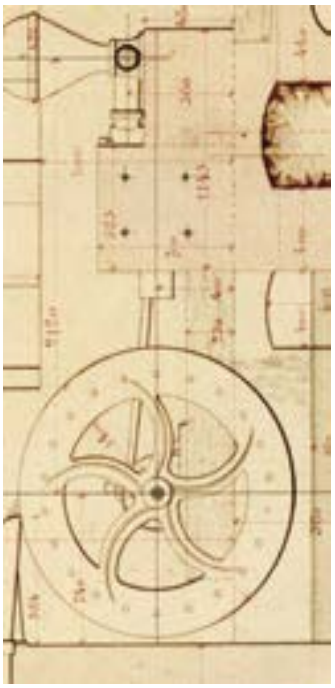
# MULTIDISCIPLINARY PROJECT
# FINAL REPORT



## Fas.P.onSite
## Fashion Production on Site

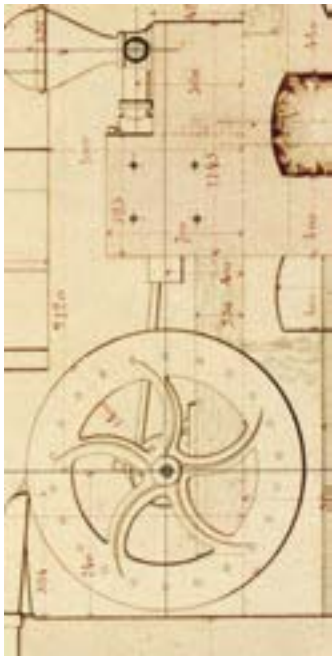
### TECHSTYLIST


ALTA SCUOLA POLITECNICA
POLITECNICO DI MILANO
POLITECNICO DI TORINO

Federico Franzi
*Architecture (Construction), Politecnico di Torino*
Valdrin Koshi
*Engineering for Cinema and Methods of Communication, Politecnico di Torino*
Riccardo Lavrano
*Management, Economics and Industrial Engineering, Politecnico di Milano*
Carlo Serafini
*Management, Economics and Industrial Engineering, Politecnico di Milano*
Narineh Tchilinguirian
*Industrial Design, Politecnico di Milano*

**Principal Academic Tutor:**
Stefano Maffei
*Dept. of Industrial Design, Arts, Communication and Fashion, Politecnico di Milano*

**Academic Tutors:**
Laura Laurenzi
*Dept. of Industrial Design, Arts, Communication and Fashion, Politecnico di Milano*
Beatrice Villari
*Dept. of Industrial Design, Arts, Communication and Fashion, Politecnico di Milano*
**Other Academic Tutors:**
Alessandro Casinovi
*Dept. of Industrial Design, Arts, Communication and Fashion, Politecnico di Milano*
Pier Paolo Peruccio
*Dept. of Architectural and Industrial Design, Politecnico di Torino*
Nicola Spiller
*Dept. of Management, Economics and Industrial Engineering, Politecnico di Milano*
**External Tutors:**
Alberto Zanone, *Consultant*

# MULTIDISCIPLINARY PROJECT FINAL REPORT

## Fas.P.onSite
## Fashion Production on Site

### TECHSTYLIST


Federico Franzi, Architecture (Construction), Politecnico di Torino

*(signature)*_____

Valdrin Koshi, Engineering for Cinema and Methods of Communication, Politecnico di Torino

*(signature)*_____

Riccardo Lavrano, Management, Economics and Industrial Engineering, Politecnico di Milano

*(signature)*_____

Carlo Serafini, Management, Economics and Industrial Engineering, Politecnico di Milano

*(signature)*_____

Narine Tchilinguirian, Industrial Design, Politecnico di Milano

*(signature)*_____

**Principal Academic Tutor:**

Stefano Maffei, Dept. of Industrial Design, Arts, Communication and Fashion, Politecnico di Milano

*(signature)*_____

**Academic Tutors:**

Laura Laurenzi, Dept. of Industrial Design, Arts, Communication and Fashion, Politecnico di Milano

Beatrice Villari, Dept. of Industrial Design, Arts, Communication and Fashion, Politecnico di Milano

**Other Academic Tutors:**

Alessandro Casinovi, Dept. of Industrial Design, Arts, Communication and Fashion, Politecnico di Milano

Pier Paolo Peruccio, Dept. of Architectural and Industrial Design, Politecnico di Torino

Nicola Spiller, Dept. of Management, Economics and Industrial Engineering, Politecnico di Milano

**External Tutor:**

Alberto Zanone, Consultant

# Index

# Part I_The Team's work

# 1_ Executive Summary

Coming up with a successful idea in a mature industry such as the fashion one is no easy task. On one side there are the high-end firms which sell luxurious items and the "status" that comes with them to wealthy individuals. On the other side there are giants like Zara or H&M with innovative business models which are able to provide new collections every one or two weeks. If the traditional models of selling clothes are thus already covered, what is there left that hasn't been fully explored yet? Where could a new start-up actually avoid the fierce competition of such firms and benefit from un-eroded margins? The answer to such question is high-tech customization and is the pillar of our project, developed in the past two years as a part of the Alta Scuola Politecnica program and in collaboration with the design faculty of the Politecnico di Milano. Such answer has not only been provided in a theoretical or abstract manner, but has been elaborated in the form of a business plan, whose ultimate goal is to create profit. With the term high-tech customization we refer to a new niche within the fashion industry in which customers can design, within the technologically feasible degrees of freedom, their own garment, and can try it on before it has even been produced, thanks to a virtual changing room system, which uses augmented reality technologies. In such a way the customization and the purchase of the knitwear item does not have to happen in a traditional store, but can be carried out online through an ad-hoc web application. Moreover a centralized production facility becomes possible and enables considerable cost-savings. The only physical contacts with customers are the flagship store, which has the role of promoting the brand but also the one of helping people in finding their way in such an innovative purchasing experience, and the temporary stores, where augmented reality videos will be shot and made available on the web-site. Such stations will be nomadic in order to maximize the number of potential customers. The name chosen for the company which will implement this business model is Techstylist.

This business report is structured as follows:

in part one a description of the approach followed by the team in "tackling" the issues at hand is given, listing all the activities and researches carried out during these two years. The needs and the requirements of all the stakeholders involved in this project and how the team has analyzed them are also illustrated.

The second part aims to give a brief description of the state of the art in the fashion world. Some of the great number of case studies investigated by the team are presented. A short analysis of the fashion market is given, focusing mainly on haute couture, luxury and on the new trends that are rising in that field, followed by a description of the "new" role of the consumer, his conversion into "prosumer" and the technologies developed by the brands in order to capture this new kind of customer. The last section of the second part is centered on a new machinery for the production phase.

The third and last part of the report deals with the Techstylist solution, developed by the team from the original Fas.P.onSite concept. In this section all the aspects of the Techstylist business are deeply analyzed: from the definition of the collection to the description of the shopping experience and from the description of the several points of contact to the analysis of all the technological details, ending with some considerations about the economic feasibility of the business itself. In the last chapter, there are some final considerations about this interesting experience of study, with a list of the main findings achieved by the project and some advices about the way our work could be used and developed further.

## 2_ Introduction

The Alta Scuola Politecnica project *Fashion Production on Site* (*"Fas.P.onSite"*) is born as a product-service of design, production and sale of knitwear. It could be seen as an experiment of "integrated factory" that deeply changes and innovates also the concept of customers' "experience".

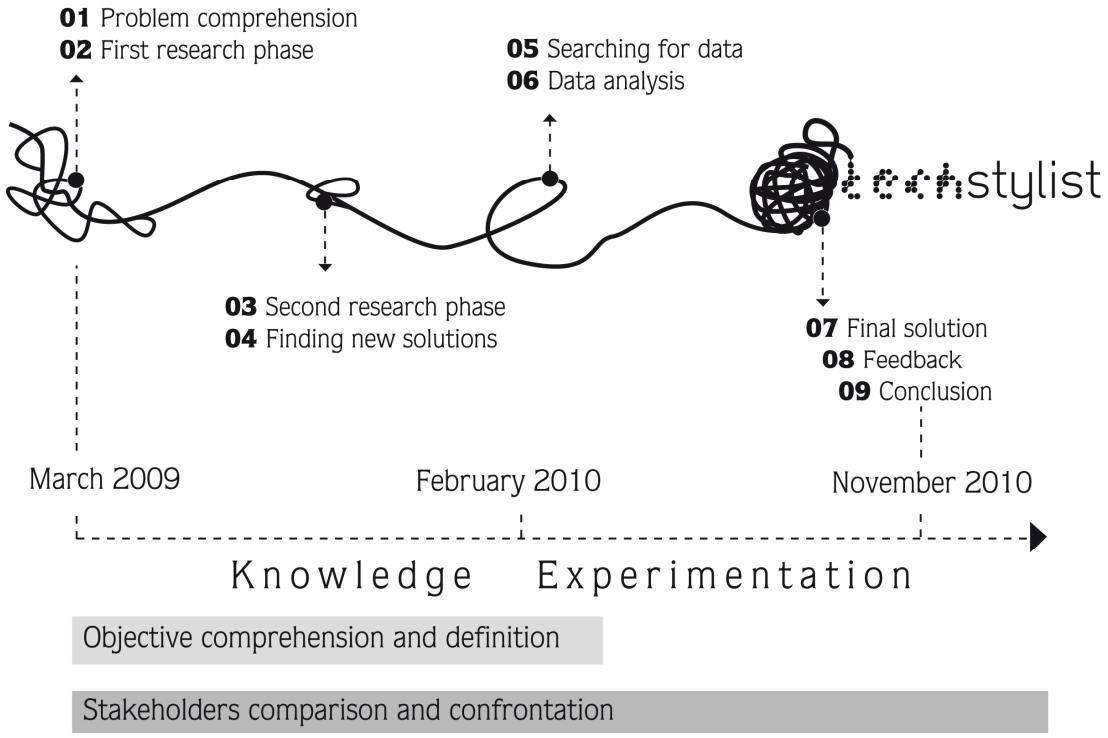
It was originally based on the idea of integrating the different phases of the productive process in the same site, a place/lab where it would have been possible to design, project and produce clothing on demand and/or in "real time", in a very short time in order to deliver it directly to the final customer. The innovation content of the project was just in the convergence between the distribution and production processes and in the creation of new areas, places and activities resetting and innovating the evaluating, logistic and distributive system.

Since all design, production and sale processes co-exist in the same area, the experience of choice, design, production and purchase of a knitwear would be completely renewed. A "new" idea of customers, involved as co-designers and co-producers, was the "heart" of the initial Fas.P.onSite concept. The customer in fact becomes the centre of the manufacturing process, fully representing the idea of "mass customization".

Moreover, Fas.P.onSite would create an alternative to the re-location of production, and the consequent loss of skills, through the improvement of new knowledge related to new technologies and alternative production systems.

This brief description was the starting point for the three teams. As the project has a deep innovative content – there exists nothing similar in the actual fashion industry – a structured approach is required to find the best answer. First of all it is crucial to be open minded in order to explore all the opportunities this kind of idea offers. The second aspect is the necessity to schedule and coordinate properly the team's work, in order to maximize the efficiency of the work. At last, according to the "system design" perspective – and ASP pillars too – it is really important that different, integrated and complementary skills converge, so that the whole design and production process can be designed. This is why the members of the teams have different university backgrounds, just to offer several viewpoints during the analysis and the definition of the final solution.

Consequently the two-year work has been initially organized as represented in the following picture.




1_Description of the two-year work

During the first phase – the first year of work – it has been necessary to build a basic knowledge about the main themes related to the project in order fully acknowledge it and find ideas for alternative solutions. Several activities have been carried out in this period, such as the analysis, throughout case studies, of the fashion market in order to analyze the offer of customizable products and find out niches for a new player or the several visits to industrial partners – such as the visits to Shima Seiki Italia in Carpi (MO) in order to see how their knitting machines works, or to a Carpi Formazione member's factory or to Sintesi Fashion Group, always in Carpi, to have a first view on the production process or the one to BasicNet headquarters in Turin, a competitor with an incredible innovative and successful business model – in order to better understand the technologies and their possible applications. The last visit was in Segrate, to the Shima Seiki Italia headquarters, where it was possible to learn more about their knitting machineries.

After this exploring-phase, the original Fas.P.onSite project has been split up in three different directions.

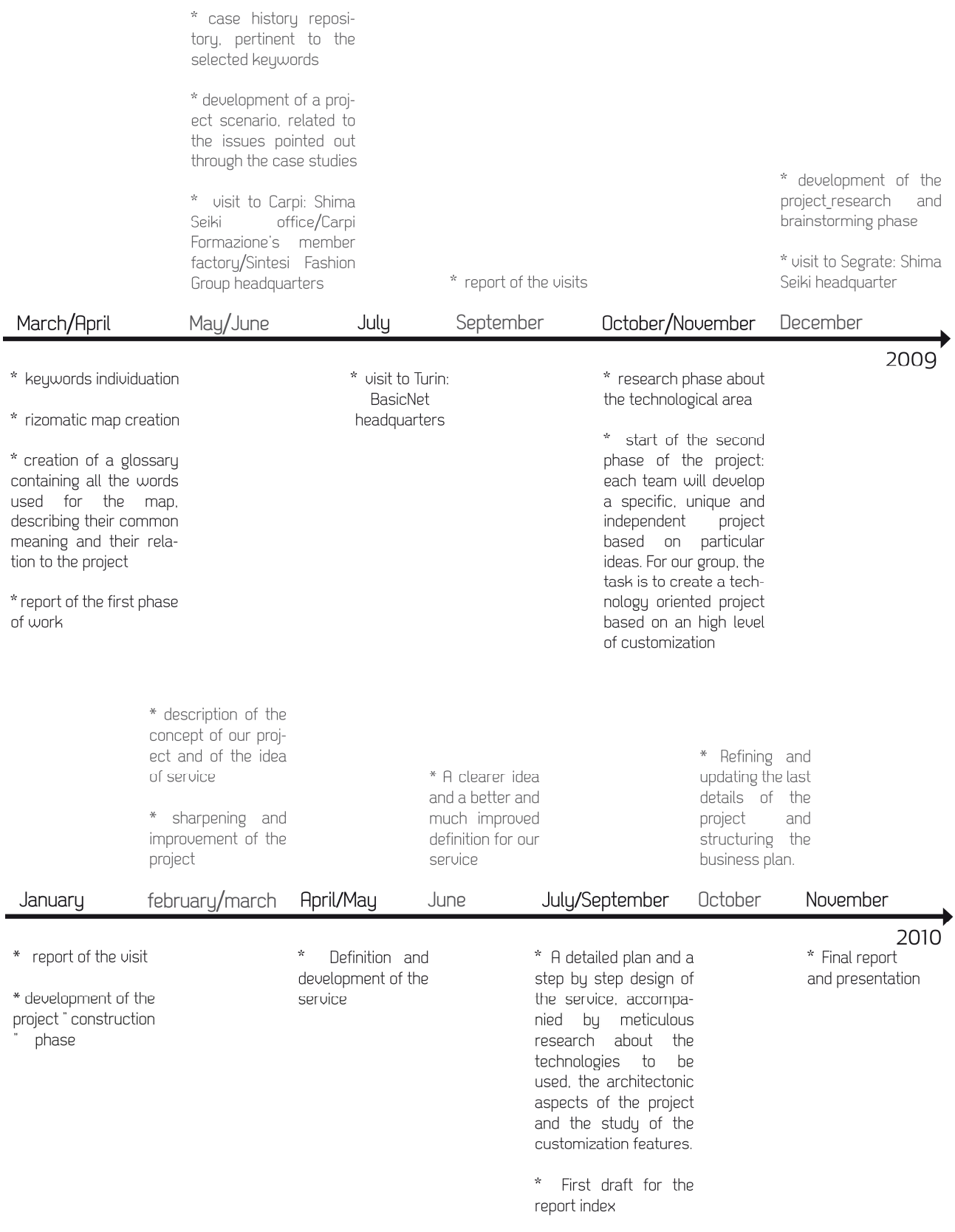
The first one is the "place of experience". It is a sort of new concept of a fashion store, with a strong link with the neighborhood and the city. A new place whose aim is not only sell products, but – hosting contests, workshops and other initiatives – especially push the people to live the place itself.

The second one is the "sustainability". Every aspect of this sub-project has to be defined in order to safe the environment – the best example the selection of the suppliers of the raw materials – and this policy has to be effectively communicated to the clients and the market, as a competitive advantage.

The last direction is the "customization", the one developed by our team and described in this report. It is an innovative idea of purchase, a new fashion experience in which clients have a high degree of freedom in customizing their clothes. Probably this sub-project is the closest one to the original Fas.P.onSite concept, as it focuses mainly on the technologies and their potential new application/combination in the garment industry, even if several aspects have been changed after the comprehension of the same technological constraints and the feasibility analysis of the alternative ideas.

After the sub-project assignment, each team started working on its own specific direction, deepening the required knowledge and analyzing possible solutions. After one year of periodical feedbacks and meetings with the ASP tutors the team has been able to define a specific solution: "*Techstylist*".

In the following page, a picture shows all the main activities carried out by the team during the two-year project work.




2_The team's work calendar

## 3_Users' Requirements

During the two-year work, the team has been in contact with the several partners involved in the project and has always kept in mind the importance of all the other stakeholders for the definition and the success of the business idea. In the following lines it is reported a list of all the stakeholders the team has identified, with a synthetic analysis of their needs and requirements (image 3).

**ASP / Politecnico tutors** The first stakeholder to be mentioned is for sure the ASP tutors, who are interested in developing this new fashion service and in understanding if it could be a profitable business. Thanks to their knowledge and their continuous feedbacks it has been possible to develop such an innovative, multidisciplinary, complex project, satisfying the quality standards requested by the Alta Scuola Politecnica. These requirements have been gathered with a detailed plan of the activities and with the efforts of all the members of the team.

**Fashion industry** The second stakeholder to be analysed is the entire fashion industry. Techstylist could be an incredible innovative player in this system, due to its unique offer of customizable garments. Possibly a player that will change the business and production rules.

**Shima Seiki** Another very important stakeholder is Shima Seiki, the Japanese supplier of the productive technology, the core of Fas.P.onSite concept. Shima Seiki's main interest is to find out if a different application of their knitting machines. The team had the opportunity to meet Shima Seiki representatives in a couple of meetings, during which it has been possible to better know the technology an to discuss its application in our project, understanding opportunities and constraints.

**Yarn suppliers** Among all the other Techstylist suppliers, yarn ones play for sure an important role. As the production is on-demand, there is more the need of frequent replenishments – in order to follow the demand of garments from clients without having high raw material inventories – rather than seasonal ones. The best scenario would be the creation of partnership agreement between Techstylist and the suppliers, with mutual benefits and profit – Techstylist would have the resources for its business activities while the suppliers would have a new client with a business model easily scalable.

**Customers** Finally, the customers. As this is a business-to-consumer ("*B2C*") company, it is crucial to fully understand the needs of the clients in order to define a value proposition that satisfies those needs and that distinguishes this innovative fashion experience.

| Stakeholder | Needs | Requirements | Methodologies |
|---|---|---|---|
| **ASP / Politecnico tutors** | Innovation and multidisciplinary approach in the management of a real complex problem | Create an innovative business model for the fashion industry<br>Economical / Technical | Original problem statement and multidisciplinary team composition. Periodic reviews and feedbacks about the work proceeding |
| **Fashion industry** | Enhance and enlarge the quality of garment offer with customizable products | Create the demand for customizable garments and develop a business model to satisfy it<br>Economical / Technical / Social impact | Analysis of the fashion industry as is and proposal of alternative solutions |
| **Shima Seiki** | Supply of the knitting machines for the production of the Techstylist garments | Partnership or other collaborative agreement in order to define all the communication aspects between Shima Seiki technologies and all the other devices used during the Techstylist fashion experience<br>Economical / Technical | Analysis of the integration of Shima Seiki knitting machines in the Techstylist business model / supply chain |
| **Yarn suppliers** | Supply of high quality yarns | Partnership or other collaborative agreement in order to integrate the yarn suppliers in the Techstylist make-to-order business model<br>Economical / Technical | Identification and integration of possible yarn suppliers in the Techstylist business model / supply chain |
| **Customers** | Purchase of high quality and customizable garments, living a unique fashion experience | Satisfy the requirements of the market<br>Social impact | Creation of a new shopping system based on digital avatar and on the absence of the final product |

3_Stakeholders, needs, requirements and methodologies

# Part II_Problems, opportunities and state of the art

# 4_The state of the art of the fashion world

## 4.1_The fashion industry

The fashion industry is a very complex business environment where roughly five different market segments can be identified: haute couture, luxury, affordable luxury, mainstream, and discount.

- Haute couture: literally "high sewing" (in French) it's the most expensive and exclusive since it comprises the small number of companies worldwide which offer women custom-made clothing at very high prices. The customer target is thus made from very wealthy individuals.
- Luxury: the target of this market remains wealthy people but quality and price are a bit lower than the previous segment and clothes are not custom-made but ready to wear.
- Affordable luxury: aimed at providing lower-priced alternatives to individuals (so-called "aspirational products" available to whom can't afford luxury or haute couture products).
- Mainstream: this segment tries to create products that match the needs of the majority in order to have the largest potential market. Exclusivity is sacrificed for popularity.
- Discount: it targets low-income customers, whose limited resources make them focus exclusively on price rather than design or quality.

These five macro-segments can be grouped in two categories based on where the point of delivery is set across the supply chain: couture houses activate the design and production process when the order arrives and are thus 100% custom-made product firms; the remaining four have already designed and produced the piece when the customer order arrives and can be classified as ready-to-wear product firms.

One of the main characteristics that make the Fashion industry different and particularly appealing is its very high insulation from economic changes, such as, for example, any cyclical crisis. In particular, as easily expected, the less affected are the top two market segments, which face quite stable revenues throughout time (stability meaning less downswings of course but also upswings). The remaining ones, with perhaps the exception of the discount segment, usually suffer the lower financial security of its customers, making them battleground for giant companies with innovative business models, such as Zara, Hennes & Mauritz (H&M) or Gap.

In the following section, an in-depth look at the top two market segments will be given, in order to reach to a better understanding on how a possible business model innovation could reap most benefits.

### 4.1.1_Haute Couture

As previously mentioned this market segment consists in the production and sale of very expensive, high quality, custom-made garments for women[1]. In order to give an idea of who exactly can the targeted customers be it's useful to point out how a haute couture piece can range from 20.000€ to hundreds or even millions of euros[2]. The potential market is thus very small since it comprises only the highest net-wealth individuals worldwide. It should be noted however, that, together with the growth of emerging markets such as India, China or Brazil this normally very stable market is currently expanding.

In France the status of exclusivity attributed to each piece is increased by the rules, set by the *Chambre syndicale de la haute couture* (Trade Union of Haute Couture), that companies have to follow to call themselves "couture houses". These firms have to (directly from Union's regulations):

[1] Haute couture for men does not exist.

[2] http://www.forbes.com/2006/06/27/haute-couture-fashion_cx_ls_0628feat_ls.html

- Design made-to-order for private clients, with one or more fittings.
- Have a workshop (*atelier*) in Paris that employs at least fifteen people full-time.
- Each season (i.e., twice a year), present a collection to the Paris press, comprising at least thirty-five runs/exits with outfits for both daytime wear and evening wear.

4_High couture fashion show

Some of the most prestigious names to belong to such "league" are Christian Dior, Jean Paul Gaultier, Chanel, Christian Lacroix, Armani and Valentino. In other countries the status of haute couture is not certified as in France but still some companies who offer custom-made knitwear operate under such a name.

An haute couture only firm, albeit the very high prices, has difficulty making high profits. For this reason all couture houses also own a ready-to-wear line (in French *prêt-à-porter*), which is by far more profitable and drives the firm's profitability and growth. Most haute couture pieces exhibited during fashion weeks for example are rarely sold and their creation is driven more by brand-related motives rather than (directly) economic-related ones.

### 4.1.2_Luxury

The most important firms in this segment are, for example, Dolce & Gabbana, Prada or Gucci. What makes them similar is the concept of exclusivity the products they sell share. The main idea, in blunt terms, is that very rich people want to buy something only their money can buy, something that can allow them to "stand-out" from the crowd and the firms in this segment provide exactly this: very expensive, high quality, ready to wear clothes.

The delicate part of operating in such a market is that there's a clear trade-off between exclusivity (which justifies higher prices) and market size: if, for instance, Dolce & Gabbana start being very successful amongst medium class customers, it might suffer the loss of its very wealthy ones, willing to pay a premium price, only if the exclusivity requirement is met.

Clothes produced by these firms can be associated to a bigger market, which incorporates other very expensive and exclusive goods such as, for example, cars, watches, hi-tech equipment or jewels. These can all be defined as being "luxury goods" and all share the same property: the demand for them from an individual rises more than proportionally as his income rises (income elasticity >1). This is the opposite from what happens to the complementary category of necessity goods, for which demand rises less than proportionally to income (income elasticity <1).

The main plague affecting this segment is the nearly effortless copying activity than can be carried out by low-cost producers (usually located in the far-east) and can lead to an injection in the market of fake pieces, diluting the idea of exclusivity for rich buyers.

The reason why only these two market segments have been further explored is that our project aims at providing a brand new business model which tries to position itself between these to categories, by offering the luxury industry targeted customers custom-made clothes though an innovative and technological process.

Competing on costs in the fashion industry is not possible and counter-productive for a start-up.

Inditex, H&M or even Gap already cover lower and medium income segments and drive their customers' demand by continuously refreshing the collection with incredible frequency. Fortunately, competing on costs is not necessary to make profit in this scenario, as one can always position its business in the higher segments, where customers are willing to pay a premium for the product of course, but most of all for the additional "perks" that come with it, i.e. social status, visibility and the possibility to "stand-out" from the crowd. This desire is common to all people but of course not everyone can afford luxurious products. Marketing gurus state that "consumers everywhere at every income level want more luxury" (Danziger, 2005). So why not create something luxurious of course but with enough appeal to convince even medium income customers to increase their budget assigned to clothes? Apple Inc. is a successful case study to take into account: it certainly sells luxurious technological products whose bottom line costs as much as two or three times the competitors' ones. Their products are certainly high quality and one-of-a-kind in some key aspects (as the proprietary operating system MacOs X for example) but this alone wouldn't justify the price premium customers at many income levels are willing to pay. What they pay for, again, is the emotion, the status that comes with the product. Coming up with a similar way of marketing a service could be a key enabler for a new successful startup in the fashion industry. The product and the service provided should be one-of-a-kind and the way all this is communicated to the customer should incorporate an "aura" of magic, of uniqueness. For such an idea to "pick-up" and gather interest in customers, it is important for it to ride on the emerging trends already observable on the market and to satisfy these rising needs all at once in a comprehensive system. For this reason in the following paragraph the most relevant emerging market trends are briefly overviewed.

### 4.1.3_Trends

Several trends have been spotted throughout 2010 that can significantly impact the way the fashion industry works and can suggest innovative business model.

**Tangible personalization and customization**

Customers seem to be distinguish themselves from the mass even more compared to previous years as probably most of them are moving away from the uniform styles fashion industry giants such as Zara or H&M are offering. A new kind of customer is rising, as more thoroughly described in chapter 4.2.

**Unservice**

Customers seem to appreciate a "do-it-yourself" purchasing philosophy assisted by technology. It gives them a sense of independence and creative control; most of all, however, on the firm's side, it allows to save a lot of money. Again for a deeper understanding of the idea, chapter 4.2 provides a more thorough analysis.

**Crowdsource**

Examples of crowdsourcing are for instance Wikipedia or less known Google Chrome experiment that allows more people to draw on the same blank sheet at the same time, without unexpected outcomes. It is the idea of outsourcing to a large group of people, instead of outsourcing to a contractor or service provider. Of course this can only be done for few things, but, also thanks to the development of communication technologies it is a growing possibility for many industries.

**Pop up retailing**

Mobile retail displays, pop art studios and shipping container bars are just a few explanes of product and stores that leverage on the exclusivity and surprise of pop up retail. It's one of the latest ways to generate buzz and quickly place a product in a new market.

## 4.2_A new type of customer

At a first glance someone could affirm that the globalization and the mass production have led to a human society characterized by a worrying homologation. Instead, if it is true that it is possible to find the same tastes, the same brands and the same products almost everywhere in the world, there is an increasing attention for the local tradition and roots (for example Slow Food in the food sector) and the society is really less homologated than it could be thought. Indeed, the need and the desire of being different from the mass has now an increasing importance.

Inside the population there are, in fact, a lot of differences and stratifications since everyone acts individually and even inside each man there are different identities and ideas (Gerosa, 2008). The complexity and the fragmentation of the society, in spite of the unifying power of globalization, are the result of the crisis of the strong ideologies and of a even more evident plurality of cultures.

In the consumer world, these differences among the customers and the different identities existing in a single customer, which generally cause strange choices during shopping activities (like, for example, mixing luxury and low-cost products), have determined, in the last years, and increasing attention towards the customer, accompanied by a lot of researches and studies in order to identify his tastes and his way of thinking.

However, it is important to say that a lot of researches about the customer started in the 70ies, and among these the studies carried out by M.E. Tauber (Iannilli, 2002) tried to explain all the different reasons influencing the client during the purchase phase.

The studies about the customers have, like their main purpose, the objective of identifying the rational and irrational factors that are at the basis of shopping activities and they change when the customer change: the abundance of goods and spurs proposed by the consumerism have changed the customers, augmenting their requirements and making them more exigent.

The type of customer which was typical during the 80ies and the 90ies, characterized by impulsive consumerism, has turned now into a type of customer which is more selective, aware and competent (Trevisan, 2007) and which considers himself no more like an ingenuous and passive purchaser, but want to be active part of the shopping process.

In reason of this change, the client has become the core of the retail world and this is the reason why, as said before, there is now a great attention toward the customer and why a lot of brands are now "consumer oriented" and have as their main purpose the will to make their clients happy and satisfied and no more the simple objective to produce and sell more and more.

The transformation of the consumer has determined a change into the shopping world, since the brands have started to modify their role in order to meet the different characteristics of the new type of customer. For example, all the retail strategy is under an important renovation, since the client want to be part of a shopping experience, be actors dialoguing with the products in an attractive context (Gerosa, 2008) and the brands, in order to create the brand loyalty, offer them stores that are also places of culture and socialization (Gerosa, 2008) and where they can live a multisensory shopping experience. In this way, the brands can create a strong relationship with their clients, trying to give them not only products but also "added value" and this is really important in a market where the consumers are very mindful and examine a lot of different aspects before buying and where they need to be constantly and fully satisfied in order to avoid their "switcher" approach, which means that they do not use to be stuck to a specific brand.

Referring to these kind of consumer emerged during the last years, Giampaolo Fabris (Gerosa, 2008) defines him "new consumer", in order to underline the difference between this kind of customer and the type of customer existed before. Obviously, and Fabris knows this very well, the consumer is always "new", since he is the result of different kinds of context (social, economical, cultural, technologic...), but in this case he wants to highlight that the consumer is "new" since the historical context has radically changed into the postmodern era.

This new context has modified not only the consumer, but also other elements which were important, before, in order to understand the shopping dynamics. For example, an important tool was the income, but in the actual context it has been replaced by the propensity to consume or, instead, the social class has been substitute by lifestyle.

Analyzing deeper these "new consumer", Fabris identifies six characteristics which can fully describe him and which are reported by Gerosa in her text (2008).

The "new consumer" is:

- autonomous, since he is no more passive but want to be active in the process of creation and production;
- competent, since he has to choose alone what to purchase;
- exigent, looking continuously for the quality and no more for the quantity;
- selective, since he is constantly looking for alternatives;
- disenchanted, because he has now a pragmatic and realistic behavior;
- holistic oriented, since his shopping choices are determined not only by tangible aspects, but also by intangible elements, like emotions.

However, it is hard to say if this new consumer has been created by the new proposals provided by the retailers or, instead, if the new consumers, being more and more exigent, guide and suggest new solutions (Trevisan, 2007). It is possible to affirm that retailers and consumers have influenced each other reciprocally, but the brands, in order to not to lose their customers inevitably have changed their products and the way they offer them, following clients' new tastes and desires.

For the new consumers emotions play a very important role during shopping and needs have been replaced by desires. In reason of this consideration, the role of the experience during shopping has become fundamental, in order to keep the clients closer to the brand.

Gerosa (2008) quoted the theory of the shopping experience established by Arnold, Price and Zinkhau:

- the first phase is constituted by the anticipation of the consumption and is characterized by the prefiguration of the following desire's satisfaction;
- the second is the phase of the real shopping experience, when the client goes into the shop and buy, and when there is the highest level of interaction among the customer and the physical role of the brand, including staff and products;
- the third phase is the one in which the goods purchased are used/consumed;
- the last one is the phase in which the experience is a good or a bad memory.

Since the experience has acquired this important role, it has been developed a new kind of marketing, different from the traditional one, and which is called "experiential marketing". It is main purpose is to create "experience" for the customer, trying to reduce the chance's role inside a planned experience and trying to understand and analyzing all the aspects related to the act of purchase.

The description of how experiential marketing works is not the purpose of this text, but it is important to add that it is based on the experiences' classification made by Schmitt (Gerosa, 2008), who divides them in Sense, Feel, Think, Act and Relate, constituting the Strategic Experiential Modules (SEM).

Related to the considerations made above about the new consumer and the shopping experience, which explain how the customer want to be active in the process of creation and production, there is the concept of mass customization, which identifies a production strategy of goods and services oriented to the satisfaction of the needs and the desires of the individual customer, however keeping the efficiency typical of the mass production, which is, instead, no more the best system of production, since it is oriented to the quantity and to made the greatest amount of sales only, without considering the client's desires and feedbacks. Mass production, in the end, is a production system no more able to manage the characteristics of the new consumer, who can not accept the passive imposition of goods,

but is looking for an active role in the creative, productive and sale process. This is the reason why it has been created a new word, "prosumer", describing this new type of active consumer: the term is, in fact, the result of the union of "producer" or "professional" with "consumer". This neologism was created by the writer Alvin Toffler, who imagined the fusion between producers and consumers, creating a new mass customization market, in reaction to a saturated mass market offering standardized goods only.

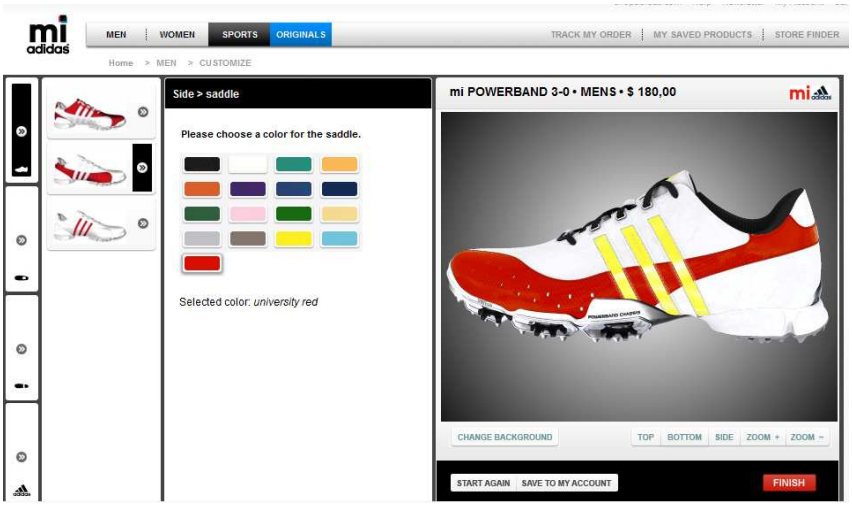
This new kind of production is based on the "one-to-one marketing", which is characterized by the aim to sell more products to a single client and no more to sell a single product to a wide number of clients. Indeed, it is important that the client is satisfied (customer satisfaction) and trusts the brand, also because a content customer is more profitable and become the best tool of sponsorship.

In the following part there are some case studies about how different brands apply the concept of (mass) customization. The decision of enclosing within brackets the term "mass" is justified by the fact that more or less all the brands, even the luxury brands which are not, obviously, mass oriented, have created customized collections, in order to better satisfy the tastes and the desire of experience of their clients.

The customization process generally starts from a standard item which the clients can finish of creating choosing among colors, materials and details proposed by the brand. This is the typical kind of customization in the fashion world, specially for shoes and bags.


5_Converse shoes configurator (www.converse.com)

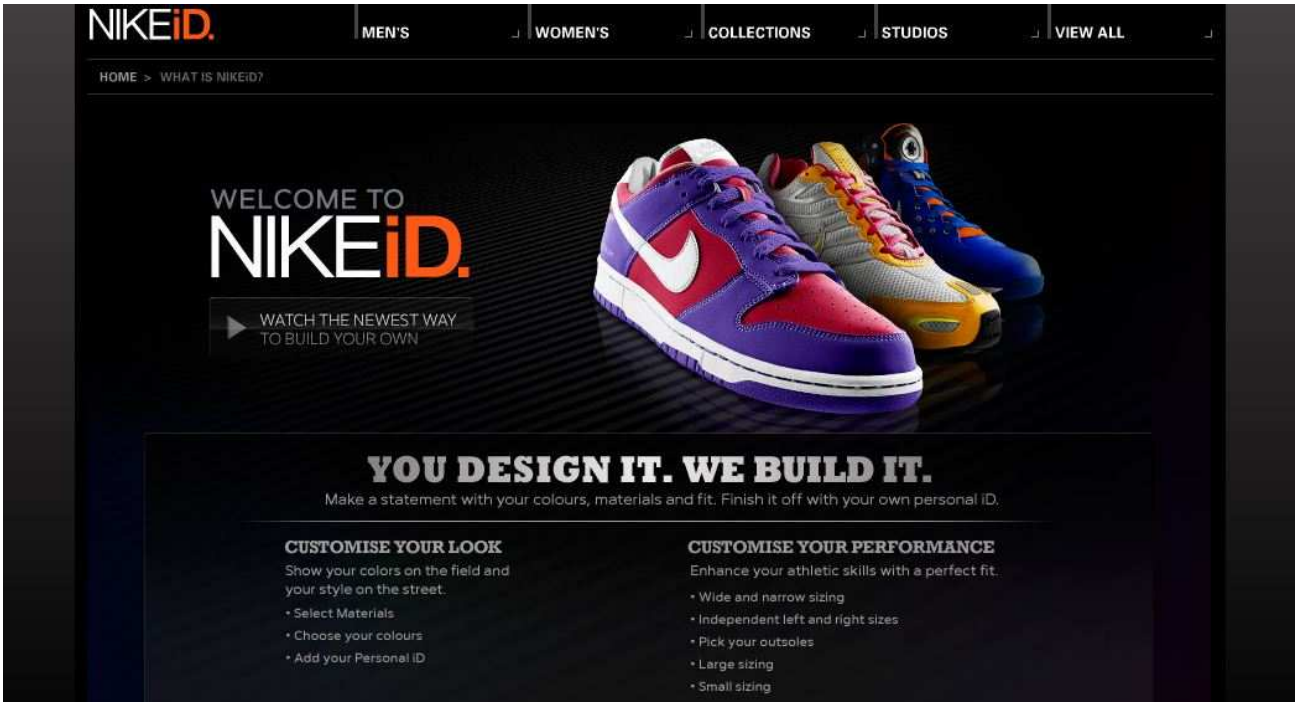
Adidas and Converse, for example, give to their clients the possibility to create their own pair of shoes, but while Converse have created a "shoes configurator" which allows customers to design directly online, Adidas provides the service "miAdidas" both on its website and in selected stores in the USA while in Italy in selected stores only. Looking to the pictures below, it is possible to see the two brands provide a web configurator which works more or less in the same way: customer has to choose first the base-type of shoes and then can customize different parts, choosing color, type of tongue, details ecc.



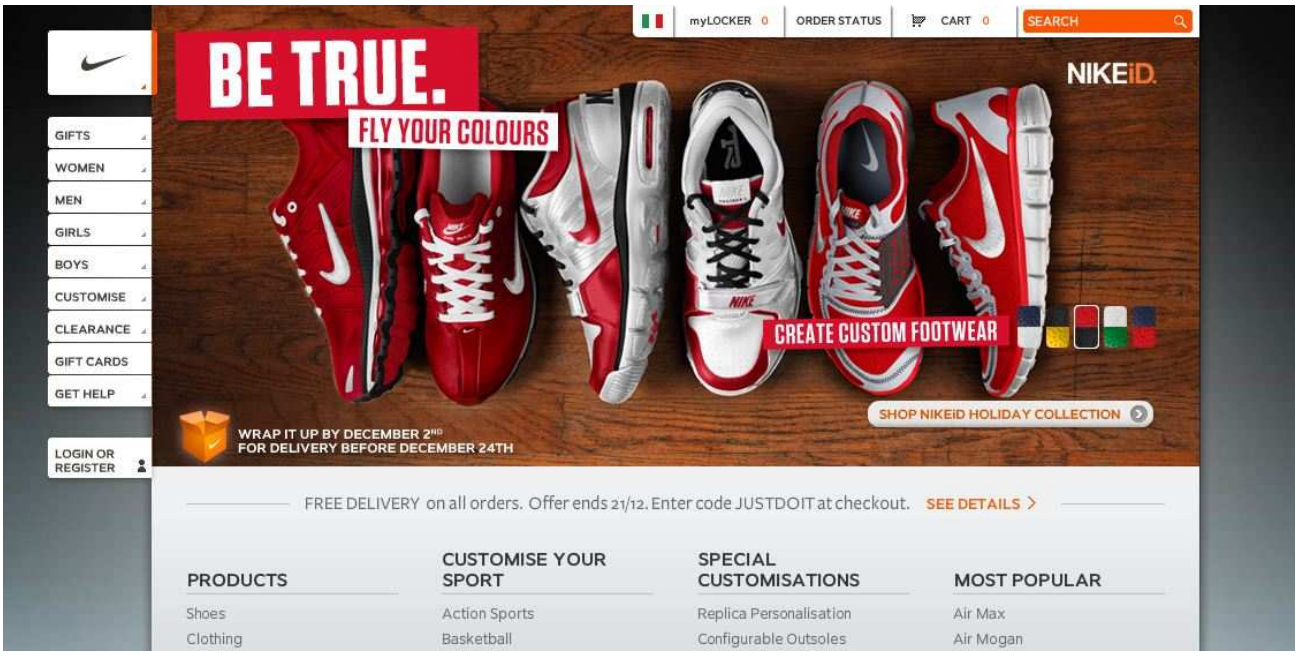

6_miAdidas shoes configurator (www.adidas.com)

Another important sportswear brand like Nike give the opportunity to its customers to buy a wide range of customized products. Indeed, unlike Adidas and Converse, which provide customization for shoes only, Nike guarantees customization for all its product (shoes, garments, bags and accessories) through its NIKEiD website. In this way, Nike demonstrates to have understand the desire of identification and personalization of its clients, giving them the possibilities to create their own total

look. This is the Nike motto: "You design it. We build it" (see picture n. 7), underlining the active role of the customer-prosumer in the creation phase.




7_NIKEiD homepage (http://nikeid.nike.com)




8_NIKEiD configurator (http://nikeid.nike.com/nikeid/index.jsp#home)

Even Louis Vuitton, probably the most known luxury brand in the world, offers to its clients the possibility of creating their own item. The Maison, indeed, gives them the chance to personalize their items adding initials or other small details on bags or leather items by painting ("My Monogram" service) or by hot stamping or, in addition, give the possibility to create their own items through the "Custom made"service (the item is created accordingly to customer's whishes) or through the "Made to order" service, where the level of customization guarantees to the client the possibility, starting from a Louis Vuitton model, of changing materials and colors (image 9).


9_ Louis Vuitton offers, to its clients, different kinds of customization
(http://www.louisvuitton.com/en/personalisation/home#/homeIntro)

The cases explained above (Converse, Adidas, Nike, Louis Vuitton) demonstrate how it is possible to customize a product before purchasing it. There are, however, other brands offering, instead, customization after the purchase of the items. Like for Louis Vuitton, we are going to talk now about customization and not mass customization.

10_Fendi DIY kit

The first case is Fendi DIY Kit (fig.10). To celebrate the 10th-anniversary of its famous "baguette" bag, Fendi decided to product and sell a special version of this bag in coated canvas, totally white. This special bag was called DIY, Do It Yourself, to underline the high level of creativity and personalization. In fact, the bag is sold in a box with ten Pantone markers and the client is the artist of his own bag: she can sketch, color and draw directly on the bag, creating an unicum that no one, except for the shape, could have. This is different from the "standard" personalization, where the client could in general add no more that the initials or choose and change some details. Even in this case, the tendency of "Do It Yourself" shows that fashion brands are trying to give to their client a wide possibility of choice and personalization. The new "must" is difference, not homologation.

The second case is the "*Do-it-yourself*" project stemmed out of a collaboration between two designers, Berber Soepboer and Michiel Schuurman. They created a collection of dresses where the design can be modified by users. The "*Colour-In Dress*" is a simple dress with a black and white print, which is especially designed to fill with colored textile markers.

11_A woman coloring her "Color-In Dress"

In these cases users become designers only when the items (bag and dress) are already created, but they are very important because they show that the desire of having hyper-personal products and customization are sound tendencies influencing the big sportswear brands, the

luxury ones and young fashion designers. In addition to these cases, there is an important example of co-designing experience, and this is the case of Threadless, where the role of "prosumer" is well underlined. Threadless is a brand which gives to its customer the chance to become designer "for a day" through a designers competition: users can upload their own t-shirt design on the website and if an adequately large number of other users vote in favor of one of those creations, the design will be produced and sold.


12_Threadless homepage (http://www.threadless.com/)

All these cases represents, so, how fashion brands try to face the change in clients' behaviors, trying to offer them "added value" represented by the possibility of "tune" the items according to their tastes and offering them innovative shopping experience, like become designers for a while, creating what they are going to buy.

In these context, the importance of customization in Techstylist seems to be even more fundamental.

## 4.3_New technologies for new customers

In a world dominated by technologies, where the technologic development is growing faster day after day, testified by the frequent launchings of new high-tech products unimaginable until few years ago and where technologies have entered imperiously into every field of the human life, it is obvious that the fashion world would not be exempt by this technologic spirit.

Avoiding to examine the role of technology into the research and production fields of new fabrics, in this paragraphs it will try to investigate briefly the use of technologic devices in the fashion world and particularly in the fashion retail sector, where they are useful to satisfy the new customers' wills.

### 4.3.1 The evolution of the dressing room

The clients' desire of living, enjoying and being part of more and more amazing shopping experiences have led brands to redefine the role of the store and the way they show themselves to the customers.

In particular, a lot of efforts have centered on the rethinking and redesigning of the traditional dressing room, in order to transform them in spaces characterized by an high experiential level and capable of positively influencing customer during shopping, useful also for strengthening the brand loyalty and the brand image and for increasing the sales.

An interesting example is the magicmirror™, a fantastic device created by the collaboration of Fujitsu, the famous technology producer company, of TheBigSpace, a Milan based merchandising solutions provider, and of Paxar, RFiD technology company.

13_Detail of the magicmirror™

Magicmirror™ is, briefly, a special mirror that gives fashion tips while a client is trying on a clothes in a store, as suggesting matching items or giving information about the garments or the fashion world and it is composed by the following elements:

- a "mirror", created by special reflecting material and which works like a touch-screen;
- an RFID aerial;
- an RFID reader;
- a computer managing data,
- an integrated sound system.

It works as a normal mirror, but thanks to RFID technology when a customer, in possession of an item with RFID tag, approaches magicmirror™, he sees on the reflecting surface not only his image, but also several kinds of information (description of the product, size and colors available, suggestions for matching items…) related to the item he is trying on. By touching the mirror, in addition, the customer can access more information regarding the products of his interest and can contact a shop assistant without getting changed, leaving the dressing room, and having to find other items.

It can be useful to quote the description of this device made by TheBigSpace:

> magicmirror™ provides retailers with a means to reach customers on an emotional level and positively influence purchase decisions at the moment of the choice.
>
> magicmirror™ communicates the story behind each tagged product and facilitates a highly innovative and personal means of product discovery.
>
> magicmirror™ provides an emotional experience that transcends rational argument at the point of sale.

Experiences form deeper bonds with customers.
Emotions per square foot is the metric that commands a brand premium for retailers today. (www.thebigspace.com/magicmirror/)

Another example of applied technology for fashion retail is the OMNIA Virtual Mirror produced by the Italy based Vimage company. It is a digital mirror which allows customers to see a 360° image of themselves thanks to an embedded camera capturing user's movements when he is reflected on the mirror and thanks to an innovative technology which recreates images with slight time delay allowing to customer a 360° complete visualization of himself from every angle. In addition, OMNIA Virtual Mirror can support additional and integrative softwares that can combine the real client's vision with several different digital contents like gaming and/or advertising.

14_A client looking at the OMNIA virtual mirror

It can be very useful in order to improve the shopping experience since it solves the traditional problem of looking how a clothes fits, for example on the back, using traditional mirrors.

The last case is a prototype studied and developed by the California-based PARC (Palo Alto Research Center), a society owned by Xerox and specialized in inventing, developing and bringing to market changing innovations. In the research field "Context aware computing & mobile interaction", PARC researchers have created the "responsive mirror", a technologic device still under development and which can enhance the retail experience.

Researchers started their work after considering the most common practice in a shop, which is to select few items for comparison and to try them on to see if they fit and look well and decide which of them to purchase, generally asking advices to other people in order to have an immediate response about how they look wearing the new garments.

Starting from these considerations, they have prototyped an high-tech system which helps shoppers during the comparison-decision phase before purchasing, allowing them to directly compare a garment being worn with images from the previously worn garment, and the orientation of images from past trials is matched to the shopper's pose as he moves. and suggesting to them alternative styles choosing from other clothes available on the store. This "responsive mirror" will help clients in the decision making process and to enjoy an amazing shopping experience (Zhang, 2008).

This device consists of a conventional mirror, placed at the center of the system, two displays placed at the sides of the mirror and two cameras, one hanged at the ceiling and one on the top of the mirror.

In order to guarantee the maximum level of privacy, the system's camera is not in the room where the customer changes clothes, but in a near "fitting room".

The display on the right gives advices and information to the shopper about other garments and items that he could try showing images of other people wearing other clothes similar or different from those the client is trying on. Indeed, the display on the left shows customers wearing previously worn garments and the view in the display matches the client's movements made to view in the mirror how garments fit from different angles. The matching program, based on the capability of the system of detecting customer's body and movement is one of the innovation of this device. The system also captures the images of the client recreating it with slight time delay, allowing to customer a complete visualization of himself.

Another important aspect of the Responsive mirror is the possibility of connecting to an online social fashion network, so customers might directly upload and share photos of themselves wearing different outfits and obtain real time advices and comments from their friends.

This system, unlike magicmirror™, for example, uses computer vision techniques to detect client's movements in front of the mirror and show, thanks to the matching technology, corresponding views from prior fittings. In addition, it is not based on RFID for garments' identification, but they are recognized (and system can propose alternatives and other clothes) through complex algorithms.

### 4.3.2_A new kind of made-to-measure

Made to measure typically refers to clothing that is sewn from a standard-sized base pattern. A tailored suit is a common example of a made-to-measure garment.

Traditionally, to order a made-to-measure garment, the customer's measurements are first taken by a made-to-measure retailer. Then a base pattern is selected that most closely corresponds with the customer's measurements. This base pattern is altered to match the customer's measurements. The garment is constructed from this altered pattern.

Some of the advantages for the customer are that made-to-measure clothing permits to have well-fitted garments and customize the fabric and detailing, but on the other hand the customer must wait up to several weeks for the garment to be sewn and delivered; in addition a typical price mark-up for a made-to-measure item is 15% over the price of its ready-to-wear counterpart.

Nowadays there are different technologies that try to change and enhance this process. Body scanning is one of them.

A body scanner is a device capable to scan and get a 3D data points of a person's body. It aims to automate the registration of the user's measurements.

Different companies propose quite expensive equipment that is able to output a 3D model after a few-minutes body scan; the following have been studied:

- Brooks Brothers, with TC2 body scanning machine; the scanner hardware costs $35,000 and the measurement extraction software $15,000.
- UniquePatterns, with Intellifit body scanning machine (proprietary, not sold to other businesses)

The body scan produces a series of 3D data points that are used both to get the measures and to have a visual feedback through a 3D model.

For the purposes of Techstylist, the adoption of these machines to take the user measurements can have different consequences in the performance of the system and cost of the service; Techstylist is a service to virtually try knitwear using an avatar, remotely from home. Having an avatar that is a 3D model requires important resources in terms of computing power to be able to render in a reasonable time the 3D model at each virtual try-on request. In addition the cost of the machine can negatively influence the final price of the knitwear.

The proposed solution is to take manually the measures of the user in order to use them during the production phase, and to rely on augmented reality technologies for the virtual try-on.

### 4.3.3_Try on in the virtual and augmented reality era

Augmented Reality and Virtual Reality are two concepts that have been studied in order to be exploited for the development of a efficient and cheap virtual try-on.

There are two commonly accepted definitions of Augmented Reality (AR). One was given by Ronald Azuma in 1997. Azuma's definition says that Augmented Reality combines real and virtual, is

interactive in real time and is registered in 3D. Additionally Paul Milgram and Fumio Kishino defined Milgram's Reality-Virtuality Continuum in 1994. They describe a continuum that spans from the real environment to a pure virtual environment. In between there are Augmented Reality (closer to the real environment) and Augmented Virtuality (is closer to the virtual environment). We consider Augmented Reality as a method to enhance the reality view through an informational layer where computer-generated shapes show information of some interest related to objects or locations in the real scene.

Virtual reality (VR) is a computer-simulated environment that can simulate places or objects in the real world, as well as in imaginary worlds. Most current virtual reality environments are primarily visual experiences, displayed either on a computer screen or through special stereoscopic displays.

**Hardware**

Virtual and Augmented reality have common hardware elements:

_displays:

- Head Mounted Display (HMD) places images of both the physical world and registered virtual graphical objects over the user's view of the world. The HMD's are either optical see-through or video see-through in nature. An optical see-through display employs half-silver mirror technology to allow views of physical world to pass through the lens and graphical overlay information to be reflected into the user's eyes. The HMD must be tracked with a Degrees-Of-Freedom (DOF) sensor. This tracking allows for the computing system to register the virtual information to the physical world. The main advantage of HMD AR is the immersive experience for the user. The graphical information is slaved to the view of the user. The most common products employed are as follows: MicroVision Nomad, Sony Glasstron, and I/O Displays.
- Handheld Augment Reality (HAR) employs a small computing device with a display that fits in a user's hand. All handheld AR solutions to date have employed video see-through techniques to overlay the graphical information to the physical world. Initially handheld AR employed sensors such as digital compasses and GPS units for its six-degree of freedom tracking sensors. This moved onto the use of fiducial marker systems such as the ARToolKit for tracking. Today vision systems such as SLAM or PTAM are being employed for tracking. Handheld display AR promises to be the first commercial success for AR technologies. The two main advantages of handheld AR are the portable nature of handheld devices and ubiquitous nature of camera phones.
- Spatial Augmented Reality (SAR) makes use of digital projectors to display graphical information onto physical objects. The key difference in SAR is that the display is separated from the users of the system. Because the displays are not associated with each user, SAR scales naturally up to groups of users, thus allowing for collocated collaboration between users. SAR has several advantages over traditional head mounted displays and handheld devices. The user is not required to carry equipment or wear the display over their eyes. This makes spatial AR a good candidate for collaborative work, as the users can see each other’s faces. Multiple people can use a system at the same time without each having to wear a head mounted display. Spatial AR does not suffer from the limited display resolution of current head mounted displays and portable devices. A projector based display system can simply incorporate more projectors to expand the display area. Where portable devices have a small window into the world for drawing, a SAR system can display on any number of surfaces of an indoor setting at once. The tangible nature of SAR makes this an ideal technology to support design, as SAR supports both a graphical visualisation and passive haptic sensation for the end users. People are able to touch physical objects, and it is this process that provides the passive haptic sensation.

_tracking: modern mobile augmented reality systems use one or more of the following tracking technologies: digital cameras and/or other optical sensors, accelerometers, GPS, gyroscopes, solid-state compasses, RFID, wireless sensors. Each of these technologies has different levels of accuracy and precision. Most important is the tracking of the pose and position of the user's head for the

augmentation of the user's view. The user's hand(s) can be tracked or a handheld input device could be tracked to provide a 6 DOF interaction technique.

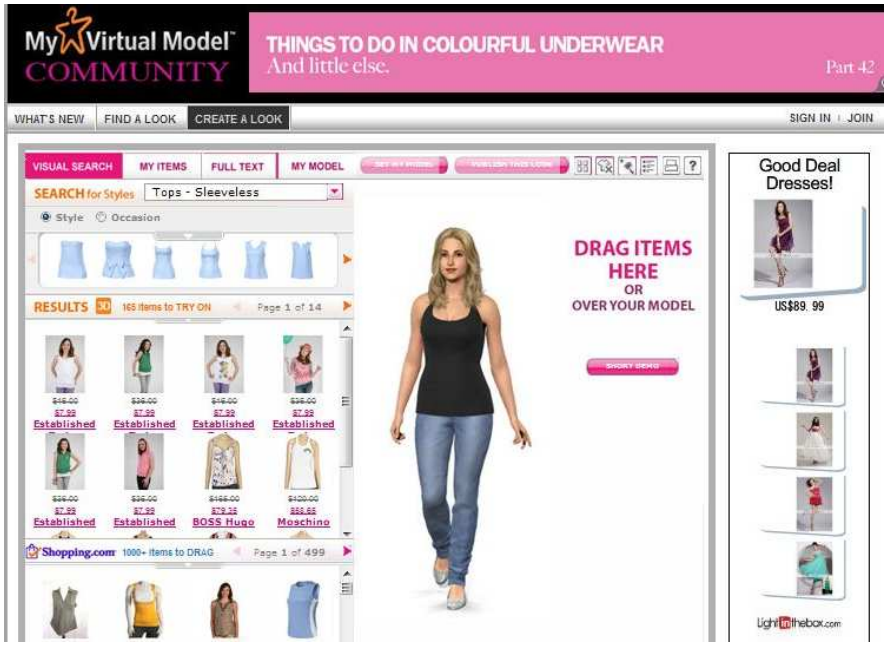
_input devices: This is a current open research question. Some systems, such as the Tinmith system, employ pinch glove techniques. Another common technique is a wand with a button on it. In case of a Smartphone, the phone itself could be used as 3D pointing device, with 3D position of the phone restored from the camera images.

_computer: Camera based systems require powerful CPU and considerable amount of RAM for processing camera images. Wearable computing systems employ a laptop in a backpack configuration. For stationary systems a traditional workstation with a powerful graphics card. Sound processing hardware could be included in augmented reality systems.

**Software**

Both AR and VR need the computation of the virtual layer; AR in addition needs the merging of the virtual and reality layers.

For a consistent merging of the virtual layer with the real-world images from camera, the Computer-Generated (CG) images should be attached to real-world locations in visually realistic way. That means a real world coordinate system, independent from the camera, should be restored from camera images. That process is called Image registration and is part of Azuma's definition of Augmented Reality. Augmented reality image registration uses different methods of computer vision, mostly related to video tracking. Many computer vision methods of augmented reality are inherited form similar visual odometry methods. Usually those methods consist of two parts. First stage is the detection of interest points (called also fiduciary markers or optical flow) from the camera images, using Feature detection methods like Corner detection, Blob detection, Edge detection, thresholding and/or other image processing methods. In the second stage, a real world coordinate system is restored from the data obtained in the first stage. Some methods assume objects with known 3D geometry (or fiduciary markers) present in the scene and make use of those data. In some of those cases all of the scene 3D structure should be pre-calculated beforehand. If not all of the scene is known beforehand SLAM technique could be used for mapping fiduciary markers/3D models relative positions. If no assumption about 3D geometry of the scene made structure from motion methods are used. Methods used in the second stage include projective (epipolar) geometry, bundle adjustment, rotation representation with exponential map, kalman and particle filters.

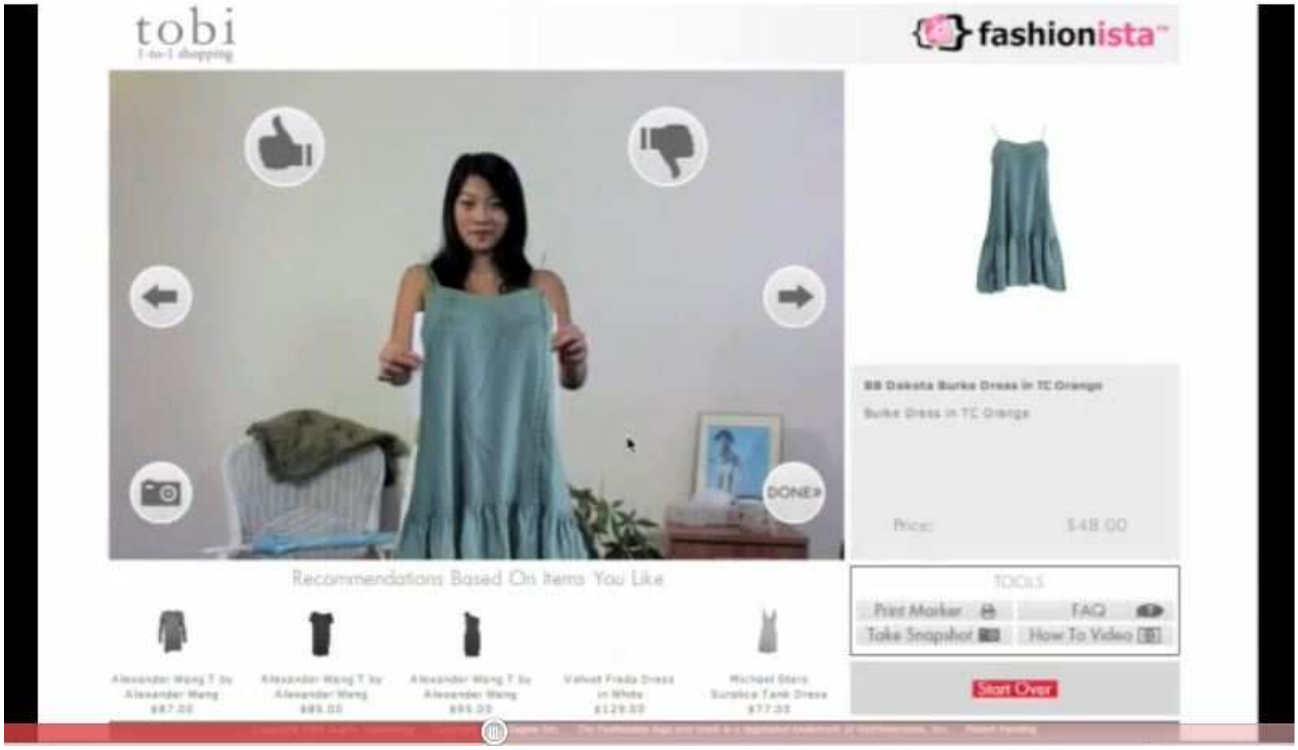



15_My Virtual Model configurator
(http://www.mvm.com/cs/shopForLooks/Default.aspx)

**Case studies**

My Virtual Model is an example of web service that allows the user to create a virtual avatar and to wear it with his/her own creations directly from home. It is a clear example of virtual reality: the user sets his/her own avatar by a web interface, giving body measurements; out of these information the system is able to reliably create a 3D model and to wear it with a priori-known models of indumenta. The user experience depends on the quality of the information given to make the avatar.

Tobi.com allows the user to add on top of his/her picture virtual knitwear; it's a clear example of augmented reality: the user can navigate the website using his/her webcam, by moving the arms in specific areas. There is no need of giving body measures for the virtual try-on; it's sufficient to print a special marker, turn on the camera and calibrate the image. Finally is possible to browse the catalogue by moving the hands in specific areas of the webcam view (as shown in the explanatory video http://www.youtube.com/watch?v=E1T0egGgc5E, see the picture below)




16_Image taken from the explanatory video

Other two examples of augmented reality web services are Silhouette.com and Virtualmirror.net; these services allow to virtually try a pair of sunglasses by taking a picture with the webcam. The system behind is able to correctly set the point of view to render the 3D model of the customized sunglass, and to add this virtual layer on top of the image, obtaining two perfectly aligned layers.

Each of these examples has given good hints and ideas for the development of Techstylist solution:

- My Virtual Model has underlined that the user requirements can be an obstacle if he/she needs to manually set all the parameters of his/her avatar for a simple virtual try-on; in addition the 3D avatar someway hasn't the same effectiveness as the real image of the user.
- Tobi.com, Silhouette.com and Virtualmirror.net remove the need of a setup of the avatar, because is the system behind that is able to automatically retrieve what is needed to correctly render a virtual layer on top of the image. They leverage the static nature of the image, calculating once the tracking points: this permits a live rendering of the virtual layer.

Techstylist aims to leverage the augmented reality concept, preferred to virtual reality because of a stronger and more effective impact on the user experience; the avatar (further described in 5.7.1) will be a video sequence made by 2 layers, the reality layer (video of the user, recorded once) and the virtual layer (the computer generated video of the personalized knitwear, created at each virtual try-on request). In order to have a common interface usable from any device, there is no need of any external device like a webcam to browse the catalogue or navigate the website.

## 4.4_New production technologies

Amongst the various innovative technologies that we researched about, we dedicated specific attention and time to Shima Seiki's knitwear machinery, in particular the WHOLEGARMENT, studying it from the aspects of capacity, performance, process, technicality, etc…

Having a good knowledge basis in its capacities and limitations was a must in order to start planning our project in a meticulous and precise manner, studying all along the new opportunities that it has to offer and the limitations that we might face. The following is an introduction to Shima Seiki's Wholegarment and its specifications.

Shima Seiki revolutionized the knitwear industry by introducing the Wholegarment knitting machine. What distinguishes the latter from the rest of the machines is the fact that it produces knitwear in entire pieces, thus leaving behind the traditional concept of knitwear formed by sewing the separate parts (front body panel, back body panel and sleeves). As the Wholegarment knitwear is produced three-dimensionally and in one entire piece on the knitting machine, the benefits are many for the producer, the designer and even the consumer.

A computer design package is available to design the garment in a very meticulous and precise way, along with a simulation of its shape over the body. This makes it possible to have a final garment produced exactly as intended by the designer. Once the required result is reached, a simple output to the machine allows starting the production of the knitwear. Since the pieces are not sewn together, there are no seams and therefore there's a whole new level of sophistication within the essential characteristics of knitwear softness, lightness and resilience. Furthermore patterns and designs are continuous on the entire garment, giving also the possibility of reversible knitwear without the necessity of double knits.

Consequently the producer's expensive and time-consuming post-production labor (such as intensive cutting and sewing processes, amongst many others) is excluded. The amount of scrap material and leftovers from the garments is completely eliminated; moreover by knitting the entire garment only with the anticipated amount of yarn the environmental friendly factor is raised up high. There are no longer limitations for lead-time, the required garments are manufactured "on-demand" and thanks to the digitally programmed data, the quality from one item to another or from one batch to another remains consistent.

On the other hand the consumer also benefits from many aspects: thanks to the absence of seams, a higher level of comfort is achieved, effective especially for newborn's knitwear or hypoallergenic clothing where skin irritation might be an issue. Additionally, the natural elasticity of knits is preserved, localized pressure is eliminated and a natural flow/drape is maintained for seamless skirts and dresses…all this allowing superior stretch and mobility to the garment and further comfort to its user.

Other innovative aspects are:

- the refinement of fine gauges: fine and ultrafine gauge fabrics add a high level of sophistication to the knitwear and modify its perception of heavy and bulky sweaters. This opens the door to new markets within the categories of sports, eveningwear or lightweight summer knits.
- New patterning opportunities: new structure patterns emerge with innovative techniques such as the slideneedle.

17_Example of knitwear produced with Shima Seiki Wholegarment

- Breaking the basic production concept: thanks to the 3D dimensional production, basic sweaters are no longer the only output. The range varies from tops, bottoms to accessories and the coordination of materials, colors and patterns is easily achieved.

18_Samples of different kinds of Wholegarment knitwear

How does the production take place?

All knitwear production is performed through an up-to-date computerized equipment: the SDS-ONE or the SDS-ONE APEX (image n.19).

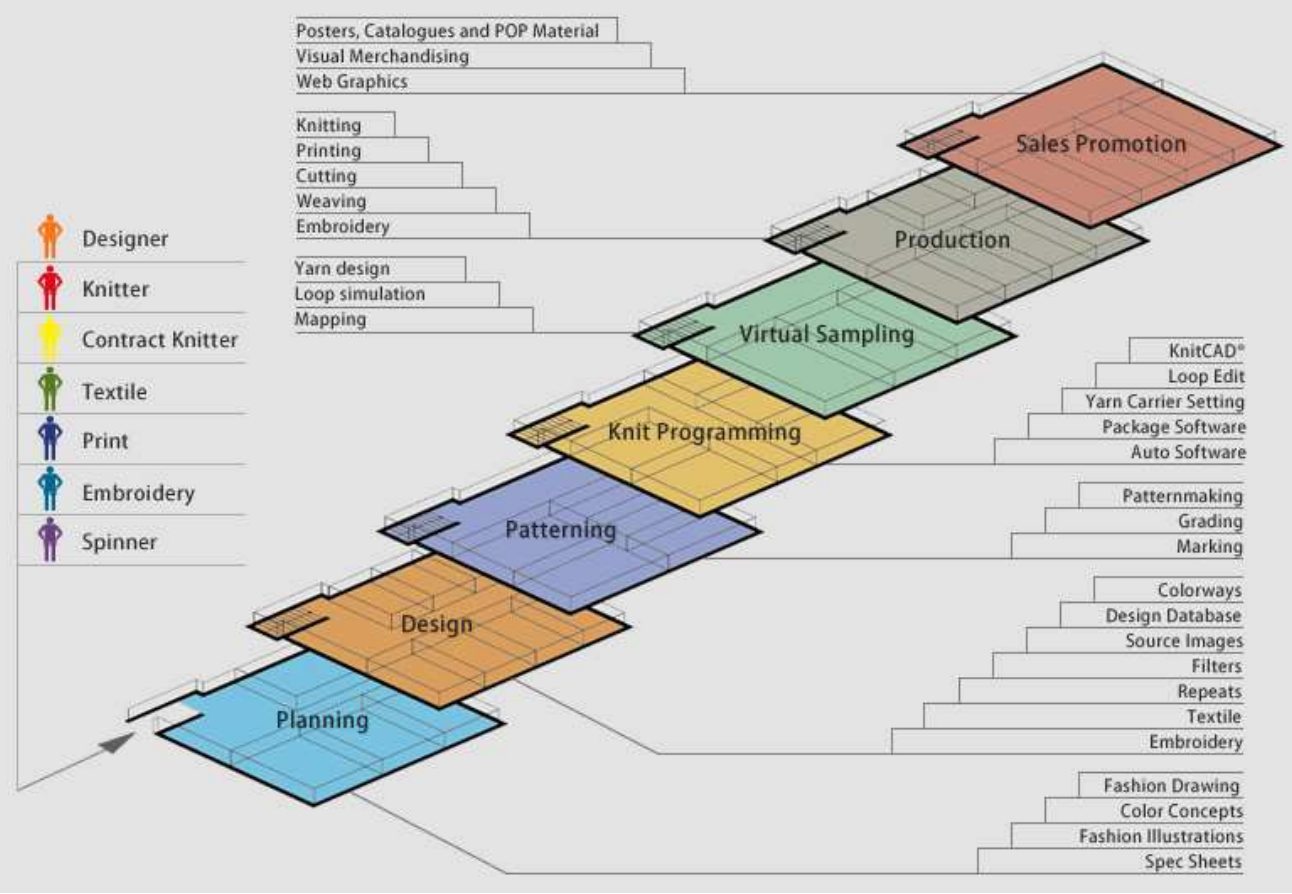
Prior design, programming, 3D mapping and simulations are done through the computer graphic design system.

19_The SDS-ONE APEX

And therefore SDS-ONE is also, other than being a design tool, a communication tool that helps the designer and the staff to skip the costly and time-consuming pre-production sampling, thanks to its virtual sampling capabilities with photo-realistic simulations in 3D. It goes a step beyond the typical 'computer-to-knit' applications and becomes a 'computer-to-garment' production, allowing to do further simulations such as color matching, texture mapping, etc…

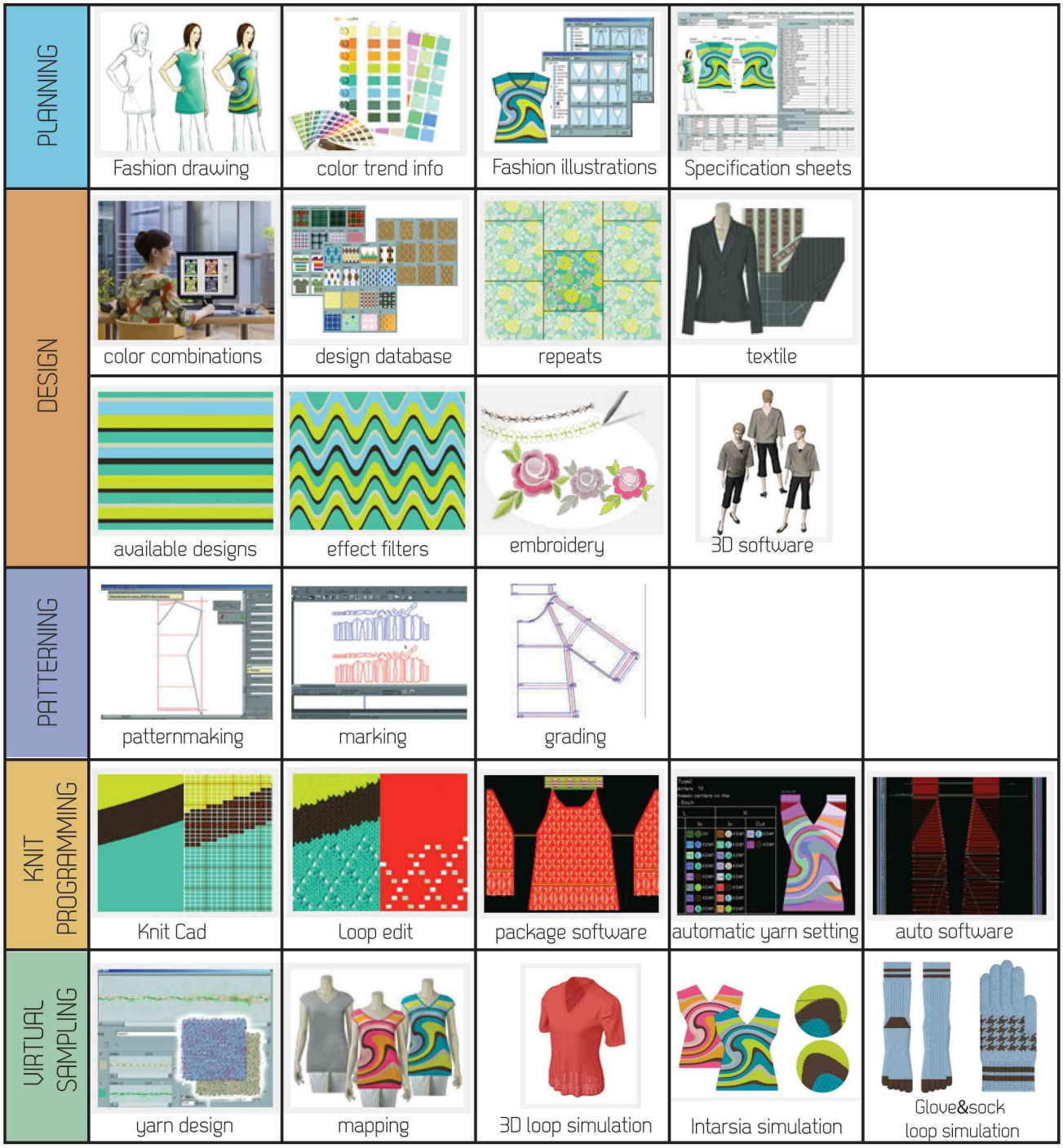
The design phase is an essential one in the fashion industry, continuously changing trends is another important topic and for that reason, SDS-ONE APEX is designed in a way to provide the customer with quick and powerful support of apparel design, compatible with all the different design phases from fashion drawings, illustrations , specification sheets, color selection, pattern mapping to 3D modelist software, knit programming, etc….

The following picture (n.20) is a map showing the various stages of design work and the various design applications used with the SDS ONE APEX before reaching to the production phase.



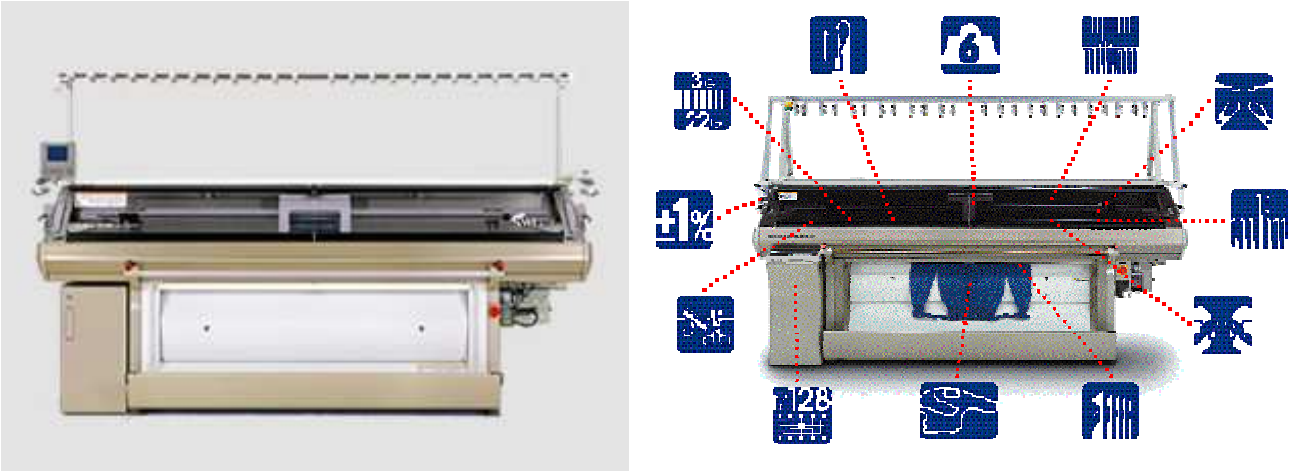

20_Map of the design and production process

The picture n.21, here reported, describe all the main feautures forming each step of the process from the *planning* phase to the *virtual sampling* one.




21_The SDS-ONE APEX workflow

Once the design has been simulated and ready for production it's as simple as printing a document. The knitwear will come out (see picture n.23) of the WHOLEGARMENT machine, almost ready to be worn!



22_The Shima Seiki Wholegarment knitting machine

23_The knitwear coming out from a Wholegarment machine.
Image taken during the team's visit to Shima Seiki Italia headquarters in Carpi (MO), 18 June 2009


24_Details of the Shima Seiki Wholegarment knitting machines.
Images taken during the during the team's visit to Shima Seiki Italia headquarters in Carpi (MO), 18 June 2009

# Part III_The solution

# 5_Techstylist

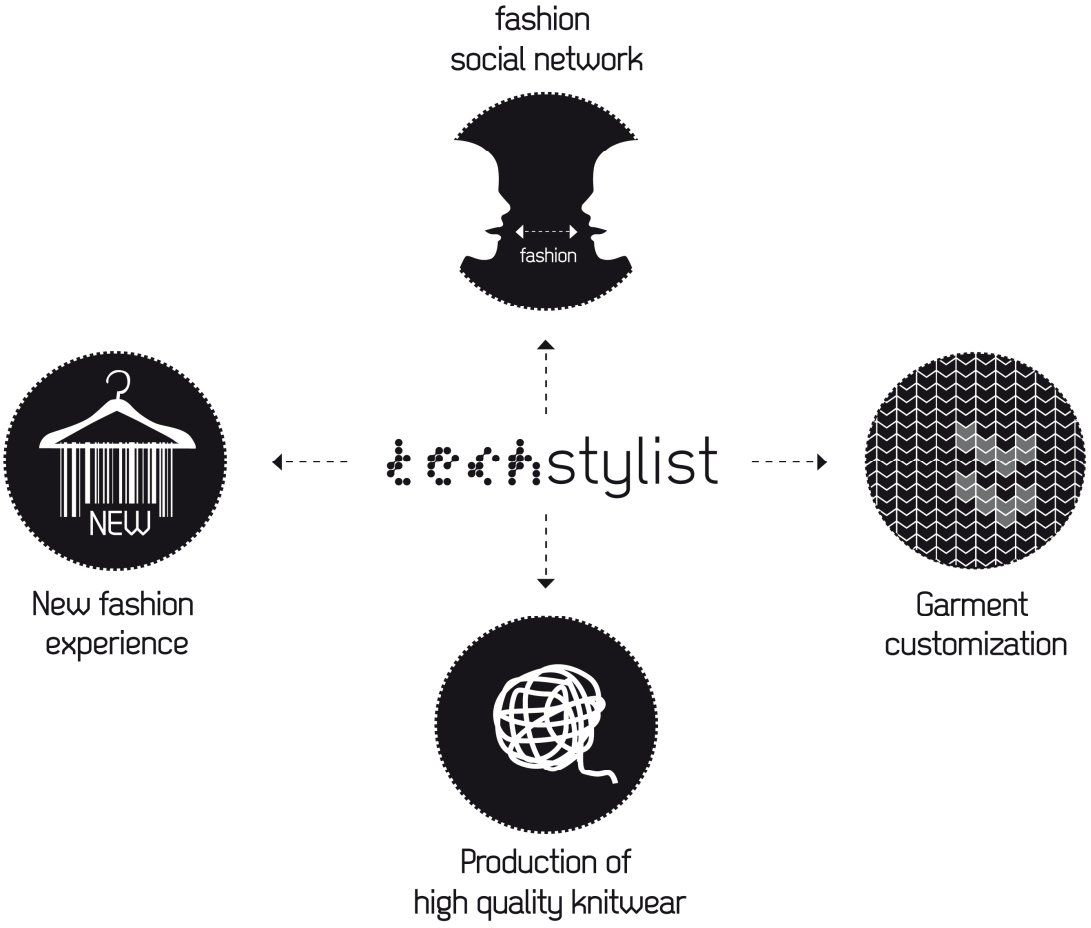
## 5.1_What it is and what it offers

Coming up with a successful idea in a mature industry such as the fashion one is not an easy task. Setting new standards, thinking innovatively and guaranteeing success is an even harder one.

The solution for our project came as a result of our profound researches, as a synergy between the fashion market analysis and the innovative systems/technologies.

Our innovative proposal is therefore a business model, named Techstylist (Technology + stylist ), which is based on high-tech customization, thus referring to a new niche within the fashion industry.

By *high- tech customization,* we mean a service that allows customers to design their own garment, within the technologically feasible degrees of freedom, and the ability to try it on before it has even been produced, thanks to a virtual changing room system which uses augmented reality technologies. The client is therefore the key actor of the whole creative process, getting an incredible make-to-order experience where he/she buys a unique fashion piece designed just to satisfy his/her own requirements.

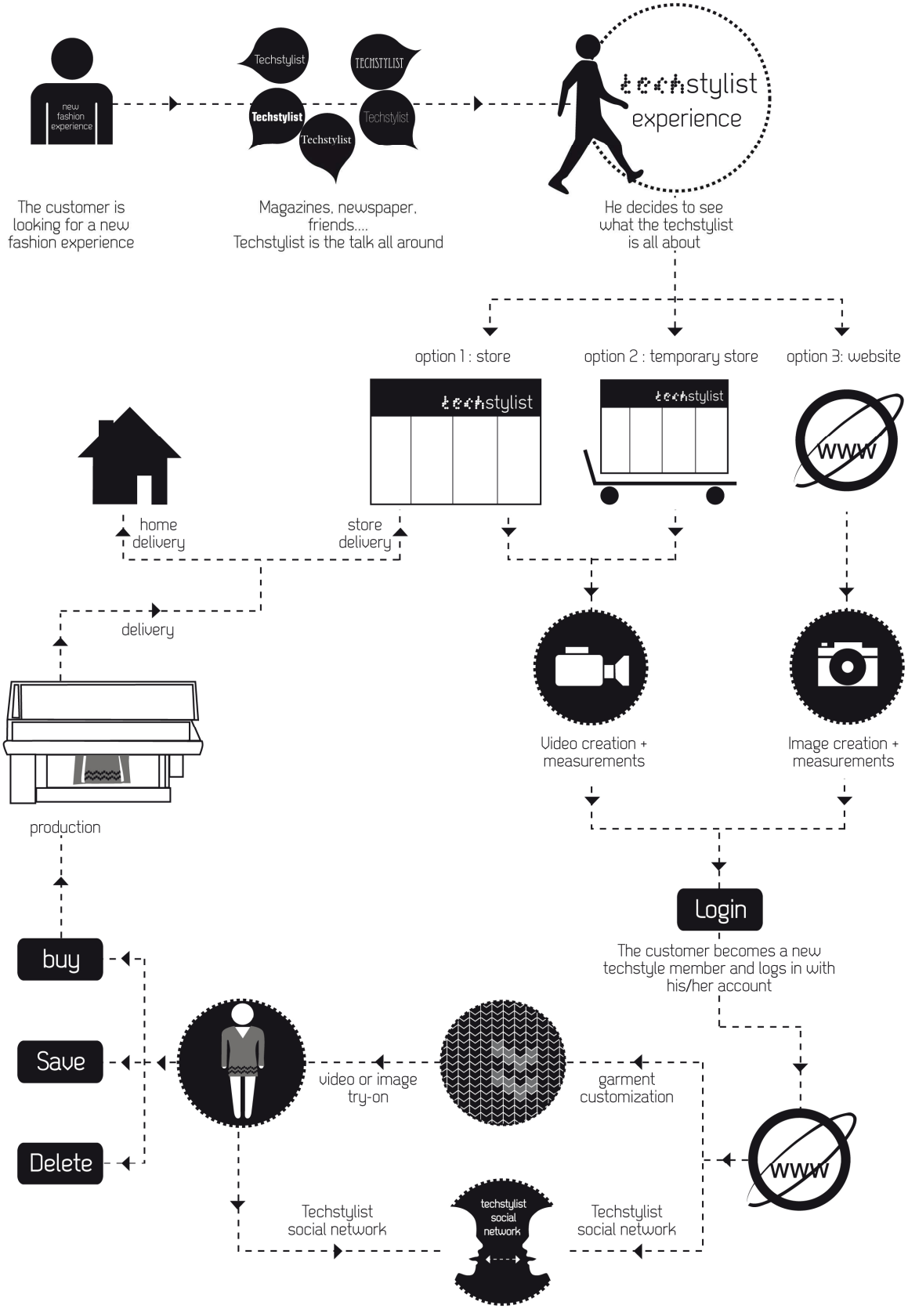



25_What Techstylist offers

A deeper analysis of the technologies involved and a better delineation of the target (men-women among 25-40 years interested in fashion, high-quality garment and new technologies) have led us to focus more on the concepts of innovation-customization-technology and deeming the "on site" concept no more fundamental. As a consequence of this choice, design, production and selling are no more in the same place and the concept of a traditional store has disappeared, given the fact that the customization and the purchase of the knitwear item do not have to happen in an ordinary manner or

in the same place. Instead, it can be carried out online through an ad-hoc web application, where the user becomes a part of a fashion social network. The service is therefore spread between retail spaces (which include flagship stores, mobile temporary stores and in-building temporary stores) and web-based access.

The following service map puts forward in a simplified way the offered services and the process followed by a first time user.




26_The Service Map

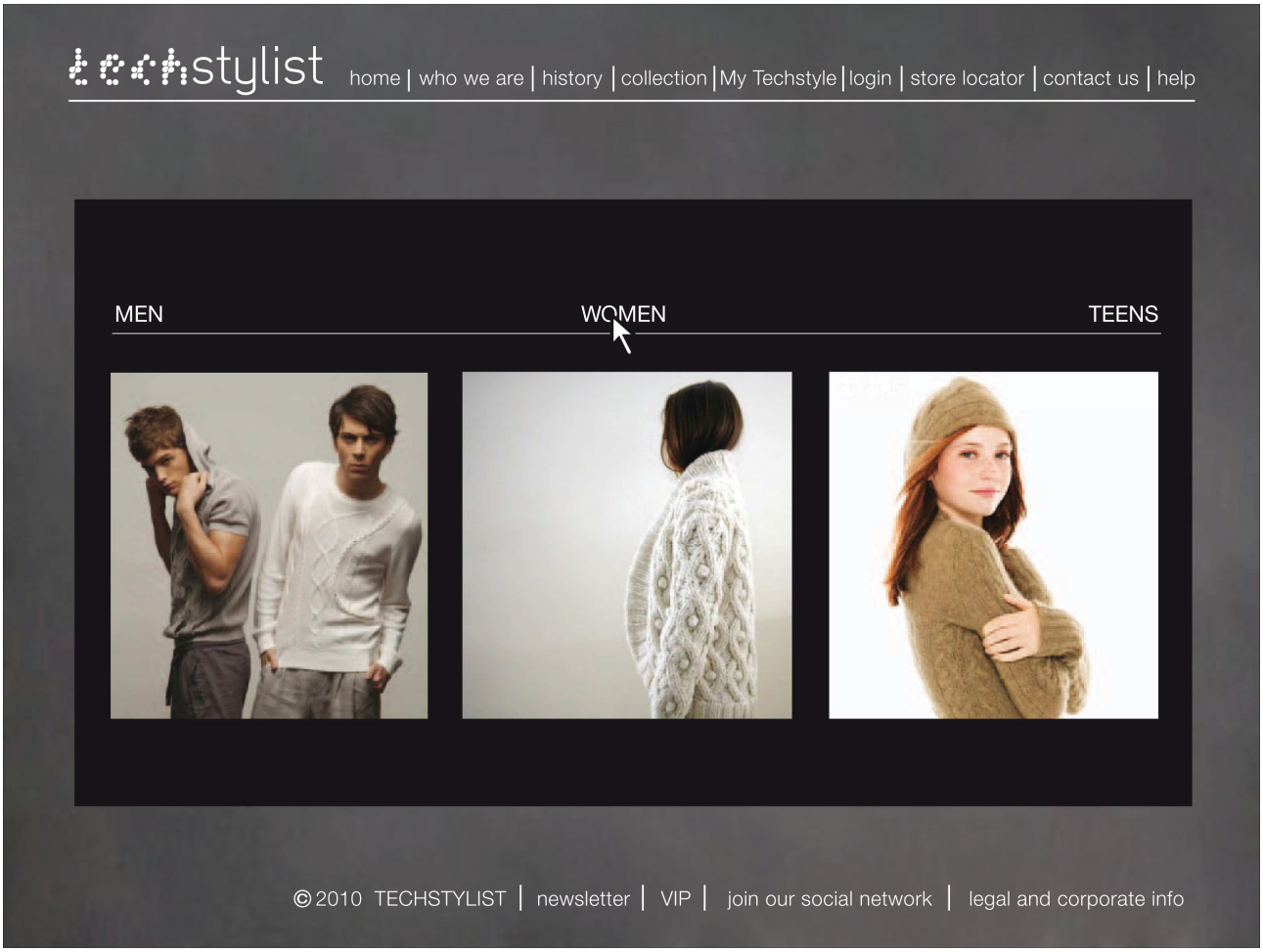
## 5.2_The Techstylist Collection

As previously seen, Shima Seiki's wholegarment machinery offers endless options and combinations for the manufacturing of a knitwear. Our project initiated therefore with the intent of a full customization, an idea that was certainly appealing and revolutionary, giving to the client the opportunity to become a fully capable designer, however it soon became clear, after speaking with specialists from the machines' manufacturer, how the times and costs of the process worked against the success of such a business model. The degrees of freedom available for customizing clothes had thus to be considerably shrunk in order for the business idea to stand on its feet. Shima Seiki software is not in fact very flexible, and, aside from minor changes such as different colors for the garment, a whole new design is required after any change in shape or size is made.

The solution emerged from the great load of research carried out in the first months of the project. The information gathered revealed new technologies, already available on the market, which could enable a service based on a lower degree of customization, but with the advantage of being an online-based and hi-tech experience. The new degree of customization was now assembling-based, meaning that customers are able to create their garment based on combinations of basic "pieces", predesigned by our stylists. This allows for an entire different approach to production, which lowers costs considerably.

In order to define this degree of customization and make sure to have a clearly organized library, we had to carefully select and individualize the basic templates. Once again it was important to make sure not to overplay with the number of combinations, given the fact that the modifiable parameters are so many and consequently the combinations might be countless.

We first individualized 3 categories: men, women and teenagers.




27_Techstylist website/choose the collection's category

- For the category of WOMEN , 8 basic templates are available : 2 for dresses, 3 for sweaters, 1 sportswear and 2 for accessories.
- For the category of MEN, 5 basic templates are available : 2 for sweaters, 1 for sportswear and 2 for accessories.
- As for the teenager's collection, the templates are the same as those of MEN/WOMEN's collection. The parameters guiding them to the final design vary by colors, patterns etc. (trendy colors selected for teens, more "young in spirit" patterns etc)

The total number of basic templates are 13 as a start, but eventually they may be added or reduced according to the feedback they get from the clients.

These templates are designed by Techstylist's own designers , and updated every season according to the new trends and the market's needs. Designers use Shima Seiki's computer graphic design systems, model SDS ONE-APEX , that provides them with ultra-high speed realtime graphics and quick and powerful support of apparel design work for supporting continuously changing trends.

- Designers start by sketching and illustrating their ideas directly on the specific graphics programs, always following the new trends and creating accordingly new combinations of colors , patterns etc.
- Each basic template would be designed in parallel to a number of pre-established combinations. These variables might range from colors, patterns to sleeve length, neckline shapes or further add-ons …
- The templates are designed always taking into consideration that they will be manufactured by the Shima Seiki's Wholegarment knitwear machines, and therefore being produced in entire pieces, thus leaving behind the traditional concept of knitwear design formed by sewing the separate parts .
- Designers have access to various databases which encompass useful patterns, structures designs, pantone color libraries, etc. They can also mix patterns, use filters, add embroidery…
- Once the design concept/illustrations are ready, they simulate their appearance on knitwear, with the help of professional technicians/programmers, and thanks to the KnitCad, a knitwear programming software, making sure that the transfer of the "order" to the wholegarment machine is proceeded correctly and without any complications.
- Once the simulations, virtual samplings and prototyping phase are over, the designed illustrations can be imported into spreadsheets for creating specification sheets, meanwhile the templates can be uploaded on the server.
- The webmaster uploads the templates and their corresponding variables on the webpage and dedicates a special try-out period to make sure that all the combinations work correctly and no complications might be generated.
- Now that the templates are updated, the user can easily have access to them, after having created his/her account and start the design phase of his/her garment.

For each selected template and according to the template category a limited number of modifications or add-ons are offered. These modifications vary from neckline shapes to sleeve length, skirt length etc.

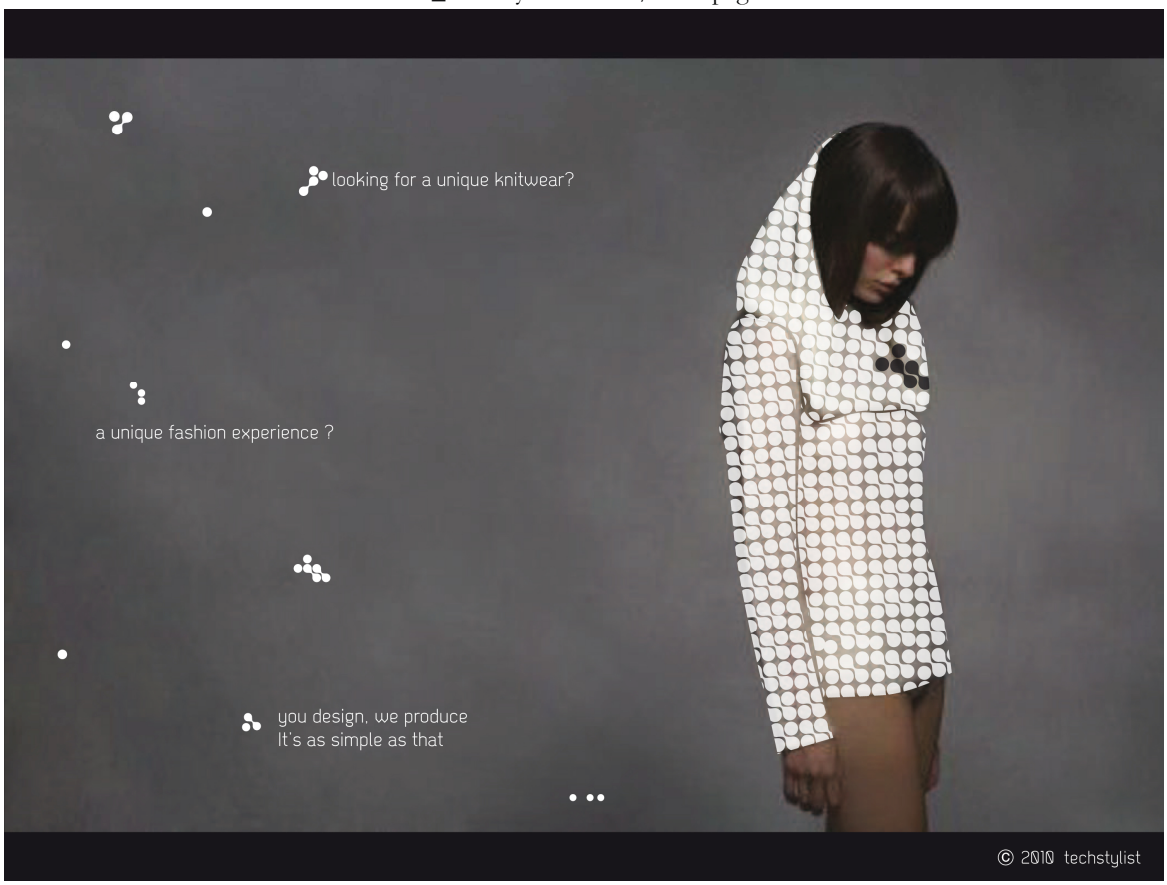
Once the model is finalized, once again for each template there is a limited number of knitwear patterns to chose from, which come with a preset number of colors (according to the season's trends) and knitwear yarns.

The primary material in the Techstylist productions is cashmere, which according to our latest studies is in demand in all seasons

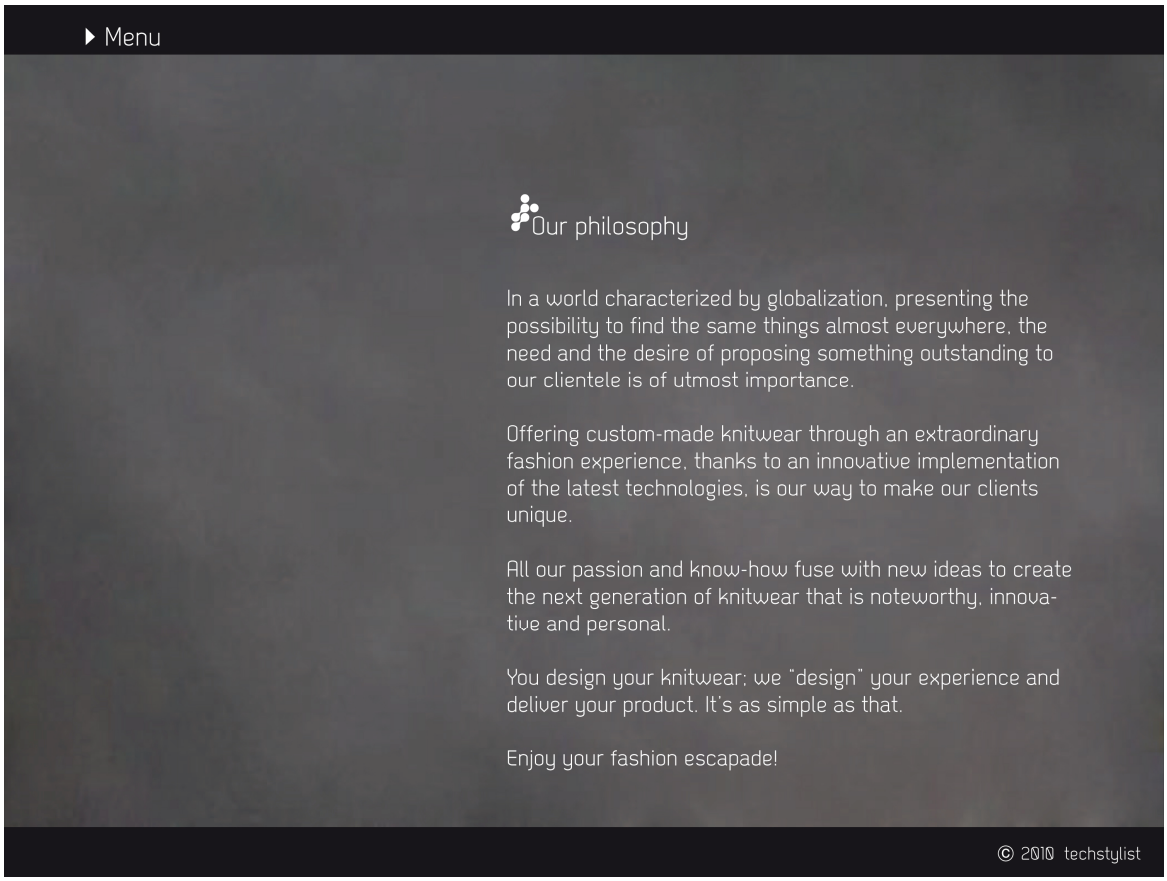
Here there is a sample of a template selection/customization.

- Connect to Techstylist website (images n.28, 29, 30):


28_Techstylist website/homepage

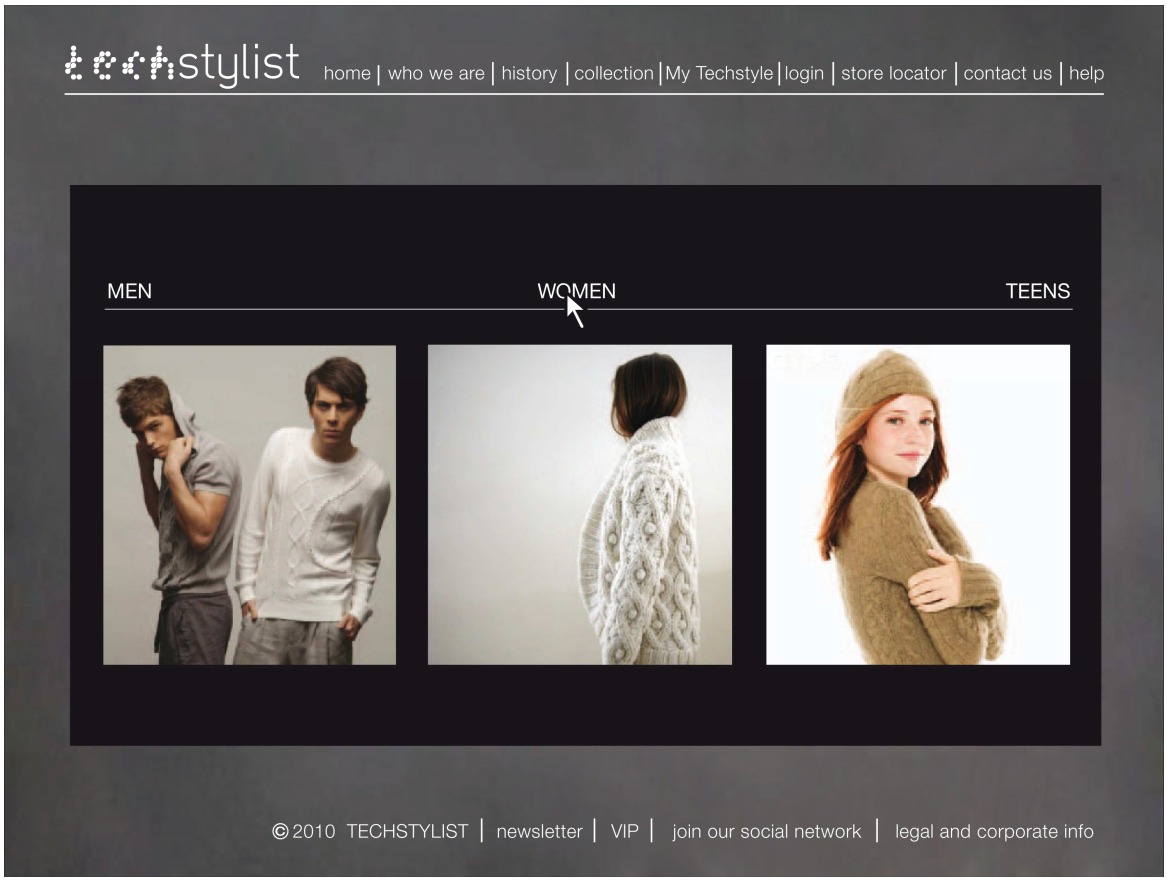



29_Techstylist website

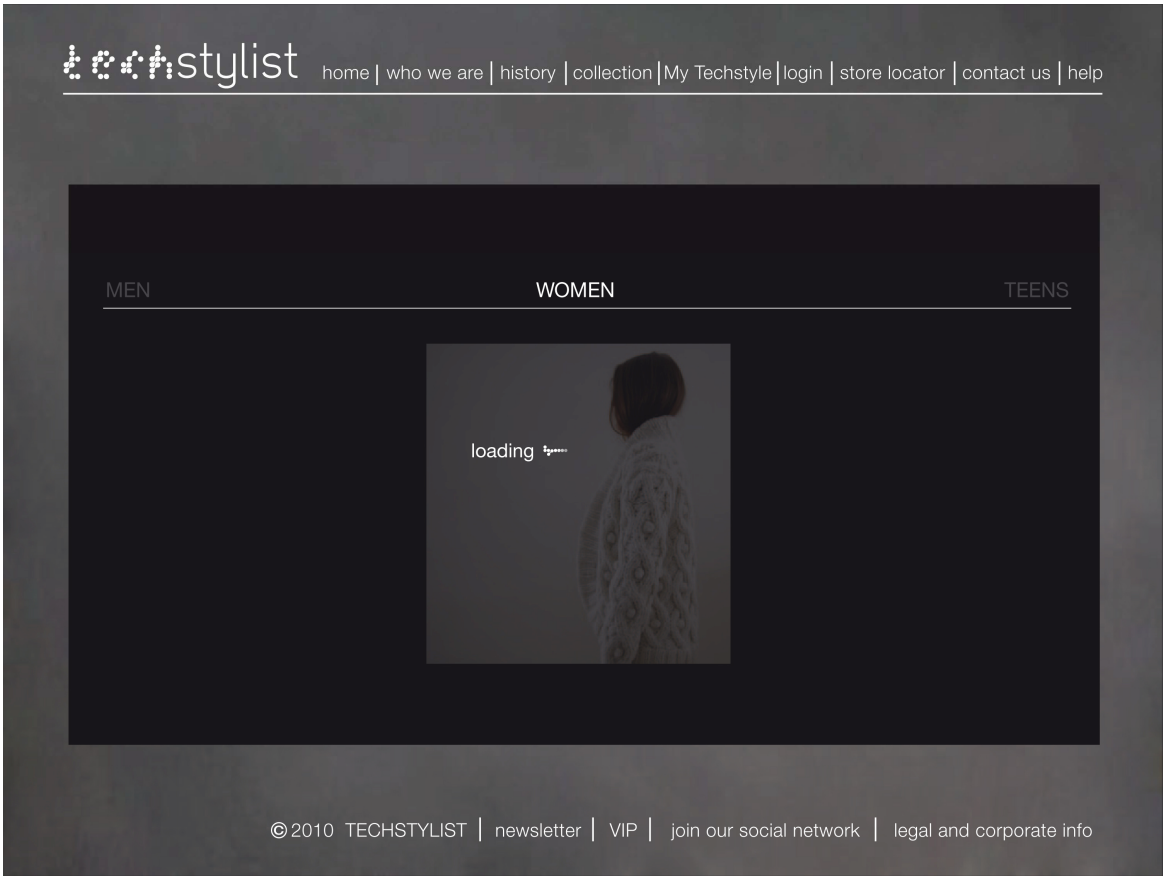



30_Techstylist website/our philosophy

- Choose the category you want (images n.31, 32);

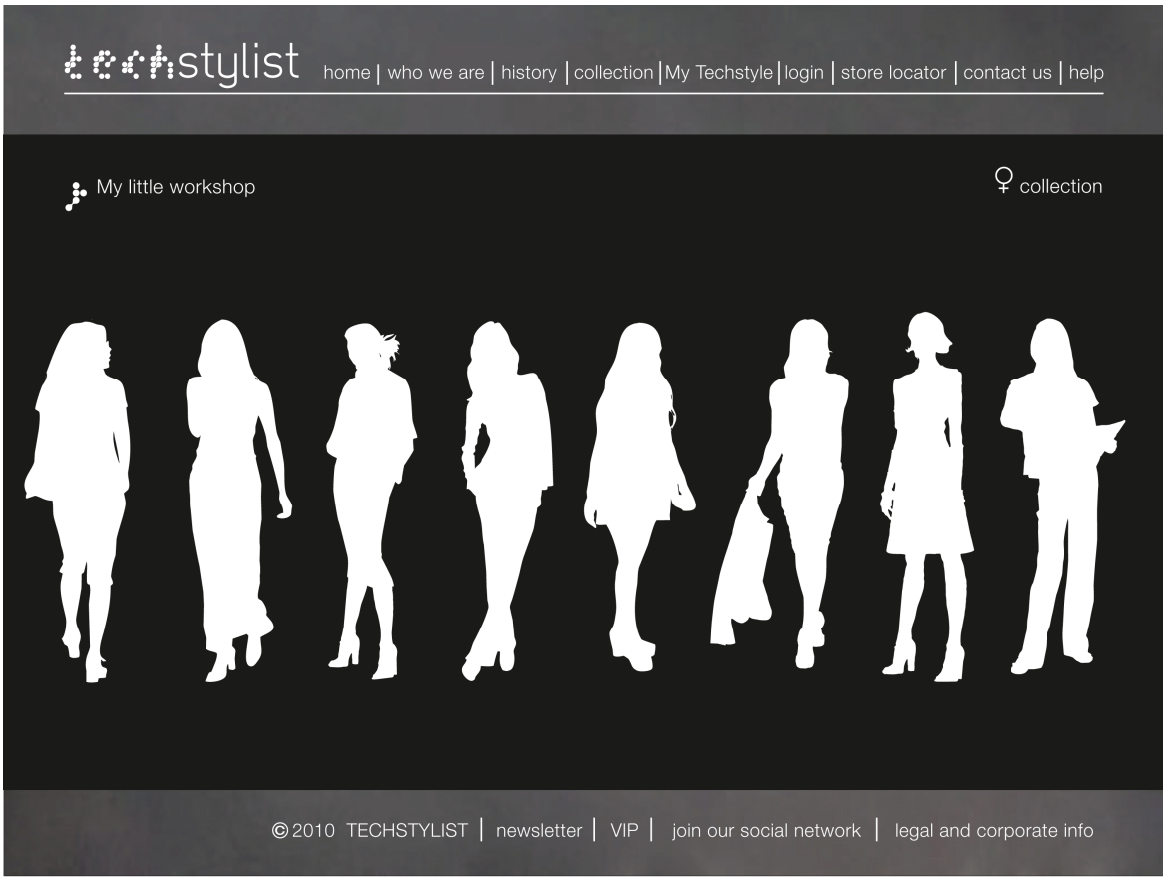



31_Techstylist website/collection's categories

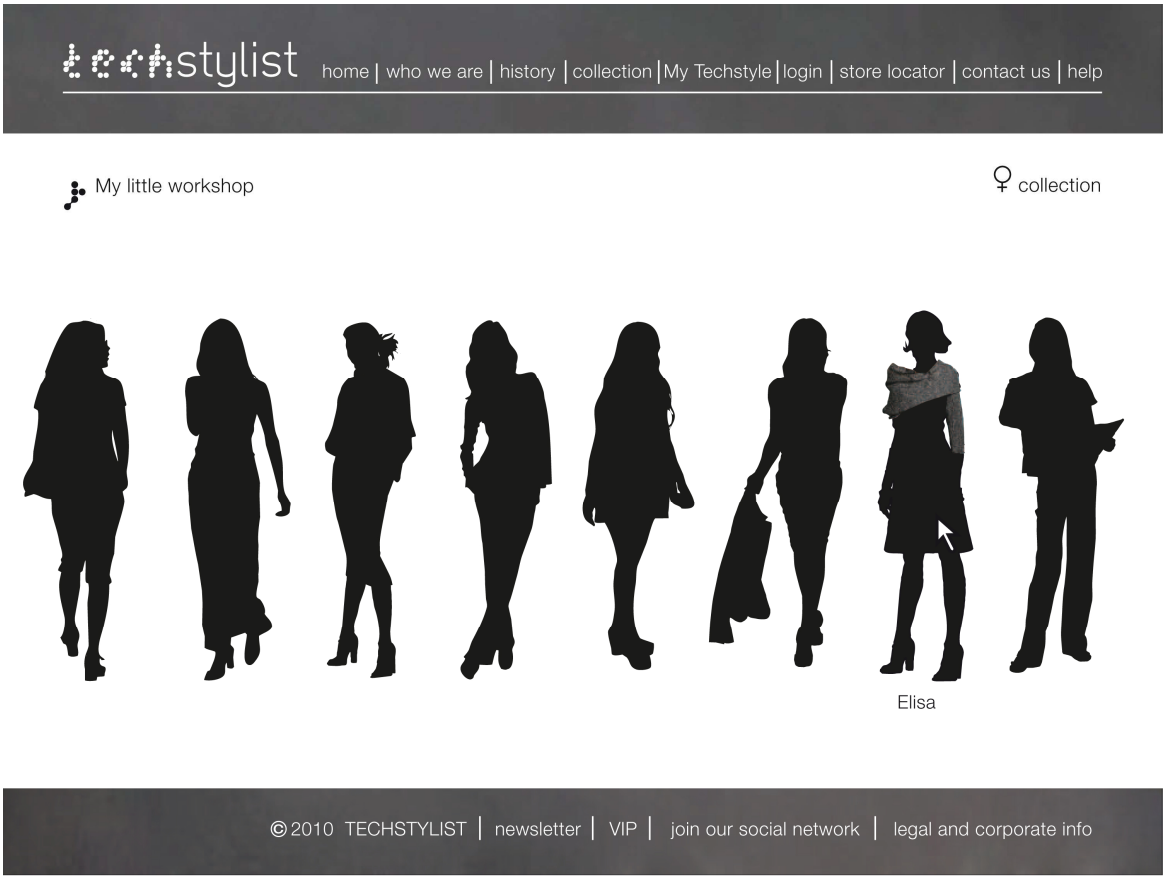



32_Techstylist website/women collection

- Scrolling over the silhouettes will make the knitwear models appear (images n.33, 34, 35);



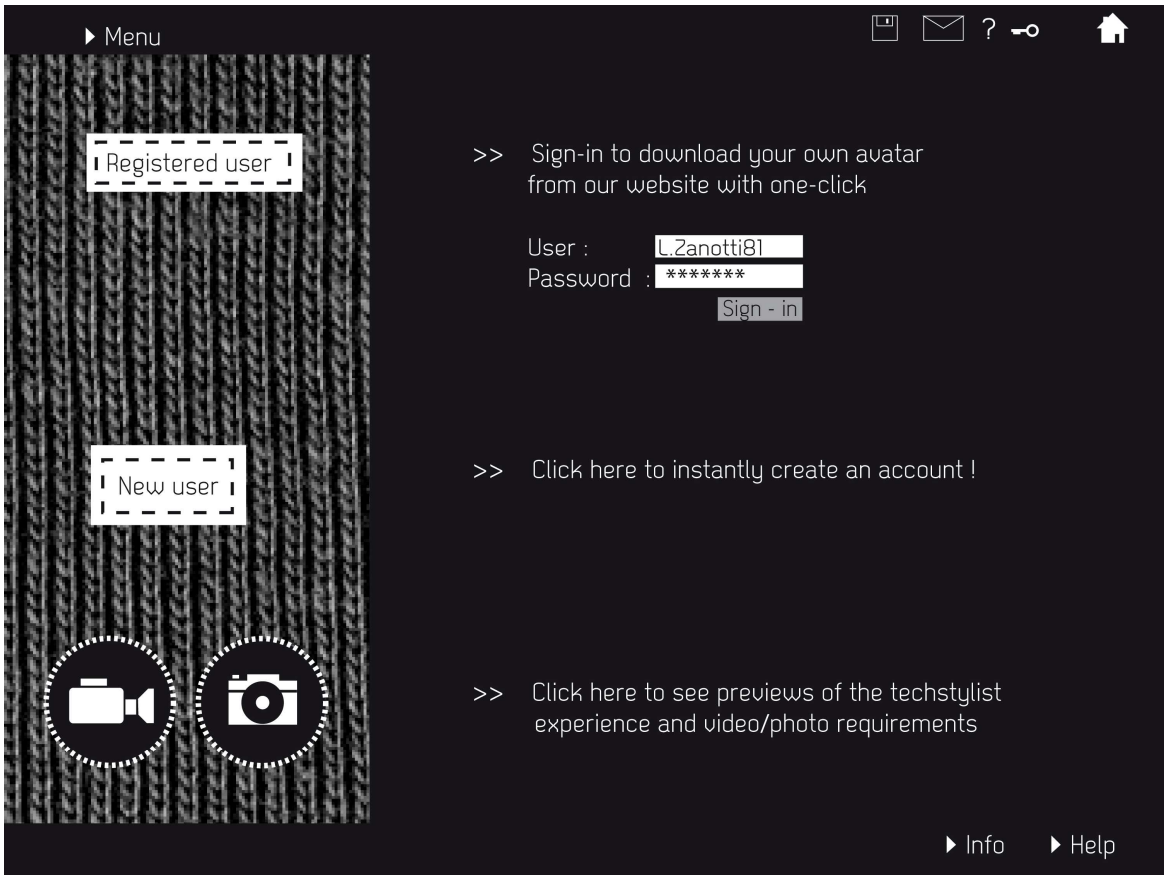

33_Techstylist website/women collection




34_Techstylist website/women collection


35_Techstylist website/women collection

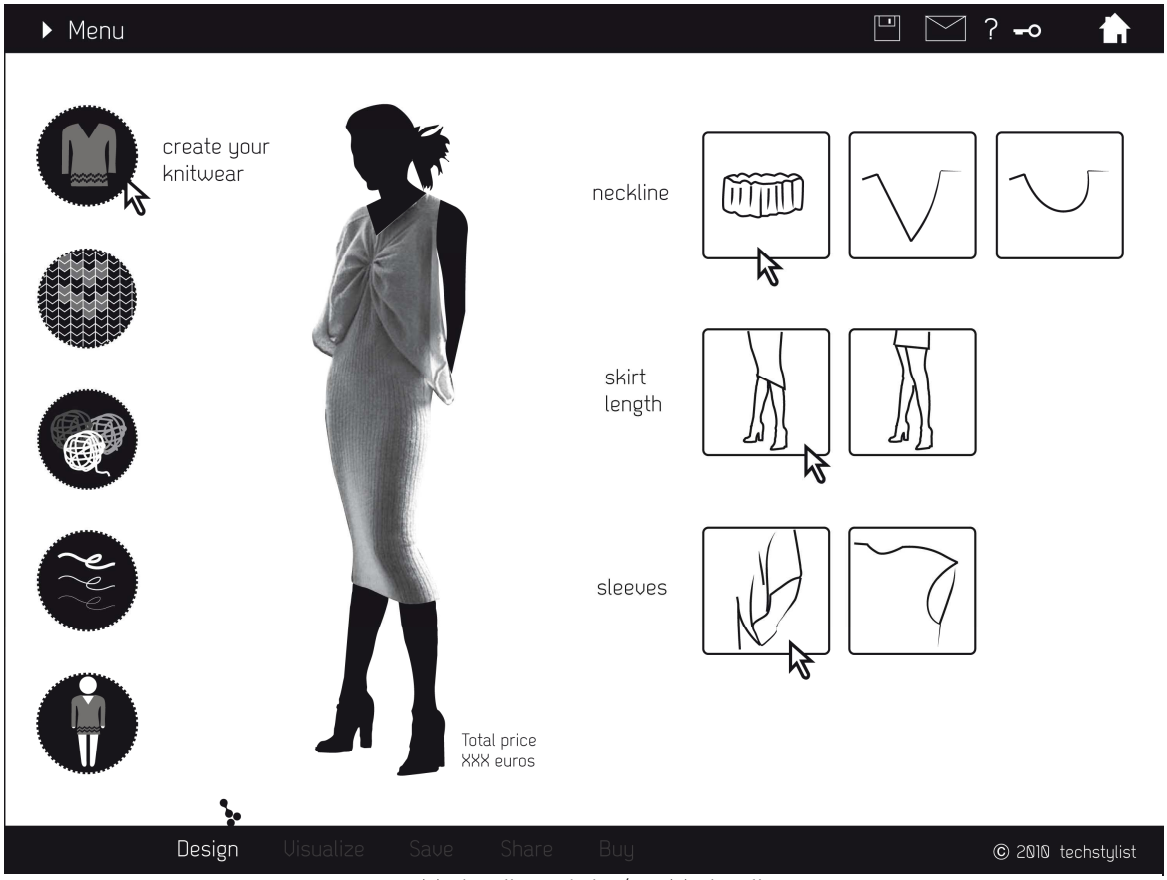
- Log-in if you want to create your garment (images n.36, 37)




36_Techstylist website/Log-in


37_Techstylist website/Log-in

- Choose the template you want and start discovering the new combinations (image 38);

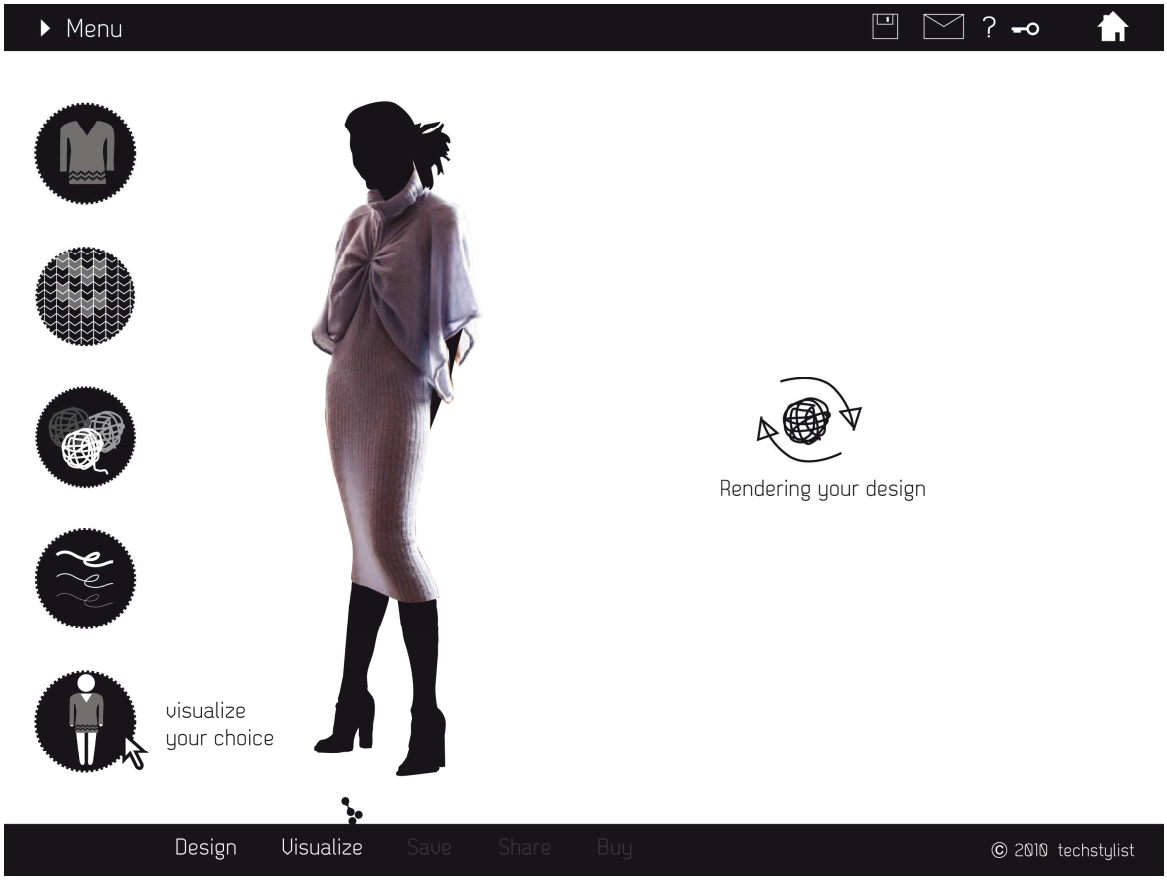



38_Techstylist website/My Techstylist

- Choose from the wide range of options and finalize your design (image n.39);


39_Techstylist website/My Techstylist

- If you like your creation, you can render it on your video/image avatar (image 40).




40_Techstylist website/My Techstylist

## 5.3_The Techstylist shopping experience

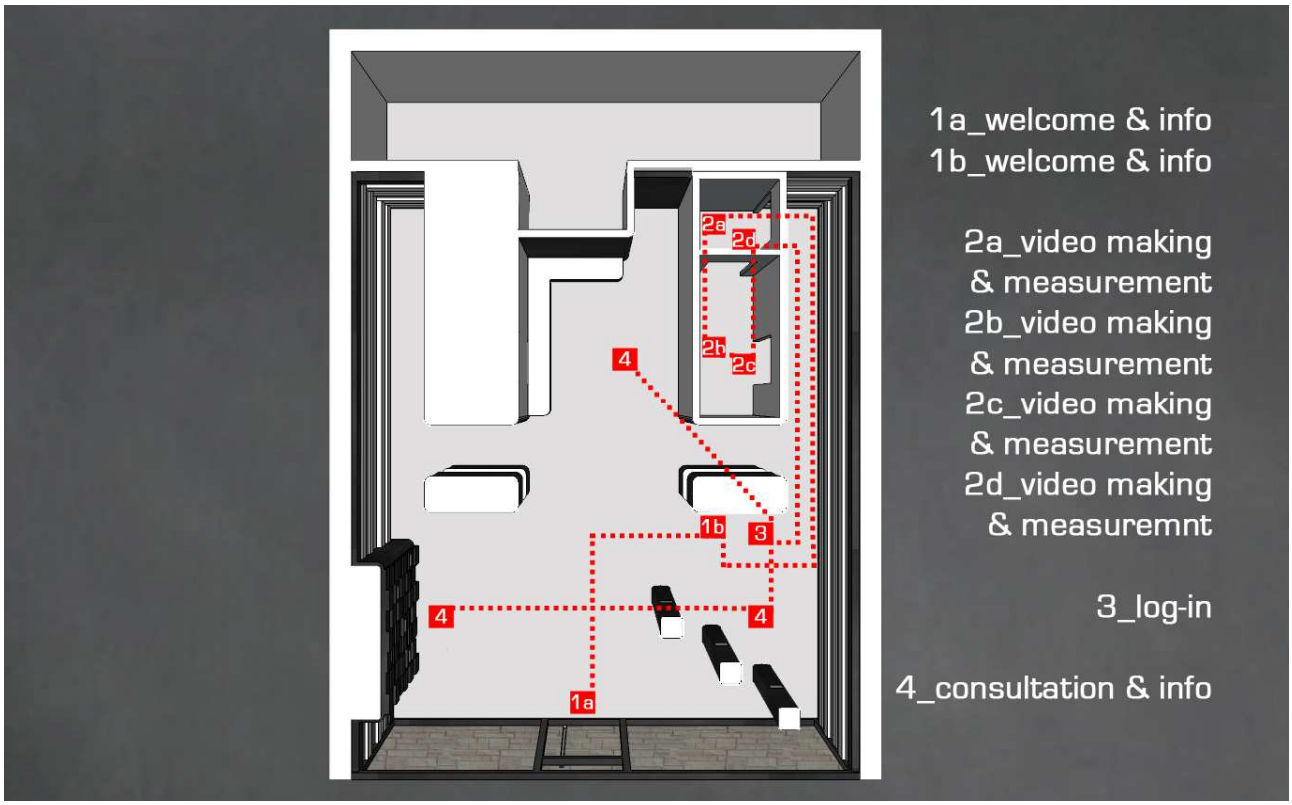
In order to start and enjoy the shopping experience provided by Techstylist, the customer must visit a Techstylist shop (no matter if the flagship or a temporary one) for making his personal video or must connect to Techstylist website for taking his image.

Indeed, the brand has provided two different type of experience connected to the account creation: an in-shop experience, which every client can enjoying visiting the Techstylist shops and a @-experience, which is web-based and thought especially for those potential customers that can not visit that stores.

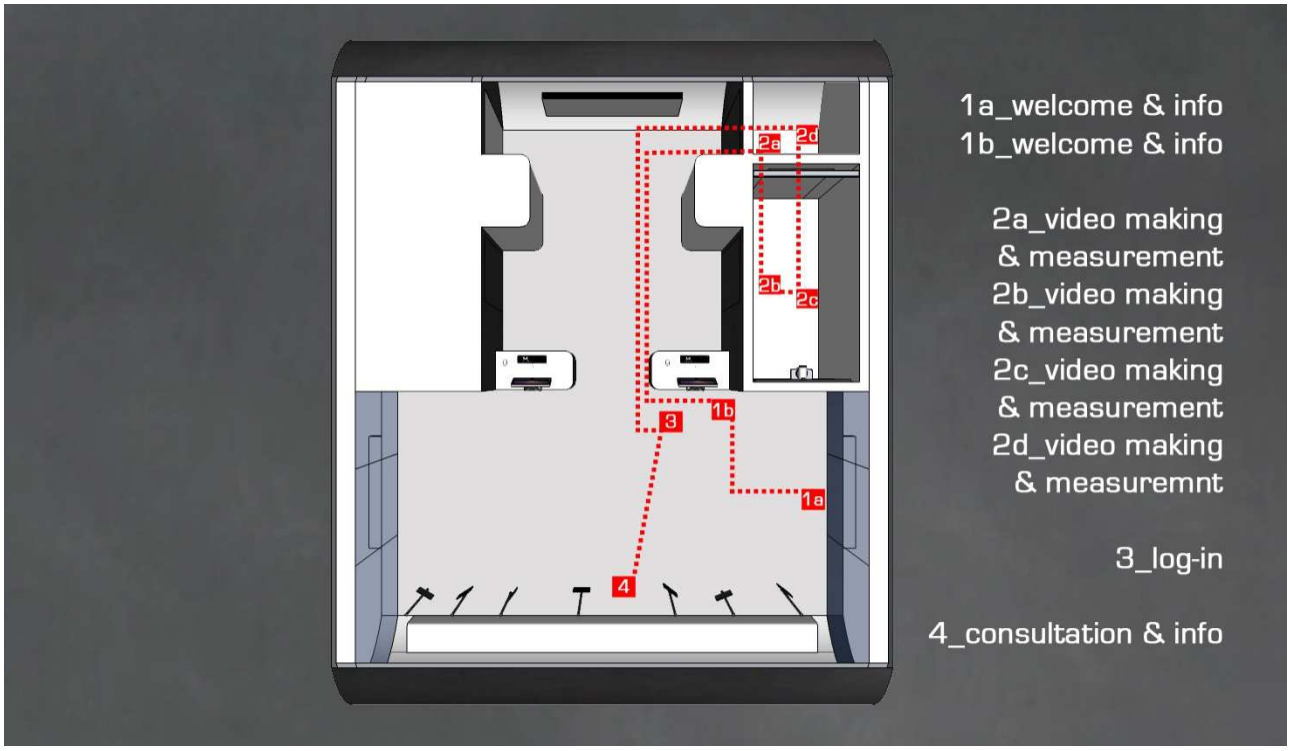
It is important to underline that the account creation, which includes video-making or image-taking, is the fundamental phase to enter the Techstylist world ant to enjoy the creative experience.

The in-shop experience is identical both in the flagship and in the temporary stores. However, in order to guarantee a better service and avoiding queues and waiting times, those customers who want to enjoy their shopping experience in the flagship store must book for their turn, while no reservations are required in temporary shops, even because their "ephemeral" locations and their nature of event are not compatible with a reservation system.

The in-shop experience, which lasts about from 15 to 20 minutes, can be divided in four main phases and goes on following the steps that are here reported:




41_The path of the customer in the flagship store




42_The path of the customer in the temporary shop

- 1_Welcome

and information

1a_The client enters into a Techstylists shop (flagship or temporary);

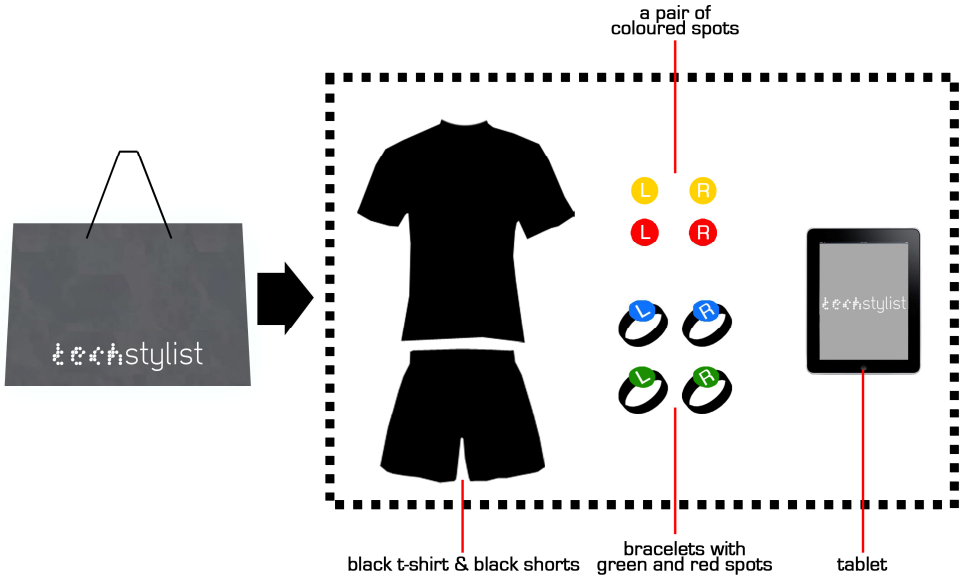
1b_A staff member welcomes the customer, who will receive all the information about the experience, a tablet (which will help him during the following steps), and a "recording kit" including black t-shirt and short pants and the colored spots for the motion tracking;

This phase lasts about 3/4 minutes.

- 2_Video-making and measurement

2a_The client goes into the dressing room and wears the dresses and the spots (according to the instructions provided by the tablet) included in the "recording kit";

2b_Then, he goes into the video making area and starts the recording phase. The recording phase will start when he plays "environment" on the tablet: a wireless system manages the lowering of the background curtain, which is, obviously, the background of the video. Then, he must play on "record" and, after a 10s countdown, necessary to allow the customer to be ready,



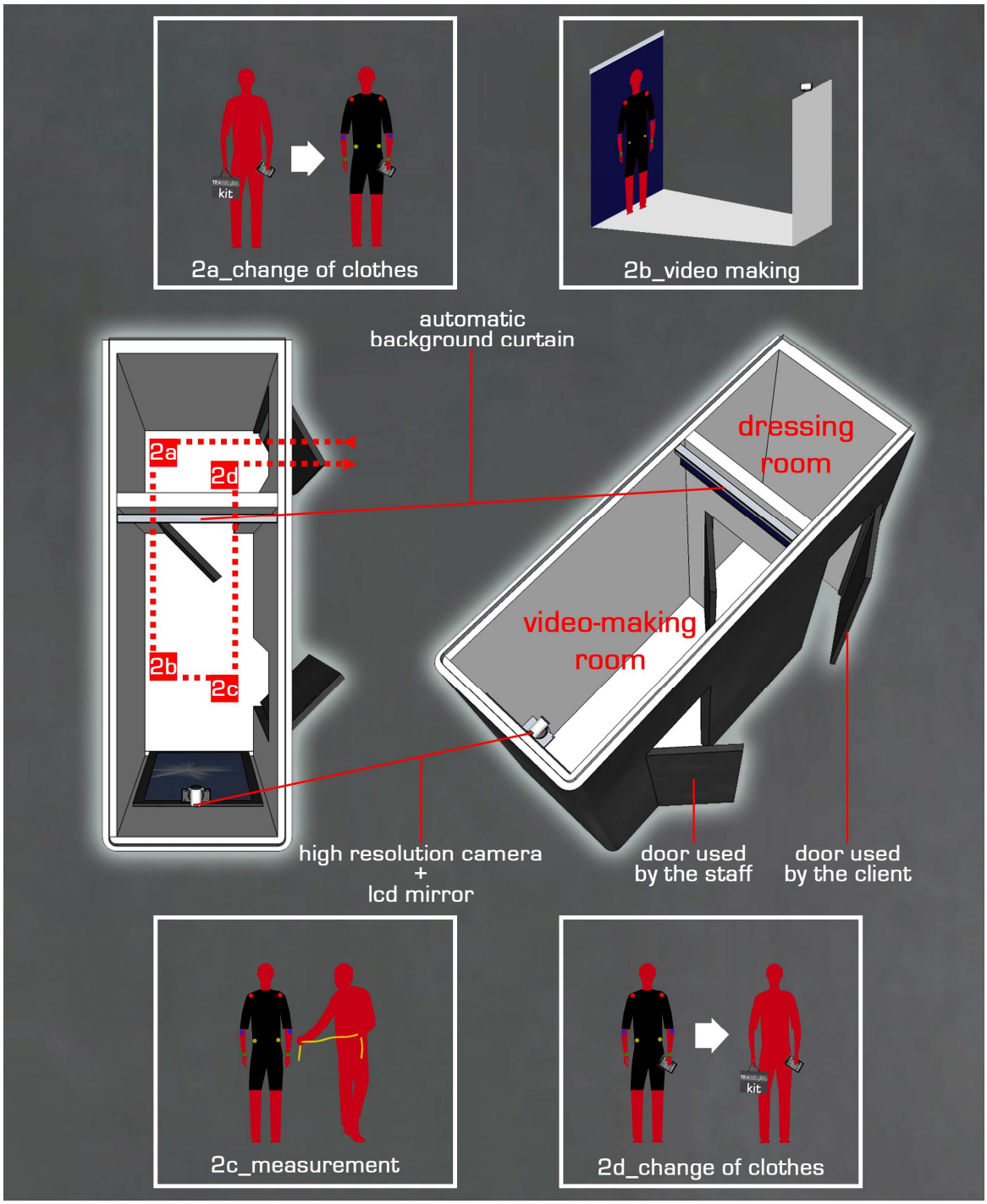

43_The recording kit

the recording of the first 5second video will start. The customer can record no more than three videos and each one lasts 5 seconds and during the recording he must stay into the area of action, which is clearly marked on the floor. In addition, movements like putting the hands in front of the body (rotations, touching of the body) are discouraged in order to not hinder the motion tracking process. After the first recording, the client can see the video directly on the tablet: if he is not satisfied, he can do it twice more.

2c_When he finishes the recording phase, selects the best video among the three videos recorded. Through the tablet, the customers advice the staff member that he is ready for the measurement phase: the shop assistant goes into the video-making room and takes measurement of the client (height, shoulders, arms, torso's circumference, waist's circumference and hip's circumference);

2d_The client can change himself again in the changing room;

The second phase lasts about 10/12 minutes.




44_The different steps in the dressing and video-making room

- 3_Log-in

The shop assistant, under the client's supervision, create the customer's account and webpage and upload there the video and the measurements. The client has finally his account and he is part of the Techstylist world.

This phase is very short and lasts 2/3 minutes.

- 4_Consultation and info

Clients can freely consult our collections through the ipads and the flat tvs which are in the store or in the temporary store and can touch and appreciate the quality of Techstylist fabrics, asking to the shop assistants for further information about Techstylist if they need. This phase has not a precise timing, since it depends on customers' needs: they can immediately go after phase3 or they can stay inside the shop watching Techstylist collection for the amount of time they prefer.

For those potential clients who can not visit a Techstylist shop (typically since they live away from them) and so can not enjoy the in-shop experience, it has been created an alternative kind of experience, the @-experience, that gives them the opportunity to "start" their experience directly through their pc. What they need is just a pc with a webcam, a printer and a web connection and in this case the client will take an image of himself and not a video.

@-experience is formed by the following steps:

- 1_the customer must connect to Techstylist website;
- 2_then he must click on "My Techstylist" and on "Create my image" where he can find the instruction about what he must do to successfully create his image and his account and a pdf file including the colored spots;
- 4_client must download, print and apply to his body the colored spots following the instructions;
- 5_after switching on the webcam; the web interface will propose a silhouette and the customer's one must fit the one proposed;
- 6_when everything is ready, he can start the count-down for the snapshot with special movements (like moving the hand on the upper right corner), avoiding the hiding of parts of the body (hands touching the body, crossed hands…) during the snapshots;
- 7_if the client likes his picture (if not he can take it again) he can complete his account registration by adding the requested personal data. In addition, the client can immediately insert his measurements, following the instruction which clearly explain how to measure the different parts of the body needed in order to check the garments fitting better (height, shoulders, arms, torso's circumference, waist's circumference and hip's circumference); or he can add them afterwards.

When the client has his own account he can completely enjoy the Techstylist world and can start creating the garments he prefers. Indeed, connecting to the brand website (even from the devices which are in the shops and the website interface is the same), he can see the Techstylist collections by clicking on "COLLECTION" or he can open the section "MY TECHSTYLIST" if he wants to start and appreciate the creative experience. The customer can choose among man, woman and teen collections of garments and accessories cachemere made, and can customize his item according to his preferences and tastes, selecting among the large number of customization possibilities provided by Techstylist, and can choose the one that fits well by checking his measurements with those provided for describing the size of each garment or accessory.

During the customization phase, the client visualizes constantly on his monitor the preview of the item and its price. When the creative phase is ended, the customer can decide to visualize the garment or the accessory just created on his video or on his image uploaded on his account by starting the rendering phase (see § 5.7 for a detailed description of the rendering phase), which constitutes a virtual try-on, allowing the client to see how the item looks and fits on himself: the user would see himself

wearing a 3d version of the chosen knitwear, synced with his body shape and movements thanks to motion capture technology.

At this point, the customer can choose among three options:

- 1_delete the render and the garment/accessory customized and start a creative experience again;
- 2_save the render on his personal webpage and, if he wants, he can share it on the Techstylist fashion social network waiting for suggestions and comments from his friends;
- 3_buy the item. The render will be automatically saved on his webpage and he can share it on the fashion social network.

In case the client chooses the option number 3, he has to click on "BUY", then he must insert the necessary data for the payment and he must choose if he prefer to receive the item directly at home or if he prefers to receive it to the Techstylist flagship store. (see § 5.6 for a detailed description of the purchasing and the production phase).

The Techstylist shopping experience ends when the client receives and enjoys his garment or his accessory appreciating its high quality level and the way it fits perfectly. Since he is happy and has an enthusiastic memory of the shopping experience provided by Techstylist, he is ready for starting another beautiful Techstylist experience.

## 5.4_Techstylist stores and temporary shops

Even if Techstylist has a web based business model, it needs the presence of retail spaces as touchpoints with costumers and places where clients can enjoy their shopping experience provided by the brand. In reason of this, Techstylist is characterized by three different retail spaces: flagship stores, mobile temporary stores and in-building temporary stores.

Starting from the first ones, at the beginning of Techstylist diffusion it is possible and reasonable to suppose the opening of a flagship store only, because it requires a great amount of money, in Milan, for example in Via Torino, which can guarantee high visibility (in this street there are always a lot of tourists), a prestigious location and can strengthen the image of the brand. Obviously, when the brand become bigger, other flagship stores can be opened in other important cities like Rome or Turin and even abroad.

The opening of a flagship store is really important, because it is not only a touchpoint between the brand and the clients, but it is the place of the description of the values connected to the brand, is the focal point of Techstylist identity and needs to be capable of positively stimulating the customers, since it is a strategic tool for the brand equity and the customer loyalty. Indeed, a store is the context of the relationships among customers, brand, products and the shop itself (Iannilli, 2002).

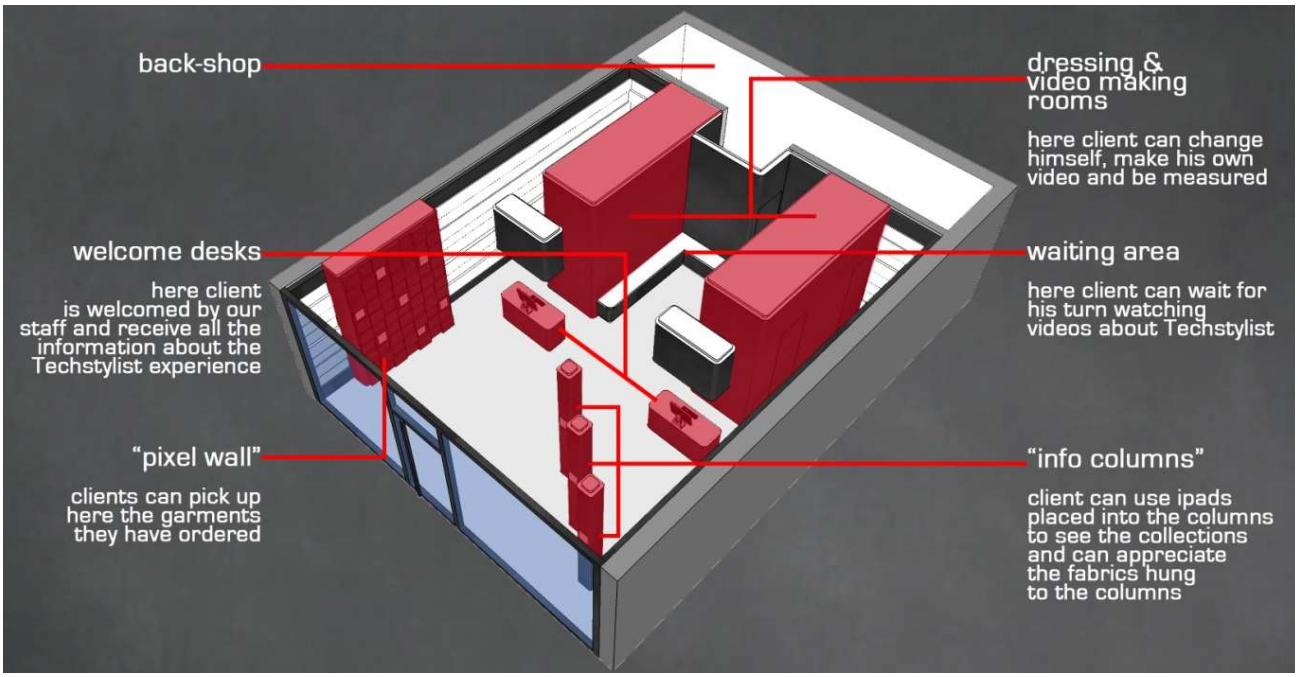
In order to design a flagship store representing in the right way the values of the brand, the first step was to identify them clearly:

- the essentiality of the garments produced by the Wholegarment machine determines a linear and clean design, without frills and characterized by the white and the dark gray. A reference can be the linear style of Sigrun Woehr store in Stuttgard, designed by Ippolito Fleitz group;
- another value is the attention for details. Techstylist, in fact, produces high quality garments that are perfect in every detail. This value is reflected on the furniture's great quality and an example of such a quality is observable in the Breil store in Shangaii, designed by Studio63 Architecture+Design;
- the third value is, obviously, the technology and it is represented by the presence of several technologic devices like flat screens, iMacs and iPads. Prada epicenters (both OMA and Herzog&deMeuron projects) are the references for this aspect and the multimedia in a store is an important tool for information-communication and brand entertainment (Gerosa, 2008).

Accordingly to Techstylist business model, in the flagship store there are no garments on sale, but it is a place where customers can:

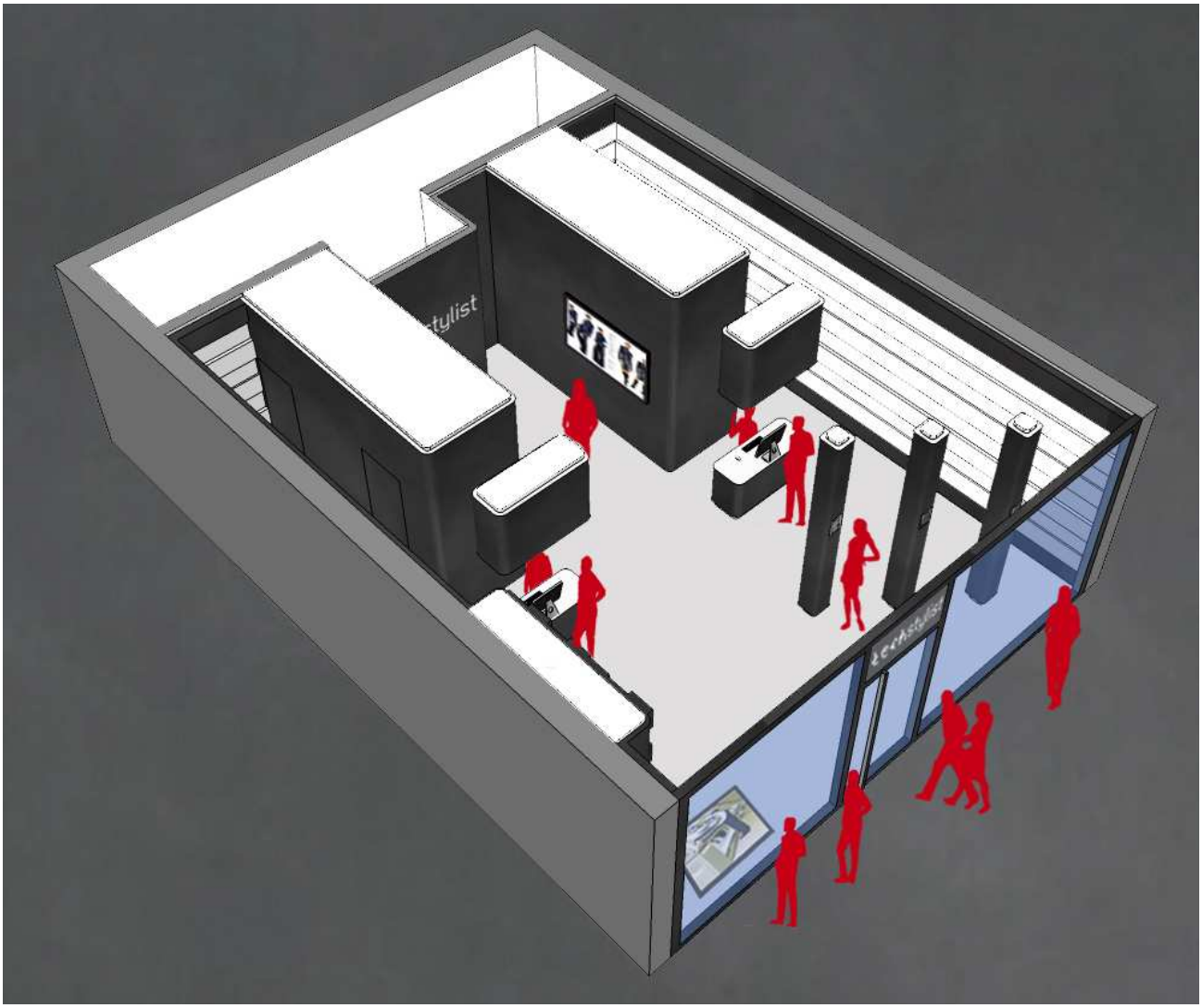
- create their video-avatar
- touch the quality of the fabrics
- watch the collections
- pick up the clothes that they have previously ordered.

Starting from the values that have to be shown and from the list of the activities above mentioned, a project of the flagship store has been created and the retail space is organized as represented in the picture n.45 in the next page.




45_Layout of Techstylist flagship store

In order to better explain the flagship store aesthetics and layout, several renderings have been created and are here reported:



46_General view of Techstylist flagship store

47_Interior view

48_Interior view


49_Everyone want to visit it!

The opening of a flagship store, even if in the Italian fashion capital, and even if this is a fundamental

point of a marketing strategy, it is not sufficient for supporting the diffusion of Techstylist. As a consequence, in order to reach a wide diffusion of our brand through the market, a useful tool could be the creation of temporary shops.

Temporary stores are having an increasingly importance in the market strategy of a brand, since they are very useful in order to understand the customers' reactions, they capture the attention since they are generally located in important public places for few days, they are better than a traditional advertising campaign and they can help the strengthening of the brand's image. They are, at the end, shops characterized by a short period of time of opening (from few days to 1-2 months) placed in squares or other public spaces or in traditional commercial spaces and they have like their main purpose the objective of capturing the attention of the greater number of people.

A lot of brands have chosen temporary stores for their marketing purposes, like Nivea with its ephemeral construction placed near the Colonne di San Lorenzo in Milan, or like Illy with its flexible structure designed by Adam Kalkin and placed for some days in New York and in other cities, or the container shaped temporary shops designed by Lot-Ek architects for Uniqlo and Puma.

50_Puma temporary store_Lot-ek architects

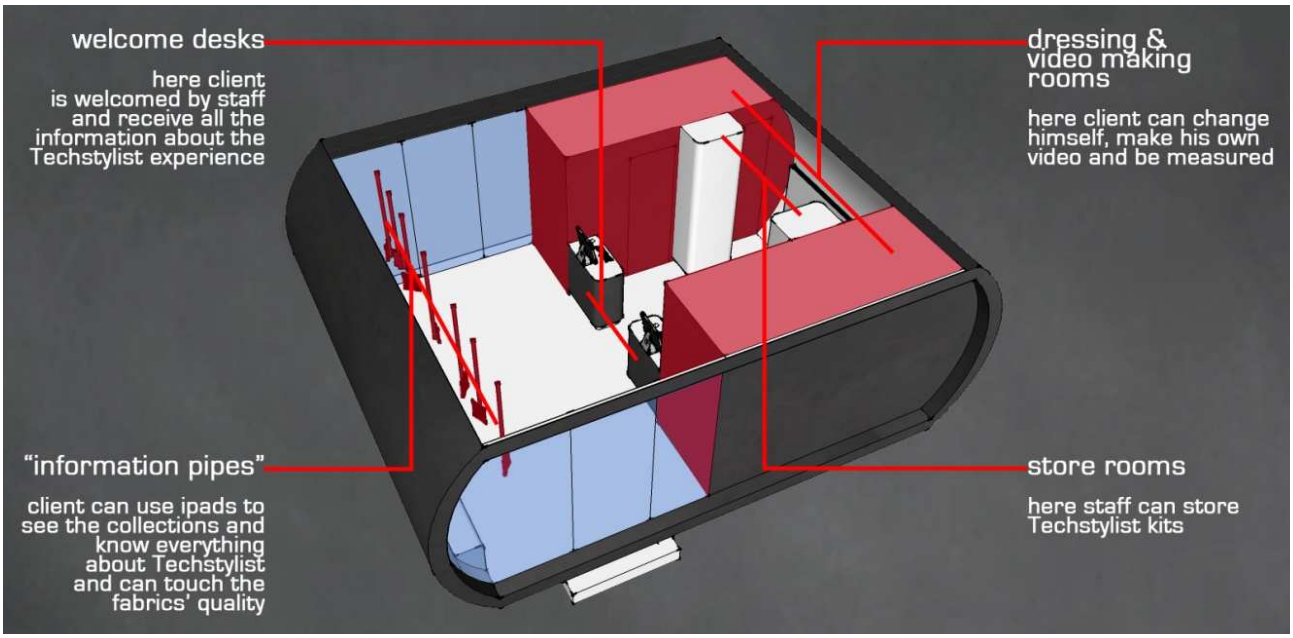

51_Uniqlo temporary store_Lot-ek architects

Generally, temporary stores can divided in two families: there are the mobile ones, which are placed in squares or other public places on the open air and there are the "in-buildings" one, which are, instead, placed inside void commercial spaces as if they were traditional shops.
Techstylist needs both types of temporary stores, which must have a design reflecting the brand identity, and their location and timing will be communicated to the customers through the Techstylist website, so clients can know everytime where they can find the nearest ephemeral shop to go.
Techstylist temporary shops host the same function of the shop, except for the possibility of picking up the garments previously ordered, and they have the following layout and two shop assistants:

- two desks where the shop assistants wait for the client and create their account;
- two changing rooms + two recording rooms;
- backshop;
- exhibition area.

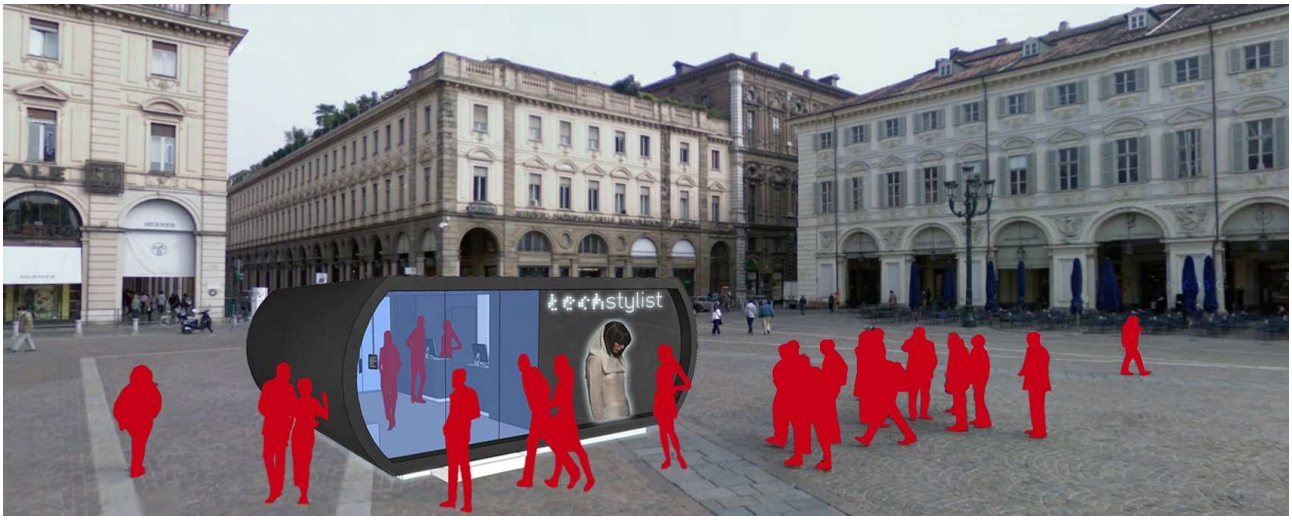
Referring to the mobile temporary store, the project proposes a small construction of 34m$^2$, fully demountable and characterized by and up-to date and attractive design and it can be placed in the main squares of great cities, during important events like fairs or Olympic games, or it can be placed inside airports or railways stations for a period of time of about two weeks.

The internal layout is described by the next picture (n.52),




52_Interior layout of Techstylist temporary store

while the other pictures (53, 54) show how it could look like.



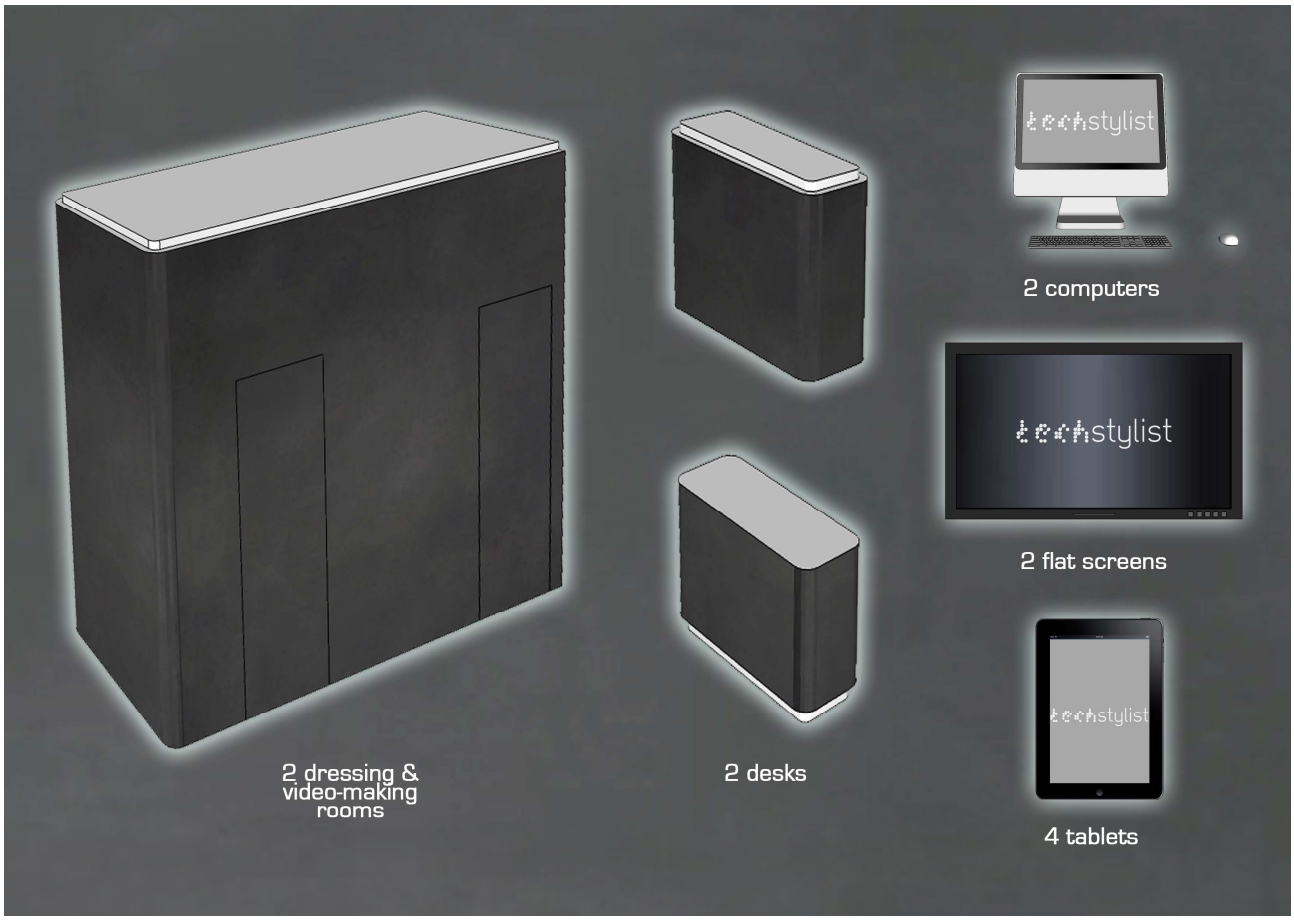

53_Techstylist mobile temporary shop in Piazza San Carlo, Turin

54_Interior view

The creation of a mobile temporary store is an operation quite expensive, since there are a lot of costs to consider (assembly, disassembly, storage, transportation, payment of public land's rent…), but it guarantees an important level of visibility since it is placed in unusual and strategic locations, capturing the people's curiosity.

In addition to mobile temporary shops, it has been developed the idea of using "in-building" temporary stores, which are Techstylist stores placed into vacant commercial spaces, or into spaces like Sidecar (http://www.sidecareventi.com/homepage.htm) or Brand-Storming (http://brand-storming.it/index.php) in Milan or Dadodoro in Turin (http://www.dadodoro.it/temporary_store.asp) that are spaces expressly created for hosting ephemeral stores: in practice, Techstylist rents a vacant shop for the needed and short period of time (from one to three months) and organizes the inner space according to its retail strategies.

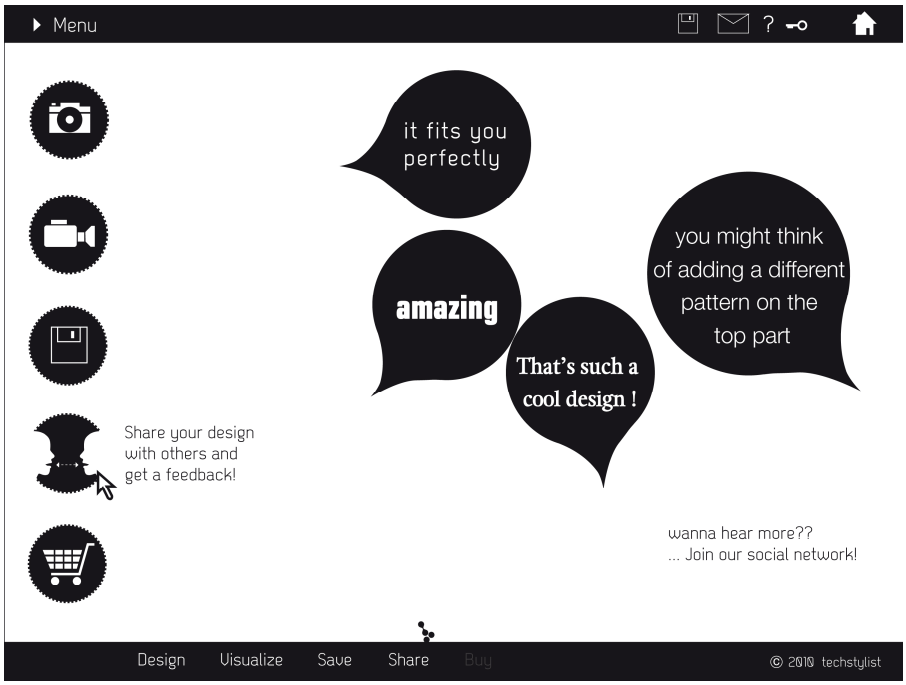
In this case, obviously, there is no a predetermined layout, since it changes whenever the "holder" changes, so a specific layout can not be designed, but instead it is possible to design the furniture systems, which will be arranged and adapted to the shop's plan from time to time. In reason of this it has been studied this furniture system that can be defined "temporary kit" (see the picture below, n.55) and includes all the transportable elements that can be used and reused for the openings of these stores. Internal partition walls will be on plasterboard and they will be white panted, in order to reduce costs.




55_The "temporary kit"

## 5.5_Techstylist website and social network

A succesful business model should be hard to imitate or to be in competition with; in other words, it should have high barriers to entry. The main challenge we faced with Techstylist is that, with enough capital to invest, an incumbent of the fashion industry could easily destroy our first mover advantage and leverage on its known brand to "steal" most, if not all, of our market share. A way to "defend" our business model was thus needed, and this is where the social network comes into play. The idea is to leverage on the fact that, since each purchase happens online, it's possible to have customers automatically sign up on the social network and be "lured into it". Obviously such network is not generalistic but is exclusive for our customers (people who have recorded their video) and targeted at fashion passionate people, who would like to share their customization, their videos, their sketches and their opinions. It's not at all targeted at being an alternative to Facebook, as this would be a business suicide, but as a complement to it for fashion lovers.




56_The Techstylist fashion social network

As for any network, the more the subscribers, the more powerful the community, whose content will be, in the initial phase, for the most part created and shared by Techstylist itself. The reason why this, if successful, represents an important barrier to entry is clear: once most of our targeted potential customers have joined (medium/high income individuals, early adopters with fashion sensibility) they will only be able to share their creations made with our service on the web-site and not the ones made on possible imitations. They will also benefit from a continuous idea and information sharing process. For this reason, as such network becomes stronger the value of the service increases significantly and since for a large part such value is generated through network effects which a competitor cannot, if not with great struggle, imitate, the business faces less risk.

For this reason, Techstylist's website, where customers can design, virtually try-on and buy customized items, will be one with the social network. One layout, one address, one comprehensive structure, so that the purchasing experience is complemented by the networking one.

**Structure**

The structure of the website will be minimal and easy to use. It's important not to add too many features at the beginning when the user is still learning how to use the portal. The basic layout is presented in the figure below. As it's possible to see it gives users similar functionalities to those already on facebook but, since the network itself is made out of people with an obvious interest for fashion, topics, videos or shared links will be most likely related to this area. Also, compared to facebook it will be more exclusive as more features become available with the first purchase. Here below a more structured description of the features is listed:

_Profile: the profile page is the starting point, it's were all personal informations are listed. It' structure is predetermined and fixed for everyone for simplicity purposes. However, each user has the possibility to draw sketches on a special part of their profile page. They can also give the possibility to

other user to give contribution to their sketch. When a modification is unwanted however it is still possible to undo the changes. This special "box" is part of the creative spirit that Techstylist wants to promote. These sketches can be for instance new design suggestions which can then be picked up by our designers and be implemented in the new collections. This sketching activity will be incentivated with the possibility of considerable discounts on future purchases and, in exceptional cases, also partnerships with the firm itself, as for instance already happens in a different manner, on Youtube.com. The sketching tools will be those of a traditional graphic program but with the addition of adding templates which work as a initial "base" that makes any creation easier.

As profile picture there are two possible choices: the traditional one of uploading a personal pic from a PC or, more interestingly, to use a frame of the motion capture video that the user can always update so that one day he/she's wearing one item, the other day another one.

_Designs: In this sections all customizations the user has made can be share with other people. They can be presented both on the "avatar", i.e. the person's video, and "raw" according to preferences. When a user within the network visits this page he can always check out how the item would look on him/her by just clicking on a "try-it-on" button.


57_The profile webpage

## 5.6 The purchasing, production and logistic phases

### 5.6.1 The purchasing phase

As Techstylist offers the possibility to customize all the products, the production is completely on demand, driven by the clients' orders. There is just one-way to place an order, through the Techstylist website.


58_The Techstylist shopping cart

The user interface requires clients to input the following information: 3D model of the chosen knitwear, modifications/customizations, avatar video and its motion tracking information, environmental light conditions – static values, retrieved from the changing room. All these information are processed – simple modifications, such as colour change, are applied to the 3D model which is rendered using avatar's motion tracking information and environmental light condition – and two main outputs are created: a visual feedback – two overlapped video streams, coherent and aligned in time and space – and an XML file containing information about the customized knitwear – e.g. user id, model id, model modification – and other aspects – e.g. delivery preferences.

When a client purchases his/her knitwear by clicking on the "buy now" button, the XML file is sent to the production facility and then to a Shima Seiki machine. The customization offered is nothing else than the possibility to assemble different components, where each possible combination has an identifier associated. It is just this identifier that has to be sent to the Shima Seiki technology. In order to guarantee the safe delivery of the code a simple XML communication through a secure protocol – like https – is enough. The conversion between web and Shima Seiki programming language is avoided due to the pre-process of the potential combinations. These are all already generated both for the web and for the Shima Seiki machines, in order to manage the order only with simple identifier.

In general to start an on-line business a website and software for e-commerce – e.g. Product Cart or EasyWeb Editor, software that are necessary to create shopping cart on a website but require to be joined to a e-commerce provider – are needed. Instead in the Techstylist case the e-commerce software is not necessary because it is included in the service itself. When a client places an on-line order, he/she has to select the payment method. Since the production is on demand, the team considers crucial that clients pay when orders are placed and the garment production starts only after the payment. Some payment methods common for online shopping – for example credit transfer and cash on delivery – are not available in Techstylist. The team thinks that for this project card payment – both credit card and pre-paid card – is the best solution. In order to accept card transaction, the seller must be par of a bank circuit and this is possible requiring the service and the qualification for e-

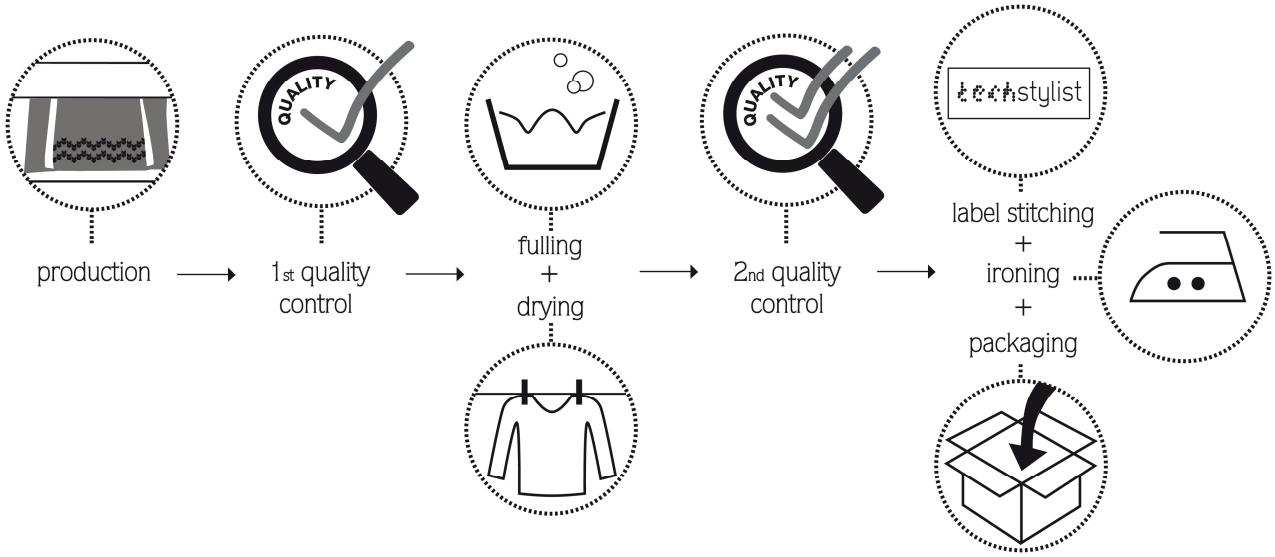
commerce from its own bank – e.g. Banca Sella offers Gestpay platform. A similar service is the one offered by PayPal – society part of the eBay group –, which allows receiving on-line payment card in a simple and easy manner. There are two ways to structure the on-line card payment phase. In the first one the transaction is completed on the seller's website. The client inserts his/her card numbers – typically the number of the card and the date of expire – directly on the website. It becomes necessary to protect the payment pages by a SSL – Secure Socket Layer – certificate, which allows a secure data sharing between the website and the bank thanks to coding algorithm. These websites are easily recognizable because the URL starts with https and not http and there is a little image of a padlock. The other solution, the most common and probably the best solution for the project because it is the most secure, is known as "gateway". When the client has to insert the card data, he/she is rerouted from the seller's website to the bank's one. It is perceived safer than the first option by the clients because the card information are directly transmitted to the bank, without passing through the seller's/merchant's website.

### 5.6.2 The production phase

The initial Fas.P.onSite concept was based on an idea of on-site production, idea that during the development of the Techstylist solution has been completely put apart. As it has been decided to create an e-business rather than another franchising activity or series of proprietary/permanent points of sale – also if the team considers of great importance the opening of a flagship store in Milan, decision that has been driven more by marketing and brand-building reasons rather than by direct revenues considerations, and does not exclude the opening of other stores in the future – the production will be concentrated in one single facility, especially in order to minimize the costs of the in-bound logistic, to take advantage of potential scale effects and because of the time required by the entire production phase.

Probably the complexity of the production of a cashmere garment has been the main for this decision. This phase begins when a client submits his/her own order. As the purchasing is made using the Techstylist's website, the order is sent to the production facility electronically. After the payment, an XML file containing all the information about the user's customized garment is generated and sent to the production place, where it is filled by TechSylist's employees when the machine supporting the gauge of the garment is available. In order to guarantee a high level of standard in terms of delivery time the orders are filled following a chronological order, on a first-in-first-out basis.

The production phase is a sum of different activities, as described in the following image (n.59).




59_The production phase

After the first step, the production of garments using the Shima Seiki machines, a TechStylist's staff member checks every product fixing any loos yarn. The activities of fulling and drying, in order to reduce costs - industrial fulling and drying machines are not designed for one single garment –, are done on a daily basis or when a certain quantity of produced items has been reached. Then garments are checked again and labels are stitched. The ironing and the packaging are the last two steps of the process, as the garments are finally place in the storehouse, finished and ready for the delivery.

As it has been highlighted in the beginning paragraph of the chapter, in the Techstylist solution the production is no more on site. The team has decided to delocalize this phase and collect it in a specific place that covers all the orders coming from a certain geographic area. Some reasons have been already pointed out, such as the possibility to exploit scale economies and improve the efficiency of the production phase itself. Another aspect is that the project, due to the technological constraints and the time required from the whole production, is no more based on the idea of real time production. So the on site production is not necessary and, moreover, it is no more in line with a business model chosen for Techstylist, a business model based on temporary shops and not on permanent ones. As a consequence, the team feels that the production facility could be located in a suburban area or outside the main metropolis – such as Milan or Turin –, where the rentals are lower compared to the ones required to rent a large shop in a city-centre, and that, at least during the starting phase, a single facility is enough to cover all the Italian market – initially Techstylist will serve only the Italian market. The pictures n.60 shows the difference between the costs for a shop in Milan and for a shed in Segrate – a potential location for the production place.

| Tipologia | Stato conservativo | Valore Mercato (€/mq) | | Superficie (L/N) | Valori Locazione (€/mq x mese) | | Superficie (L/N) |
|---|---|---|---|---|---|---|---|
| | | Min | Max | | Min | Max | |
| Magazzini | NORMALE | 900 | 1300 | L | 5,4 | 7,8 | L |
| Negozi | NORMALE | 3500 | 4500 | L | 16 | 21 | L |
| Negozi | ottimo | 6000 | 8500 | L | 28 | 39,5 | L |

Milano _ zona corso Venezia (fonte Agenzia del Territorio)

| Tipologia | Stato conservativo | Valore Mercato (€/mq) | | Superficie (L/N) | Valori Locazione (€/mq x mese) | | Superficie (L/N) |
|---|---|---|---|---|---|---|---|
| | | Min | Max | | Min | Max | |
| Capannoni industriali | NORMALE | 740 | 840 | L | 4,4 | 5 | L |
| Capannoni tipici | NORMALE | 790 | 890 | L | 4,5 | 5 | L |
| Laboratori | NORMALE | 790 | 890 | L | 4,7 | 5,1 | L |

Segrate_ zona cascina boffalora (fonte Agenzia del Territorio)

60_Rental fees in Milano and Segrate

After the description of the production phase, further details about the production place requirements are necessary. The core of Techstylist is Shima Seiki technology. Three Shima Seiki Wholegarment knitting machines are required, in order to cover several finesses and to be able to produce accessories. The team has identified the following knitting machines: two Shima Seiki Wholegarment knitting machine type NewSES-S-WG in order to cover finesses 8-10 and 14-16 and one Shima Seiki knitting machine type SWG041N for accessories production. There is also the need of the following machines: 1 fulling machine type PW6321 and 1 dryer machine type PT7801 produced by the leading German company Miele and 1 ironing press type Automatic Utility Press 2300 produced by Granimpianti. At last, the place has to be provided with a work-table, a yarn stand, a packaging stand, a shelf for finished garments, some computers for the management of the different activities – orders management, machines set-up, in-bound and out-bound logistic management. A total area – production and warehouse – of 150/200 mq is required.


61_The SWG041N knitting machine

The last aspect to cover about the production place is the staff. As the different activities require different competences,

there is the need of specific professionals. The team has identified two main competency areas: the first one is related to Shima Seiki technology, while the second one to finishing operations. In the end, it is necessary to hire at least two technicians for the control of the knitting machines – two in order to operate on work-shifts – and two employees for finishing operations such as fixing loose yarn ends, fulling, ironing and packaging. Of course all these considerations are linked to market demand.


62_Dryer machine PT7801 produced by Miele

63_Fulling machine PW 6321 produced by Miele

### 5.6.3 The logistic phase

As the Techstylist business is based on home or store delivery – especially on home delivery, as just one flagship store will be opened in Italy at the beginning – the out-bound logistic is an important topic to address. It is a client's decision to receive his/her purchase directly at home or pick up his garment at one of the Techstylist flagship/permanent stores. In both these scenarios a secure and well-known pony express company – e.g. FedEx and DHL – provides the delivery service, whose costs are charged to the clients. Of course there is a difference between the two alternatives in term of costs, both for the clients and for Techstylist, where the store delivery is the cheapest one, due to the shorter distance and the possibility to take advantage of scale economies. Instead in terms of delivery time it has been estimated a total time from the order reception to the client delivery of 3 days – the delivery phase takes the last day. In future the analysis of the market demand and/or the possibility to open new flagship/permanent stores will push the Techstylist management to consider if relocate the production place or eventually open new production facilities in order to minimize the logistic costs.

In-bound logistic is another important aspect of Techstylist. The designed business model can be classified as "*make to order*" ("*MTO*"), where all the activities, especially the production phase, are driven by the client's order. In this case, the best kind of relationship with the yarn supplier would be a partnership, a "*Supply Chain Collaboration*" ("*SCC*"). Some examples of SCC are the Vendor Manged Inventory models, the Continuous Replenishment Programs or the Collaborative Planning Forecasting and Replenishment. The common idea is to increase the mutual visibility on the inventories between producer and supplier in order to improve their management, minimizing costs and delays. Even if this seems to be the best solution, it is clear it is very expensive and hard to implement, because it requires convincing a counterparty that could not be interested, especially to sign this kind of agreement with a new player within the fashion industry. Probably at the beginning of the Techstylist activity the most suitable solution is to enter in a standard agreement in order to keep the inventories of raw material between a minimum and a maximum level, thanks to a periodic replenishment.

## 5.7_The role of technology in Techstylist

Techstylist relies on its technologies for the delivery of an affordable and outstanding service, which is fed by the customer's data, and consist in using them to output tailor-made knitwear.

The knitwear production is handled mainly by the Shima Seiki technologies, so in this chapter we analyze which technologies are used for the knitwear design and the customer's data collection and editing.

The information needed to produce the knitwear is about the customer's body measures: they're retrieved from staff members in the store. The customer will create his/her own knitwear from the website or in a store assembling and personalizing the different elements proposed by the system, and will virtually try the creation on his/her avatar.

### 5.7.1_The avatar

The avatar is a video of the customer. It can be recorded into a store's recording room or created as an image through the website. The use of the recording room is strongly advised to obtain a high quality result.

The avatar is used to virtually try knitwear; two layers compose it:

- The video of the customer
- The Computer-Generated (CG) video of the knitwear created by the customer, put on top of the customer's video.

The final avatar is obtained by substituting the customer's video pixels with the non-transparent pixels of the CG knitwear video.

The two layers must be synchronized together: the CG knitwear must follow the movements of the customer. The information about these movements is obtained applying motion tracking algorithms to the customer's video.

**Motion tracking**

Motion tracking is the process of locating a moving object (or multiple objects) over time using a camera. These objects are special markers applied on the customer's body during the recording of the video.

There are two major components of a visual tracking system:

- Target Representation and Localization; in particular techniques like blob detection, block-based correlation or optical flow are useful to identify human movement (persons profile changes dynamically).
- Filtering and Data Association allows the tracking of complex objects, eventually considering also obstructions (e.g. Kalman filter, Particle filter)

The output of this process will be used to replicate the customer movements on the personalized knitwear. The following table (n. 64) shows an example of the output, where to each anchor we associate an array of 2D points that vary over time, each representing motion information on x and y axes at a given time:

| Anchor name | t 1 | t 2 | t 3 |
|---|---|---|---|
| Left arm | (1.0 ; 2.1) | (1.4 ; 2.2) | (1.6 ; 2.5) |
| Right arm | (6.3 ; 2.4) | (6.0 ; 2.1) | (5.7 ; 1.9) |
| Left leg | (0.9 ; 7.1) | (1.1 ; 7.0) | (1.2 ; 7.1) |
| Right leg | (6.2 ; 7.2) | (6.3 ; 7.1) | (6.1 ; 7.3) |

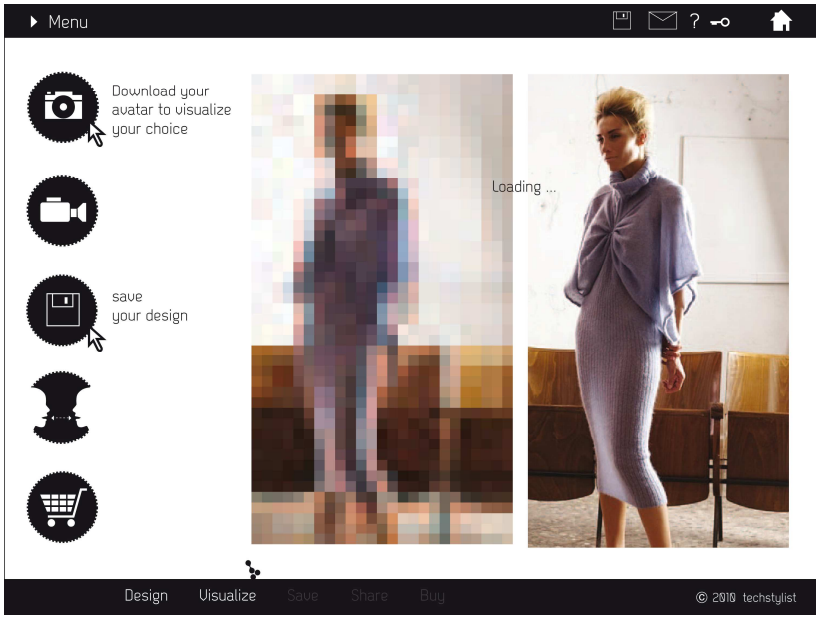
64_Output sample

## CG knitwear video

The customer can create knitwear assembling together the different elements proposed by the interface and customizing some of their parameters (e.g. color, texture).

The different elements are stored as 3D models; they are assembled together to form the customer creation; the resulting model is then animated using the motion tracking information and measures of the customer; it will be rendered as a video (3D-to-video conversion).

This output will be overlaid to the customer's video, so the knitwear must be correctly mapped on the customer's body and movements; to obtain a satisfying result we need to know information like height of the customer (obtained from his/her measures) and distance from the camera (obtained putting these constraints when the customer's video is recorded).

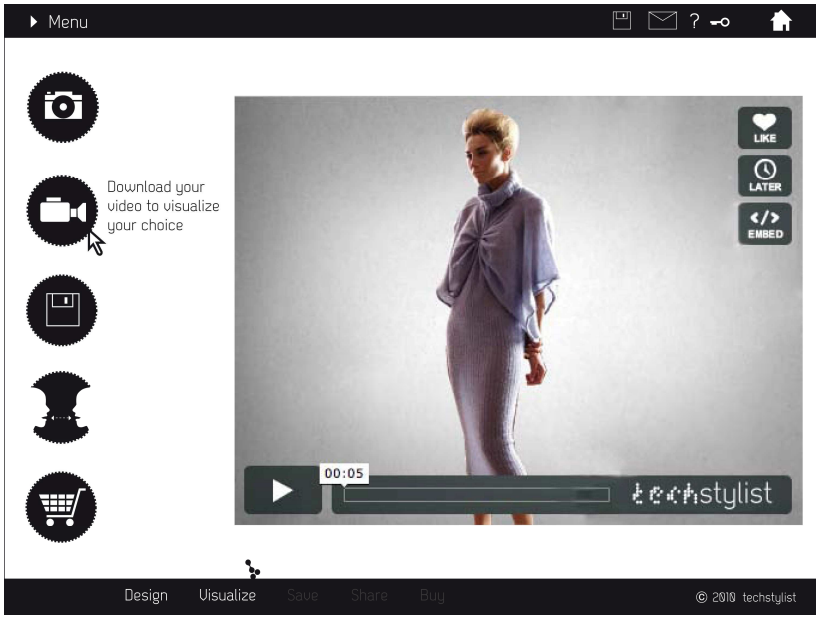



65_The rendering phase for the virtual try-on

The elements proposed by the system are stored as 3D models; each model is previewed as a thumbnail and converted to video for the virtual tries on avatars.

The 3D-to-video conversion requires the merging of the collected information:

- The selected raw elements are assembled into an unique 3D model
- Their parameters are customized by the customer (e.g. color, texture)
- The lighting conditions are a priori known (the ones of the recording room)
- Same for the Point of View into the 3D scene (the one of the recording room, use of the distance from the camera)
- The assembled 3D model is animated over time thanks to the motion tracking information and customer's measures.
- The rendering of the frames is saved as a video with transparent pixels where the knitwear is not present.




66_The video showing how the garment fits on the client is ready

**Recording room**

The recording room is the place where is possible to record a video that will be used for the virtual tries of customized knitwear; it consists in recording 3 videos of 5 seconds each, under certain constraints, and selecting the preferred one to be used for the final avatar (see chapter 5.3).

The main components of a recording room are:

- Camera able to record videos in HD resolution mounted on the "mirror"; a good choice in term of price and performances is the photo camera Canon EOS 5D; its ability to record videos in HD resolution guarantees a reliable source from where picking the movement information with the motion tracking;
- LCD display, 80 inches to be mounted as a "mirror" (portrait orientation); it will show the images recorded from the camera, eventually adding informational layers on top of the video stream (augmented reality). Depending on the speed of the developed motion tracking algorithm and to the 3D-to-video conversion, it could be possible to wear the customer's video in real time, with a default knitwear;
- Area of action, to determine the distance from the camera and to limit the customer movements (gray area on the ground)

67_A customer ready for the motion tracking in the video-making room

The customer enters in a recording room equipped with:

- A special wearing furnished by the store, with the spots to be tracked
- A mobile tablet like an Apple iPad or Samsung Galaxy, to be used to start/stop the recording, and to trim/select the piece of video to be used as avatar. This device will also offer to the user instructions and tutorials on how to record a video.

When the customer is satisfied with the video, he/she can confirm and associate it to his/her profile. From this moment all the virtual tries of his/her creations will rely on this video.

## 5.7.2_Web services & data management

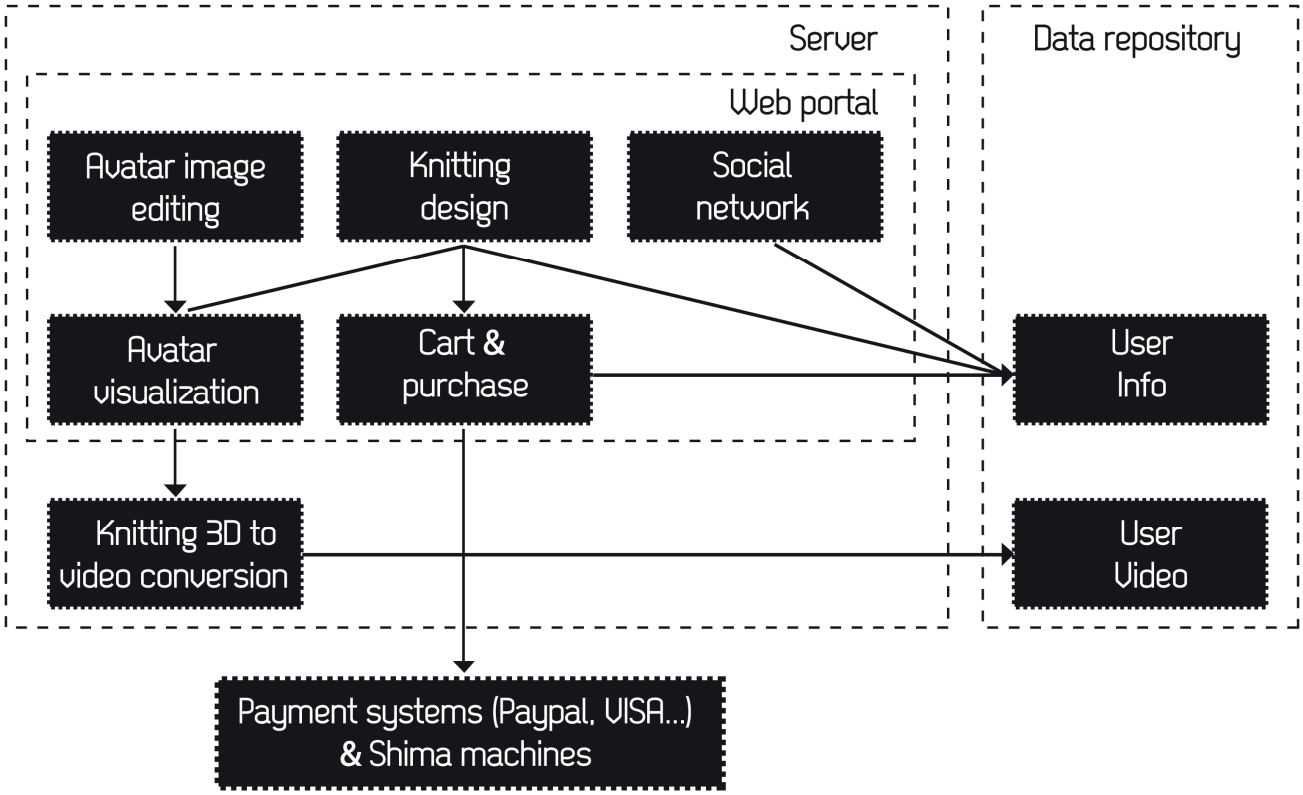
Techstylist exposes different services that are consumed by different devices: the customer can access to these services from the stores or the website through any type of device (notebook, desktop, mobile tablet, Smartphone); the cost of development for such scenario can be very high if done for each device.

The idea is to expose the services for the web, using HTML5 standard; in this way the services are accessible from any device able to surf the web. In a second phase specific applications can be developed for each device.

HTML5 supports multimedia content. Before this standard it was necessary to use third party (and proprietary) components like Flash or Silverlight, not always supported by all the devices (e.g. Apple doesn't support Flash).

**Architecture**

The web portal is the access point to the services; it permits to access to the social network, the user account, and to the Techstylist information and support. The back end server handles the web portal and retrieves information from the Data repository.




68_The architecture of the system

**Avatar @ home**

The customer can create his/her own avatar from home by uploading an image. There are some prerequisites needed for the image to be accepted:

- It must respect size and resolution constraints (e.g. 1000x2000 pixel and 2 Mb)
- The image must represent a person in front of the camera
- The person must have applied the tracking spots on his/her body (the spots can be downloaded and printed from the website)

If it passes these controls, the image can be used as avatar; the tracking algorithm is still valid because the image is considered as a video with 1 frame as length.

For the best experience of the service, we strongly advice to create the avatar through the stores' recording rooms.

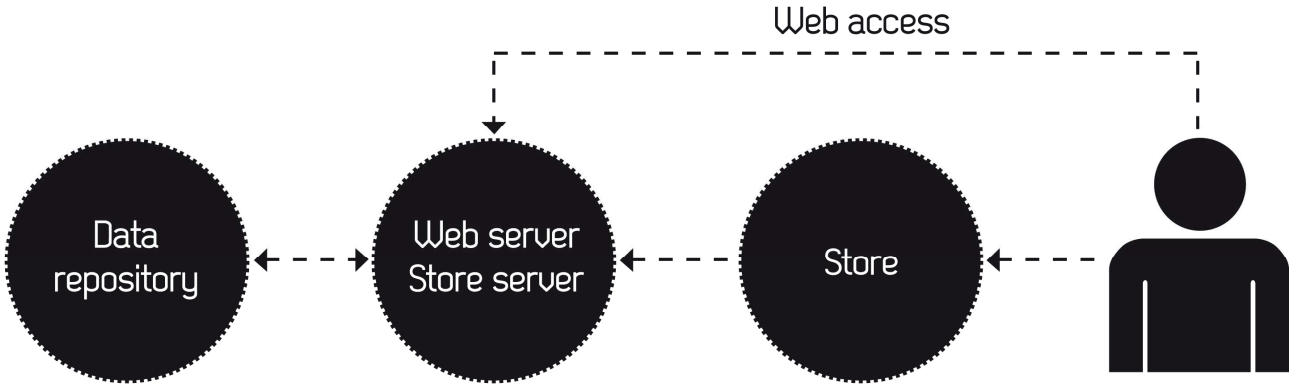
**Data management**

The collection and management of the customer's data is organized as follows:

- Data access: the customer accesses his/her data by home or from the stores. The Server has 2 interfaces to allow access from the web (Web server component) and from specific terminals (stores) through dedicated sockets (Store server component). Both components permit to modify user information (address, preferred method of payment, avatar...)
- Data storage: the data repository contains a MySQL database in order to be easily queried using PHP as scripting language for the Web applications offered by the service (e.g. Techstylist

Social network, Knitting store...). Both MySQL and PHP are open source, robust, quite scalable and are widely used in the Web development. Videos and images are stored locally into the Data repository; their location is associated to the correct user into the database.

- Data transmission: only the server components can alter the content of the data repository. They receive from the external (Web or Stores) the modification to be done, and control if the sender has the right to execute these modifications. In this case modifications are applied. The Web server is weaker than the Store server because it can be accessed by anyone, so the controls on permissions must be strong to preserve the consistency of data; the Store server can be accessed only by a-priori known terminals (the stores), so these controls can be eased.
- Data editing: the customer can edit his/her data from the web or a store; in particular the avatar editing requires the sending of multimedia content to the server. This content can be an image or video generated directly by the user or from the Recording room of a store. The other information (e.g. address, method of payment...) involves only text information, that is to say the editing of some field into the database. All the modifications require the correct login of the user. Each user has read/write permissions of his/her own data. The store staff accounts can have read/write permissions over multiple users' data; they can be used only from Store terminals for security reasons.




69_Data management

## 5.8_Business Plan

### 5.8.1_Mission

Techstylist offers a unique shopping experience and positions itself in the fashion industry with a highly innovative business model. Thanks to the technological solutions it implements, Techstylist guarantees the possibility of customized clothes, and thus distinguishes itself significantly from its competitors.

### 5.8.2_Objectives

In the following lines a list of the main objectives is fully analysed.

**Brand** A strong brand is very important for the success of the business. Techstylist should be a synonym of quality and innovation: to achieve this a strong and convincing marketing strategy should be implemented.

**Offer** Techstylist sells both clothes, both an experience. Customers can customize our many templates as they wish by switching several characteristics of the garment. The service is predominantly offered online and customers can see how their creation fits through the highly-innovative motion capture video "dressing room". Of course a flagship store and temporary recording station for the video to be shot are also provided.

**Qualified personnel** Our staff should have experience in the fashion industry and be able to serve the customers' needs in the their first experience in using the service. They should be able to understand the technology and explain it. The design team should be able to follow emerging trends and needs and create templates that allow for many different likable combinations.

**High return** It is required that Techstylist be able to create profit in order to autonomously finance the initial desired growth.

### 5.8.3_Strategy

Techstylist's strategy is simple yet with high potential: be the first mover in the newly created high-tech customized garments segment and tie in customers thanks to an online community where people can share ideas, suggest customizations and interact with the firm's design staff. This will help at increasing the barriers to entry and protect Techstylist's niche from incumbents.

On a more specific level, the strategy will unfold in the following way: in the first year most of the investments will be made in order to open a flagship store in Milan (see relative section), to set up the production facility in the outskirts of the city, to launch the web-site and to create the temporary store.

The initial target will be Milan's medium/high wealth individuals and the many tourists who visit the city every day. It will be important to "lure" as many people as possible into the service by promoting the video avatar and by making it visible for everyone as a pop-up store in the city centre. This is the only part of the service that needs to be carried out "on-site". The customization and the purchasing phases can be done directly from the home computer's web browser. For this reason, as previously said, tourists are also part of the target.

The flagship store will serve both as brand promoter and as an enabler for people who have difficulty understanding the customization platform. It also indirectly reassures customers, of the quality and validity of the business, by exhibiting pre-produced garments.

The back-end side of the business model greatly benefits from the front-end strategy since production can be located in the outskirts of the city centre where rent costs are lower and were synergies with logistics providers are easier to create.

### 5.8.4_External Analysis

The external analysis is comprised of two parts: a business area attractiveness analysis and an external factors analysis.

- **Attractiveness Analysis**

As is very common for these types of studies, Porter's 5 forces model will be used to better understand and structure the most relevant issues.

**Suppliers' power** Techstylist aims at creating collaborative partnerships with its suppliers so that chances of opportunistic behaviors are minimized due to the bilateral convenience of a long term profitable business relationship. In detail the main suppliers will be:

- **Shima Seiki:** this company's proprietary technology, i.e. the Wholegarment knitting machine, is on of the key enablers of Techstylist's business model. Since Shima Seiki is the only producer of such machine, it would be in a dominant contractual position so, for this reason, Shima will be part of the company itself, by providing part of the initial capital.
- **Raw materials suppliers:** there is a large enough number of cashmere suppliers, both Italian and international, with the right quality standards required by Techstylist.
- **Logistics providers:** there are many third party logistics providers that could serve Techstylist's purposes. As long as the volumes will be low the company will not need to build long term relationships with a specific provider and should just search the market for the cheapest alternatives. In case of future expansion however, the possibility of a collaboration with a partner should be explored.
- **Packaging providers:** Techstylist doesn't need any particular set of characteristics for its packages so the number of competitors in the packaging providers upstream market is large enough not to raise contractual power-related concerns.

**Customers' power** Techstylist's business is a B2C one and, as such, the contractual power on the customers' side is usually low, especially in this case, being the company a first mover in an unexplored market segment.

**Internal rivalry** No real alternative to Techstylist exists so rivalry is not yet very high. When one considers the high quality garments market however the "rivalry" level of the market becomes very high since success is mainly driven by the strength of the brand, due to the fact that usually products offered by different firms do not differ significantly. Some of the most important competitors, operating in the same geographical area and providing cashmere garments are described below.

- **Loro Piana SpA:** founded in 1924, it offers high quality garments for men, women and children. Its products, strinctly produced in Italy with only the best materials (cashmere, wool, cotton) are distributed worldwide through a private network of stores and through the most reknowned multi-brand shops.
- **Brunello Cucinelli SpA:** it's a leader in cashmere knitwear and was founded in 1978. It offers luxurious, high quality garments for men and women both in Italy (40% of total revenues) and the rest of the world.

- **Malo SpA:** founded in Florence in 1972 and became in a few years a worldwide leader in the high-quality cashmere knitwear. The company has the peculiarity of being vertically integrated since it covers all production phases from raw materials to finished good.
- **Ballantyne SpA:** founded in Scotland in 1921 it's a very prestigious brand in the cashmere and cotton knitwear industry.

Of course one should also take into account the fashion industry giants such as Armani, Versace, Fendi.

**Substitute products** When applying the idea of substitute product to Techstylist's business model the only significant threat that can arise is that people substitute the possibility to customize with the choice not to customize, that is they "stick" to the traditional approach in the industry. As of now, however, being customization a growing "buzz word" and an emerging trend this doesn't seem to be the case.

**New entrants** This is by far the most important force affecting this new market segment, due to the fact that barriers to entry are not very high. Augmented reality technology is available for everyone and, with a different production approach even Shima Seiki's machines can be substituted. This is the reason that led to the creation of a social network, part of the purchasing experience. Initial success will be vital in order to establish Techstylist's brand and make it less vulnerable to potential attacks from the fashion industry incument firms.

- **External Factors Analysis**

The team has identified five main factors, analysed in the following lines.

**Cultural Factors** Techstylist will be an Italian fashion firm and, as such, will benefit from the very big reputation Italian brand have. This will be a very important factor both in the initial phase when targeting tourists in big cities like Milano, but most of all in case a international expansion were to be made.

**Quality** In the last few years, the average customer's purchasing behavior has slightly changed, bringing many fashion industries to shift their focus from mass production to higher quality. A very important example is H&M, that has gone from being a standardized and cheap clothes seller to an additional channel for collections designed by important stylists such as Roberto Cavalli and Stella McCartney, characterized by higher quality standards. On top of this, as the market research carried out by Techstylist shows, 81.1% of the interviewees indicate product quality as the critical driver in the purchasing decision making process.

**Customization** Another important trend that has emerged througout the fashion industry, especially amongst the shoes and accessories producers, is customization, i.e. offering the custode the possibilità to personalize the item of their choice. Important exampels are brand such as Converse or Nike, tat through their web-site offer services of this kind. Fendi's maison has also followed this path, by having realized a completely customizable bag, the baguette Fendi DIY (Do It Yourself). Techstylist will offer its customers even more, by providing a technological support to the personalization experience which has never been offered before.

**Restrictions** The Italian parliament has recently made several restrictions to Made in Italy products in the garment industry. Products should be labeled with specific informations regarding the country of production. Such restriction, however, in Techstylist's case will not have consequences since all production phases will

remain in Italy, so this requirement will actually work in favor of the company and will work as a certification.

**Technology** After speaking with Shima Seiki, no signicant production innovations should be expected in the next ten years. As far as augmented reality technologies on the other side, leaps are being made every year so it will be vital for Techstylist to be up-to-date with the current standards.

### 5.8.5_Swot analysis

The SWOT – Strengths Weaknesses Opportunities Threats – analysis helps at addressing specifically the challenges or the opportunities coming from the market in relation to the characteristics of the firms itself. The main findings are summarized in the matrix below but a more thorough description of the conclusions that can be drawn from it will be provided in this paragraph.

A successful start-up firm should find that its strengths are exactly what is needed to exploit the biggest opportunities present on the market and that its weaknesses are not decisive, if compared to the market threats, in making the firm at risk of failure. For an existing firm a SWOT analysis helps at understanding what characteristics ought to be changed in order to continue being successful in a changing market; for a start-up it is a sort of control panel that can help at understanding if anything important is missing in the business model definition.

In this case, as the matrix shows, the analysis shows comforting results: Techstylist has been designed from the start by looking at market trends, so it is natural that its strengths prove to be a good match for the opportunities it faces. More important then is to look at any considerable threats that, although accounted for in the business definition, can still be a source of risk. With this approach, two factors immediately stand out: incumbents' disturbing strategies and the overall macro-economic situation. Incumbents such as the afore-mentioned Inditex, D&G, Armani Jeans or other firms who address with a least one if not all collection medium-high wealth individuals could easily enter this new market by leveraging on their high capital availability and brand. In this case a natural barrier is the video which is required to access the service. Customers are most likely not so eager to have to go through this step every

| STRENGHTS | WEAKNESSES |
|---|---|
| _ on demand production<br>_ no stocks --> costs reduction<br>_ temporary stores allow to reach all potential customers<br>_ product customization<br>_ new fashion experience and new role of the client --> "prosumer"<br>_ if fashion social network picks up its network economies will create a strong entry barrier<br>_ highly scalable business (without massive additional costs)<br>_ first movers | _ brand quality/brand perception --> hard to build due to the absence of the final products (client has to buy and try the clothes)<br>_ high cost of collection design<br>_ high initial investment gives low flexibility<br>_ strength of barriers to entry relies mainly on the success of social network/community |
| **OPPORTUNITIES** | **THREATS** |
| _ competitive priced customized garments represent a great unexplored business opportunity<br>_ growing need for looking diferent, to be "unique"<br>_ new technologies such as augmented reality are maturing rapidly | _ incumbents from the fashion industry have money and brand to enter our newly created market<br>_ technologies are maturing rapidly but are getting more and more accessible for everyone to use (i.e. competitors)<br>_ low cost fashion might remain the key market growth driver also in the future<br>_ effects of credit crunch crisis might still cause potential customers to be fewer |

70_SWOT matrix

time they want to switch to another provided. Anyways the risk of facing harsh competition is still very high. Techstylist has addressed this problem by including in its model a fashion social network, that works symbiotically with the purchasing experience and that has the main goal of becoming an important community of fashion "lovers". The reason why this can work as a barrier to entry is explained in chapter 5.5; it should be noted however how Techstylist still bears a lot of risk from incumbents even after accounting for this defensive strategy; such risk is inevitable and the extent of the consequences it could have on the firm's business is greatly affected by two things: the speed at which costumers learn about this new service and start adopting it and the brand perception the firm is able to convey on the market. The more it relates to innovation, quality, pioneerical, the more customers will be less likely to switch to another new service provider.

## 5.8.6_Potential market analysis

In order to understand the economic sustainability of TechStylist it is necessary to figure out an estimation of its potential market. This part is focused only on Milan. The aim of this analysis is to investigate if this business model has the possibility to be economically profitable in the short term, when the efforts of marketing and brand-building would be concentrated in Milan as the selected location for the flagship store and the first temporary store / scanning location. The starting point is the 2009/2010 research "*Indagine sui consumi delle famiglie*" carried out by Camera di Commercio di Milano. Considering that the TechStylist target clients are individuals with medium-high salary and in the age range 30-50, living into the Milan metropolitan area, a potential market of 138.436 families and/or 293.407 individuals has been obtained.

| | | REDDITO NUCLEO FAMILIARE | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | *percentuali di colonna* | | | | | | | |
| | | <15.000 | 15.000-30.000 | 30.000-45.000 | 45.000-60.000 | >60.000 | n.d. | totale % | totale famiglie |
| CLASSE DI ETA DELLA PERSONA DI RIFERIMENTO | fino 34 anni | 10,2% | 7,2% | 4,7% | 6,2% | 12,1% | 18,0% | 7,7% | 50.463 |
| | 35-49 anni | 11,6% | 25,5% | 38,5% | 33,4% | 29,3% | 23,0% | 26,5% | 173.671 |
| | 50-64 anni | 13,9% | 19,0% | 30,4% | 41,5% | 47,7% | 20,1% | 23,9% | 156.632 |
| | 65+ anni | 64,2% | 48,4% | 26,4% | 19,0% | 10,9% | 39,0% | 41,9% | 274.597 |
| NUMERO DI COMPONENTI DEL NUCLEO FAMILIARE | 1 | 81,7% | 51,2% | 22,7% | 21,4% | 13,8% | 46,4% | 46,3% | 303.433 |
| | 2 | 12,6% | 31,1% | 31,2% | 19,6% | 26,3% | 24,3% | 25,9% | 169.739 |
| | 3 | 3,0% | 10,8% | 27,3% | 30,0% | 28,0% | 2,3% | 15,3% | 100.271 |
| | 4 | 1,2% | 5,4% | 14,3% | 24,6% | 21,6% | 23,5% | 9,5% | 62.259 |
| | 5+ | 1,4% | 1,5% | 4,4% | 4,4% | 10,2% | 3,5% | 2,9% | 19.006 |

71_Analysis of Milan population

In these calculations, foreigners and other visitors have been not considered as potential customers, obtaining as a consequence an underestimation of the potential market. Usually the analysis of the potential demand continues with a couple of following steps to determine the attachable market and its penetration. As there exist no competitors with a business model or an offer of customizable garment comparable to TechStylist's one, the results obtained from the proceeding of the analysis would be totally subjected to the hypothesis made. Instead the team has decided to take into account the size of the potential market as a check for the breakeven analysis, where the breakeven point is the level of demand for which cost or expenses and revenue are equal.

## 5.8.7_Economic feasibility analysis

In this last section some considerations about the economic feasibility of the Techstylist business are reported.

Before preceding it is really important to understand that the results obtained are preliminary, given the complexity of founding a company and the degree of innovation of this idea – so innovative that there are no competitors with a similar business model. For these reasons the team has decided to simplify the analysis, focusing only on the main cost entries and without considering explicitly some

others – such as financing costs or marketing costs – due to the high dependence with the objectives/aims of the entrepreneurial group.

Three main cost areas have been identified – garment, machine and personnel –, while other main costs – shop-related and distribution costs – have been considered separately.

**Garment** It has been estimated a cost of €10 for every 100g of cashmere. Given an average weight of 500g for item, the cost of each garment is about €50 – only in terms of raw material.

**Machine** The most relevant cost area is represented by the production machines. Even if it would be possible either buy or rent these machines, as they are the core and strategic assets of the business the buy-option is the best one. Regarding the Shima Seiki machines, the price is around €170.000 for a garment machine and €70.000 for an accessorize one. A possibility to reduce this investment cost is to buy old Shima Seiki machines from other companies. This option could generate a saving of more than 50% on the original price, but without any guarantees about the status of the machines themselves. The price to buy a washing, a fulling and an iron machine is instead around €20.000.

**Personnel** According with Italian national contract rules and the designed service, the team believes it is necessary to hire four shoppers – equally split between the flagship store and the temporary shop – and four figures for the production place. At the beginning at least two machiners and two finishers are needed, while in the future they will be trained in order to become interchangeable and improving the flexibility and the efficiency of the production phase. A possible estimation of the salary for these figures – it is just a rough estimation of a medium salary – is around €25.000 for finishers/shoppers and €30.000 for machiners – due to the very specific competences required.

Identified the main cost entries the team has carried out a kind of breakeven analysis – detailed in the following image – from which it has been estimated a breakeven of 1.241 items per year. Comparing this result with the potential market size, Techstylist would reach the breakeven demand with a penetration of the single Milan market of 0,4%. This number seems really promising – especially because Techstylist would cover the whole Italian market since the beginning –, but it should be refined especially with an improved market analysis in order to better understand the customers' needs.

## PRODUCTION PLAN AND ECONOMICS

| GARMENT | | |
|---|---|---|
| g cashmere / item | | 500 |
| € / 100g cashmere | | 10 |
| total cost | € | 50 |

| MACHINE | | |
|---|---|---|
| Shima Seiki garment | € | 170.000 |
| # Shima Seiki garment | | 2 |
| expected life | | 15 |
| depreciation / y | € | 22.667 |
| variable costs / item | € | 15 |
| | | |
| Shima Seiki accessorize | € | 70.000 |
| # Shima Seiki accessorize | | 1 |
| expected life | | 15 |
| depreciation / y | € | 4.667 |
| variable costs / item | € | 10 |
| | | |
| washing / fulling / ironing | € | 20.000 |
| expected life | | 15 |
| depreciation / y | € | 1.333 |
| variable costs / item | € | 5 |

| PRODUCTION | | |
|---|---|---|
| item price | € | 300 |
| item productive cost | € | 70 |
| margin | € | 230 |
| items / y | | 1.241 |

| PERSONNEL | | |
|---|---|---|
| machiner salary / y | € | 30.000 |
| # machiner | | 2 |
| | | |
| finisher salary / y | € | 25.000 |
| # finisher | | 2 |
| | | |
| shopper salary / y | € | 25.000 |
| # shopper | | 2 |

| OTHER COSTS | | |
|---|---|---|
| shop rent / y | € | 70.000 |
| | | |
| expense / rent | | 15% |
| shop expense / y | € | 10.500 |
| | | |
| furniture | € | 50.000 |
| expected life | | 5 |
| depreciation / y | € | 10.000 |
| | | |
| distribution / item | € | 5 |

| ECONOMICS | | |
|---|---|---|
| Revenues / y | € | 372.222 |
| Production cost / y | € | 86.852 |
| Machine cost / y | € | 28.667 |
| Personell / y | € | 160.000 |
| Extra cost / y | € | 96.704 |

72_Breakeven analysis

The last aspect to consider is the temporary shop. Analysing the main cost entries for the most innovative element of the Techstylist experience, it has been estimated an increase of about 40 items/orders is required to cover the expenses of one-month activity.

PRODUCTION PLAN AND ECONOMICS - TEMPORARY STORE MOBILE

| COSTS | | |
|---|---|---|
| tax / installation | € | 4.500 |
| furniture | € | 40.000 |
| expected life | | 5 |
| depreciation / 30days | € | 658 |

| PERSONNEL | | |
|---|---|---|
| shopper salary / y | € | 25.000 |
| # shopper | | 2 |
| cost / 30days | € | 4.110 |

| | |
|---|---|
| items/orders increase | 41 |

PRODUCTION PLAN AND ECONOMICS - IN-BUILDING TEMPORARY STORE

| COSTS | | |
|---|---|---|
| shop rent / 30days | € | 4.000 |
| installation & furniture | € | 15.000 |
| expected life | | 5 |
| depreciation / 30days | € | 247 |

| PERSONNEL | | |
|---|---|---|
| shopper salary / y | € | 25.000 |
| # shopper | | 2 |
| cost / 30days | € | 4.110 |

| | |
|---|---|
| items/orders increase | 37 |

73_Items increase for covering the cost of temporary shop

## 6_Conclusions

The realization of this project was not easy, but it has been developed through a process characterized by numerous attempts, tests, fixes that have allowed us to refine the project from time to time by eliminating the less appropriate parts and reach a final result able to meet the objectives that were set at the beginning.

To the satisfaction of having developed a stimulating project is added the awareness that this was a valuable source of enrichment from a human and cultural point of view.

To be successful, a service must be appealing for the end user and generate profit: this is guaranteed by the right choice of the technology, the understanding of the user needs, and a good business plan.

Techstylist has been designed considering the state and evolution of the social, economical and technological fields, finding correlations and interdependences between them. We found how the changing of paradigm in one field can affect the others: for example, the evolution of the consumer into prosumer has created new opportunities into the fashion market and the consequent innovation of enabling technologies.

The interdependence of these fields makes it difficult to find which one is the trigger, sometimes they evolve simultaneously and separately, so it's important to monitor each of them in order to foreseen implications and eventually new opportunities.

Techstylist takes place in a context where the user is used to web services, Rich Internet Applications (RIA), web social life, and customization, where the fashion industry is starting to push on technology to innovate the market, and where different technologies such as Augmented Reality, knitting machines, or mobile devices (smartphones, tablets) are mature enough and can be rethought for this context.

Under these considerations, some of the main findings have been that:

- The service must be web based, in order to remotely manage users and resources such as machines, purchases, stocks, and stores.
- The user experience must be both real and virtual: internet satisfies the informational and customization phases, but through the stores is possible to enhance the experience creating Augmented Reality avatars, having one-to-one support, and touching with hand the materials that can be used for the creation of knitting
- Garments are created by assembling basic elements.
- The use of standards such as HTML5 is preferred, in order to develop once for multiple devices.
- Augmented Reality is preferred to Virtual Reality because is more near to reality, more tangible; on top of the reality layer (user's video) is overlaid the informational layer (rendering of the 3D model obtained assembling the chosen basic elements).
- Basic elements must be modeled in 3D in order to be available to the user: standardized formats like X3D are preferred.
- To reduce costs is possible to decentralize the production and use automated knitting machines (like Shima Seiki Wholegarment ones) remotely managed.

Our research and study, even though detailed, cannot comprehensively address all the individual aspects and details of the project, but provides a good basis on which begin to plan a new business inside the complex fashion market. It's necessary to pass to an executive level of those aspects that we analyzed, trying to figure out how to optimize costs and maximize revenues by offering an exciting experience to customers. One possibility would be to enter into business alliances with suppliers and with Shima Seiki itself, in order to create a network of actors directed toward a common goal.

## Bibliography

[1] C. Arthur, *Augmented reality: it's like real life, but better*, The Observer, 21 March 2010.

Downloadable from:

http://www.guardian.co.uk/technology/2010/mar/21/augmented-reality-iphone-advertising

[2] G. Azzone, U. Bertelè, *L'impresa: sistemi di governo, valutazione e controllo*, Edizioni Etas, Milano.

[3] P. Bertola, E. Manzini, *Design Multiverso*, Ed. Polidesign, Milano, 2006.

[4] Brun, F. Caniato, M. Caridi, C. Castelli, G. Miragliotta, S. Ronchi, A. Sianesi, G. Spina, *Logistics and supply chain management in luxury fashion retail: Empirical investigation of Italian firms*, Int. J. Production Economics 114, 2008, 554–570.

[5] Brun, C. Castelli, *Supply chain strategy in the fashion industry: Developing a portfolio model depending on product, retail channel and brand*, Int. J. Production Economics 116, 2008, 169–181

[6] F. Cordier, W. Lee, H. Seo, N. Magnenat-Thalmann, *Virtual-Try-On on the Web*, VRIC (Virtual Reality International Conference), Laval Virtual 2001, May 16-18.

[7] E. Curtis, *Fashion Retail*, Wiley, Chicester, 2004.

[8] F. Dallari, G. Marchet, *Rinnovare la Supply Chain*, Il Sole 24 Ore, Milano, 2003.

[9] P.N. Danziger, *Let them eat cake: marketing luxury to the masses-as well as the classes*, Dearborn Trade Publishing, 2005

[10] M. Galbiati, Il retail come luogo di comunicazione, 2008. In: G. Gerosa, *Il progetto dell'identità di marca nel punto vendita*, Franco Angeli, Milano, 2008.

[11] G. Gerosa, Il settore retail come campo di indagine, 2008. In: G. Gerosa, *Il progetto dell'identità di marca nel punto vendita*, Franco Angeli, Milano, 2008.

[12] G. Gerosa, Contributi da diversi approcci disciplinari, 2008. In: G. Gerosa, *Il progetto dell'identità di marca nel punto vendita*, Franco Angeli, Milano, 2008.

[13] G. Giammaresi, *La moda e l'architettura*, Electa, Milano 2008.

[14] I. Hardy, *Parc overflowing with new ideas*, 9 October 2009.

Downloadable from: http://news.bbc.co.uk/2/hi/programmes/click_online/8295413.stm

[15] V. Iannilli, *Riflessioni e scenari innovative nel progetto del punto vendita*, Esculapio, Bologna, 2002.

[16] R. Koolhass, *Projects for Prada part 1*, Fondazione Prada, Milano 2001.

[17] P. La Marca, G. Palamara, *Strategie di nicchia nel settore moda*, Quaderno di ricerca n.4-Febbraio 2005, Copyland, Pavia, 2005.

[18] A. Mainoli, C. Savino, *Negozi e showroom d'autore*, Motta Architettura, Milano, 2008.

[19] R. Moore, *Reinventare lo shopping*, Domus, n.845, 30-45, February 2002.

[20] E. Sabbadin, F. Negri, *Flagship store e temporary store: la brand retailization*, International Marketing Trends Conference, Paris, 15-17 January 2009.

Downloadable from:

http://www.marketing-trends-congress.com/2009_cp/Materiali/Paper/It/Sabbadin_Negri.pdf

[21] L.Sherman, *The Cult of Couture*, 28 June 2006.

Downloadable from:

http://www.forbes.com/2006/06/27/haute-couture-fashion_cx_ls_0628feat_ls.html

[22] D. Scodeller, *Negozi: l'architetto nello spazio della merce*, Electa, Milano, 2007.

[23] C.Swedberg, *Magicmirror could assist retail customers*, RFID Journal, 29 November 2006.

Downloadable from: http://www.rfidjournal.com/article/articleview/2854/1/1/

[24] M. Trevisan, M.Pegoraro, *Retail Design. Progettare la shopping experience*, Franco Angeli, Milano, 2007.

[25] M. Tungate, *Fashion brands: branding style from Armani to Zara,* Kogan Page, 2005.

[26] K. Zaghi, *Atmosfera e visual merchandising: ambient, relazioni ed esperienze*, Franco Angeli, Milano, 2008.

[27] W. Zhang, T. Matsumoto, J.Liu, M.Chu and B. Begole, *An Intelligent Fitting Room Using Multi-Camera Perception*, International Conference on Intelligent User Interfaces (IUI 2008); 2008 January 13-16; Canary Islands, Spain. NY: ACM; 2008; 60-69.

Downloadable from: http://www.parc.com/content/attachments/intelligent-fitting-room.pdf

## Websites

www.adidas.com

www.brandstorming.it

www.converse.com

www.dadodoro.it

www.fujitsu.com

www.istat.it

www.louisvuitton.com

www.milano.consumi.info

www.mi.camcom.it

www.myvirtualmirror.com

http://magicmirror.thebigspace.com/

www.medialine.de/facts: luxury market report

http://nikeid.nike.com

www.parc.com/publication/2046/responsive-mirror.html

www.silhouette.com

www.sistemamodaitalia.com

www.tobi.com

www.sidecareventi.com

www.threadless.com

www.trendhunter.com

www.vimage.it

www.virtualmirror.net