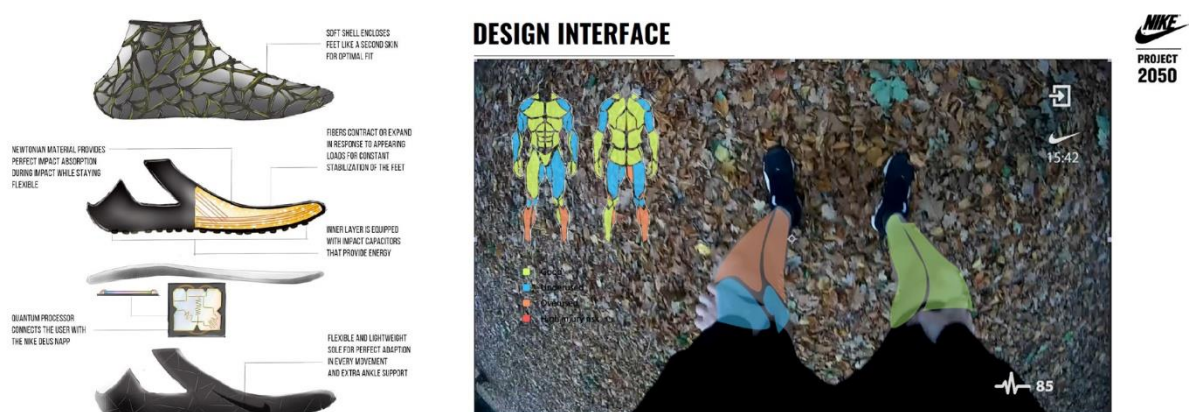
*Figure 7. Modular set-up of the shoe concept (left). The nano-implant would provide an augmented reality-type information overlay for monitoring your own body (right).*

The sustainability aspect of the project was explained by the increase in technology and functionality in the system. In that way Nike would be able to sell less shoes as a fashion item and concentrate on the added value of the nano-robot platform. And consumers would spend more money on one pair of shoes, instead of buying multiple. This was emphasised with a modular set-up of the shoe, much like the famous Nike Zvezdochka sneaker by designer Marc Newson from 2004 (marc-newson.com, 2018), which would allow for interchange of parts and upgrades for the system. This would refrain consumers from discarding their shoes too easily, which from a consumer behaviour perspective is however not straightforward. On the other hand, the lesser contribution of the concept to sustainability is understandable, because of the scenario choice.

**Fashion and technology (fabrics/Greenpeace)**

A third student group chose to address their project to Greenpeace, the renown non-governmental environmental organization with offices in over 40 countries and a headquarter located in Amsterdam. The organisation campaigns on worldwide issues in order to ensure the ability of the Earth to nurture life in all its diversity. The challenge for this group, within a chosen scenario called "Fast Forward Fashion Future", was to figure out how the organisation would be able to influence consumer behaviour effectively. Because the groups' scenario was dominated by commercial enterprises and corresponding fast fashion, it was difficult to address the consumer directly. So they envisioned a change in strategy for the future of Greenpeace where the organisation would team-up with commercial parties in strategic collaborations in order to convince them about the application of sustainable solutions (Ven et al., 2017). The modus operandi would then be that Greenpeace developed sustainable demonstrator projects, to be adopted by commercial parties. The group developed one of such demonstrator projects, based on the concept of the "wearable tree".

Initially this concept was about clothes with an active influence on the environment: the wearable tree would absorb $CO_2$ while wearing, contributing to the decrease of the greenhouse effect (figure 8, left).
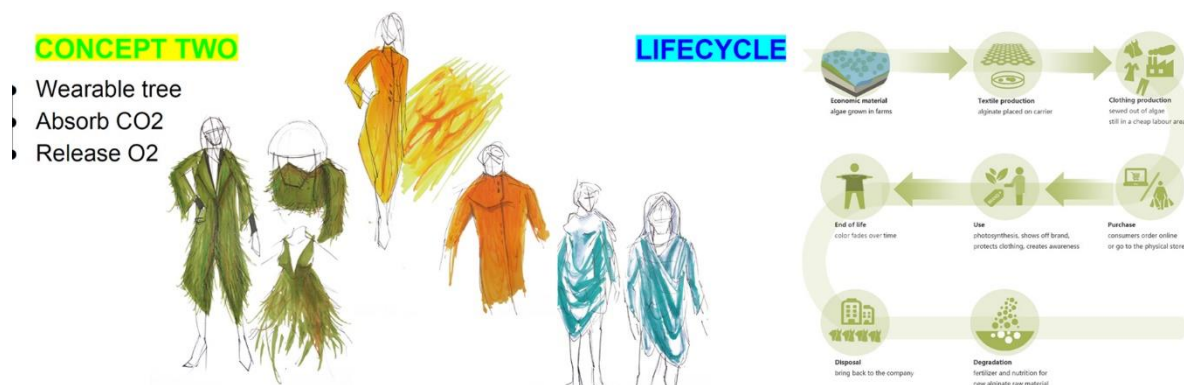


*Figure 8. The "wearable tree" concept for Greenpeace: clothing that would actively contribute to a better environment while wearing (Ven et al., 2017).*

Later, the concept developed in a protective garment, made from algae, that would be worn over ones precious clothes. During the use the active clothing would reduce $CO_2$ by means of photosynthesis and after

disposal, the material would be reused (figure 8, right). The group presented the final concept as a collab with sports brand Nike (figure 9).
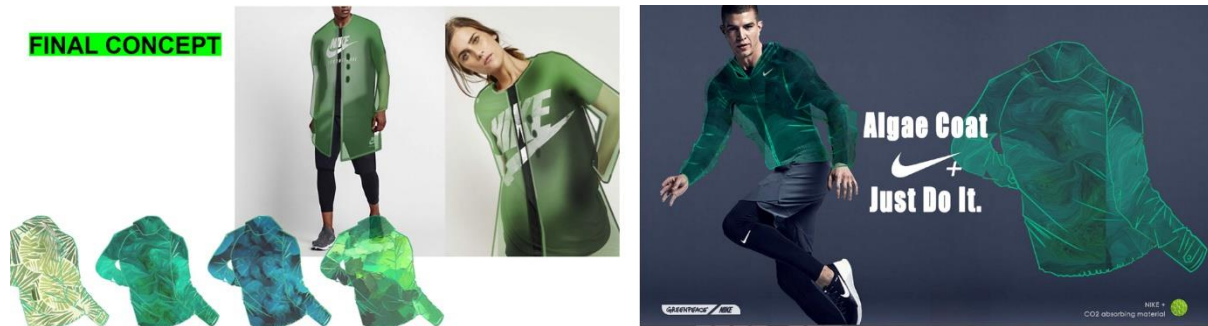


*Figure 9. Example of the Greenpeace "wearable tree" concept in a collaboration with Nike.*

The major contribution of this project is in our opinion the surprising new perspective on clothing and sustainability. Instead of seeing the garment as a contributor to pollution and resource depletion, the clothing is a source of nature preservation. Together with a closed-loop circular system, this can contribute to a sustainable future. Regardless whether the presented garment design for Nike is very plausible or desirable, because that is just an example.

**Fashion and production (locally/H&M)**

Another project was constructed around central actor H&M. As the unofficial inventor of fast fashion, this was an interesting choice regarding a sustainable future. The group therefore formulated the focal issue straightforward: "How can H&M use less resources?" (Oostra et al., 2017). They eventually presented a future concept for H&M targeted at a closed loop production and consumption model, based on local integration of all the items in the chain. Therefore they developed a conceptual flagship store, where the clothing would be designed, produced and sold in the same building. The loss of fibers when recycling old clothing would be compensated by also locally grown new fibers. The group chose hemp as the basis fiber for their concept, because of its quick growth and high productivity. On a per acre basis, hemp yields 250% more fiber than cotton and 600% more fiber than flax (Oostra et al., 2017), making it suitable for production in a highly urbanised environment (figure 10).
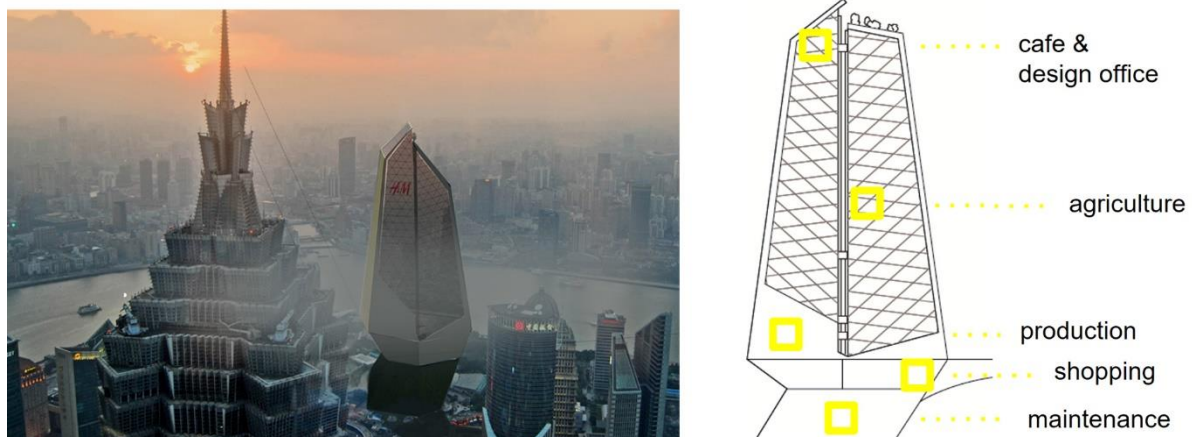
*Figure 10. Urban flagship store concept for H&M, integrating all the steps in the production-consumption chain.*

To tempt the consumer into the closed-loop system, the flagship store would also encompass a design-café where people could hang-out and talk with creative people of H&M about customized designs and a guided tour to the automated in-house hemp factories (figure 11).
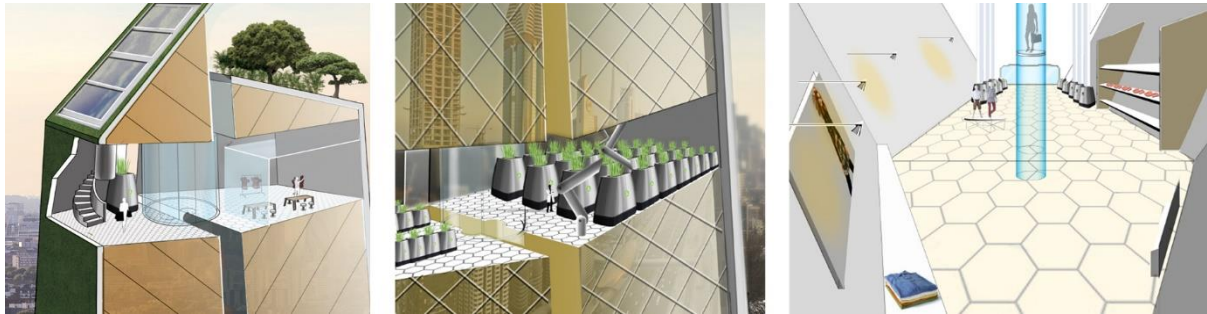


*Figure 11. Design-café, automated greenhouses and conceptual shop floor for the H&M concept.*

**Fashion and identity (fulfilment/Nike)**

The last project to be discussed in this paper was also centred around Nike as the central actor. Operating within a scenario that was typified by a participatory society and a purpose-driven value system (as opposed to income-driven) the focal issue was formulated as: "How can Nike implement smart clothing technologies to improve the abilities and context of the participants of sports?" (Shkribliak et al., 2017). Especially the aspect of a purpose-driven value system led the group into thinking how a commercial party like Nike could stimulate self-awareness and self-actualisation. This resulted in a platform concept, where innovative technology would help consumers to find their 'own' favourite active pastime. With the aid of virtual reality experiences, brain activity sensors and a coaching program, the customer would be advised on sports activities and products fitting to their private values and deepest desires (figure 12). The system could be tailoring on aspects like whether one would prefer individual or team sports, or level of competitiveness or risk-taking.



*Figure 12. Lay-out of the "Nike purpose" platform, helping people to find new activity goals in life.*

The system could then be help with monitoring of training activities and achievements. Or connecting people with the same interests for social sports events. Envisioned within a participatory society, the design also emphasised inclusivity from a technology perspective. Much like the current makerspace-movement, the technology platform would be open, adaptable and upgradable, in order to make the people more involved in their own development. The group embodied this idea with an example of a 'basic' shirt, to be 'smartened' by octagonal patches with sensors and actuators (figure 13, left).



*Figure 13. A "Nike-purpose" product, envisioned as patches that could be sewn on a basic shirt with conductive capacity (left), and visual of the "power to the people" future scenario where it was developed for (right).*

In this way, the user could taylor their garment according to their wishes. The personalised sporting gear would then become more meaningful to the wearer. Because it would also give the user more functionality in their process of self-actualisation, this principle is a nice example of the implementation of the theory of product-attachment by Mugge (2007). This theory distinguishes four factors that can influence product attachment: self-expression (can I distinguish myself from others with the product?), group affiliation (does ownership of the product connect me to a group?), memories (related to the product) and pleasure. The presented purpose concept fosters all four factors (personalised shirts by means of the patches, being part of the "Nike-purpose" community, remembrance of the personal achievements, and the pleasure in exercising a favourite activity), therefore making it less likely that the user would easily discard their clothing gear.

**Discussion**

Remarkably, in all five projects, the actual design of clothes or other fashion items plays a subservient role. The design results are more about the contexts in which the clothes play their different socio-cultural roles (Breward, 1998) from providing protection and convenience, to identity and self-actualisation. In our opinion this is related to the emphasis of our scenario development method on the role of actors and factors. This is related to the concept of "Socio-technical landscapes" by Grin et.al. (2010) who argue that for understanding the long term transformation to a more sustainable society, three levels of analysis are important: "(i) Financial and banking crisis (ii) Relations between Market, Government and Society, and (iii) Values and their expressions in life-styles. This regards a new sustainable economic system, based on different virtues, norms and values more in tune with sustainable development." (Grin et al., 2010, pp.1-2). The future scenario building focusses on the relations between market, government and society, resulting in a future context or landscape, with different power relations. Through the development of actual future concepts within these

landscapes, the future use scenarios show plausible implementations of the associated norms and values, in order to be "more in tune with sustainable development".

Of course, five student projects are not a solid base for research, and forecasting the future is not in any case objective. However we hope that with our methodology, and especially with the five design examples we can inspire the discipline to think of alternatives for the current status quo and add to the creativity of sustainable solutions.

**Conclusion**

Envisioning the future can help in understanding contemporary issues and possible scenarios for solving them. With a forecasting methodology that focusses on the future user scenarios (Dorrestijn et al., 2014), instead of the more usual emphasis on technologies we showed possible and plausible alternatives for different sectors of the clothing industry. Change in user behaviour plays an important role in these envisioned "fashion futures". Therefore, we suggest not only to design or produce sustainable fashion, but rather also design sustainable habits and contexts in which this fashion can flourish. In other words; from product sustainability to societal sustainability.

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