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Master Thesis

Textiles and Architecture

by
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towards the academic title
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Cultural Analysis

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1. Acknowledgement

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2. Abstract

The big themes of today that keep us busy considering are the mobility issues - mobile working and living, 24-7 connectivity, utilizing spaces - the private and the public spaces, sustainability of resources including time, radical democratization of every thing – from ueber concepts to the consumer & prosumer economy, internet-of-things comes along with the privacy question on the big-data, we are also concerned about the rising questions of health and care industry with the complete acknowledgement of the ageing population in Europe. With all these changes we feel new forms of living are emerging in our society. There is a co-existence of the old and the known ways with the new ways of living. From a perspective of a fashion designer with textiles as a tool and material I perceive clothing as an individualized space and architecture. With these materials I envision responsive spaces for individuals that help use our senses to interact with.

The aim of this research is to explore textile thinking for use of technology in textile architecture in the far aim for designing for new forms of living.

The approach to this research under the scope of master thesis is theoretical. Building up future scenarios for 25 years from now, helps looking at the driving parameters and their impact on the dimensions of society, culture, technology, economics, ecology and politics. The scenarios build up here are the possible suggestions of future ways of living.

The four scenarios are developed based on the accessibility of technology and space. Each scenario is different from the other in terms of ways of living and the same is reflected upon the social, cultural, political and economical situation. The interpretations deducted from the possible four future scenarios draw up the attention to the possible opportunities and likewise to the risks involved in each of the four different scenarios.

The conclusion to this theoretical research is a starting point for future trans-disciplinary research opportunity between the textiles, architecture and interaction design to create new kinds of spaces and interactions between humans and the environments.

3. Introduction

Do our clothes say about who we are or who we think we are? How does the way we dress communicate messages about our identity?[1] It is intriguing to explore onto these wearable identities. Being a fashion designer, I see clothing as an extension of a skin or body. Clothing being extended further becomes an individual architecture or an individualized space. It is the outside of us, in a way reflecting our inside yet very private. As we move around in public spaces with the individualized clothing or "architecture" we are confronted with various cultural, social and political issues.

The idea of creating spaces around us that are our own extensions from the inside out is indeed aspiring. Learning through our own body, body that moves feels and dreams.

Using conventional and new textile materials together with technology may help us envision a space that becomes responsive and reacts to our needs, a space that has a playful and explorative character to its users. As an imaginative world of a small child certain spaces can be thought of which pop-up when ever one needs them. After that they are not visible.

Understanding through the dimensions of society, culture, economy, ecology, technology and politics it is worthwhile to acknowledge the new forms of living due to the fast technological changes that essentially may not be sustainable.

Sustainable ways of living requires radical changes in design thinking. Primary challenge is to experimentally explore the nature of these changes. [2]

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[1] Davis, Fred. 1992. "Fashion, Culture and Identity". The university of Chicago Press

[2] Homepage of ArchInTex Network, Sweden- http://arcintex.hb.se/index.php

3.1.   Textiles and Architecture

Textiles and clothing are one of the oldest products created and so is the architecture. One of the primary needs of a human being is shelter. In the early stages of evolution rocky caves served the shelter and the skins of hunted animals became the clothing to protect from severe weather conditions. Through the Ancient history until Modern and present times one can follow a path of development from the basic needs to statement of prestige and luxury that one can afford.

The relationship of architecture to textiles has a long history, even though for long textiles have been of peripheral interest to central theories of architecture. It is lately that the theorist, architects, engineers and designers look at the importance of this disciplinary confluence and its increasing centrality in architecture.[3]

Tracing the genealogy of this relationship, there are four forms that have frequently been experimented with. When textile or textile based process is used as a metaphor, when a textile like spatial structure is produced in architecture, when textiles or textile composites are used as a real material in a building and where textiles appear in architectural theory and texts.[4]

The importance of the theorization of field-effect architecture and field spaces[5] and of new architectural building skins is also stimulating the interfacing of architecture with textiles. On a larger scale, the concepts being developed in landscape urbanism theories of spatial design[6] share common concepts and qualities with today's textile design research.

Fashion and textiles were traditionally associated with crafts, the feminine, frivolity, the ephemeral and the sensuous and trivial for the mainstream architecture.

Flexibility is what differentiates textiles from most other (stiff) materials. Textiles can in fact hang, but they cannot support themselves. They can however adapt to their environment, this adaptation being allowed by their thinness, lightness, production technique and material. This adaptability explains the versatility of applications in which textiles are used.[7]

Textiles have shorter lifetimes than e.g. concrete, but this can be turned into an advantage, as it can allow a building to change appearance over time, depending on the needs of its users.

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[3] Garcia, Mark. Nov/Dec 2006. "Prologue for a History and Theory of Architextiles". Architectural Design, Wiley Academy

[4] Garcia, Mark. Nov/Dec 2006. "Prologue for a History and Theory of Architextiles". Architectural Design, Wiley Academy

[5] Kwinter, S. 2000. "La Citta Nuova: Modernity and Continuity", in M and MIT press (London and Cambridge, MA)

[6] Corner, J. 2003. "Landscape Urbanism". Landscape Urbanism: A Manual for the Machinic Landscape, AA Publications (London)

[7] Bau, Alexandre 2003. "How to Dress Buildings up". Textile Architecture. http://www.transplant.nu

Architecture on the other hand is very inspirational for its forms and spaces to the world of fashion. Rendering clean and straight lines to clothes, the collection gets unmistakably applauded and compared to architecture.

In this piece of research work, the apparent purpose of architecture, which is housing, cocooning, cover or protection is imagined on textiles for exploring new ideas of designs.

3.2.   Spaces

Living spaces are to the scale of the body; spaces between bodies, between thoughts and between activities.

Textiles are connecting the ways of living to spaces of living- ways we dress our environments and ourselves.

Architecture is connecting spaces of living to ways of living – ways we define our living environment.

In the new forms of living, spaces are defined to be resilient and are multi-useable. The concept of co-housing and co-working for communal activities are well accepted. The shared spaces encourage the use of public and private spaces for the purpose of practicing individual or communal skill-sets. Participation is key to this culture and supportive communities encourage individuals to succeed.

Shared infrastructures in private and public spaces make it hassle-free for people. The spaces are clutter free and easily packable and moveable.

Within all this there is also a personal space or inner space that is a space created for contemplation, a relaxation space, designed to reduce work-related stress.

Certain new Post-modern architecture theories developed after Deleuze's text on fold[8] are articulating a new metaphysical and ontological characterisation of space. These new theories are concerned with the dynamic, interactive, multimedia, flexible, ephemeral, event and process based methods of designing and experiencing space. Opposed to historical paradigms based on Vitruvian concept and conception of architectural space as permanent, finished, durable, static, hard and compression based, they articulate a new space – one that is never finished, never static, in a continuous state of provisional and transitional becoming.[9]

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[8] Deleuze, G. 1992. "The Fold: Leibnitz and the Baroque. University of Minnesota Press

[9] Garcia, Mark. Nov/Dec 2006. "Prologue for a History and Theory of Architextiles". Architectural Design, Wiley Academy

3.3.   Technology

Today technology is tremendously accessible to us. The latest of technological breakthroughs are made available to the consumers at a much faster rate than ever.

Research and innovation in interdisciplinary fields especially in Europe are on the rise. This is opening up new opportunities and fields of applications for collaborated areas like biology and technology short named as biotech.

The current interdisciplinary researches in the area of biotechnology and textiles are aiming for ecologically grown textiles. Bio-textiles is an area of research for growing textiles using living tissues. The applications of this technology can be very wide and far beyond fashion.

Interaction Design is an area of interest for applications on textiles. Creating smart textiles that are not just adapting to the user but are also responsive to the user are one of the interdisciplinary approaches for future textile applications.

Similarly the Internet connectivity is making it possible to bring in micro and nanoelctronics on the textile surfaces and making the wearable technology very flexible and easy for the user. This opens up opportunities in designing new textiles for various applications in the health, fashion, interior, architecture and travel industry.

The list of technological interventions do not stop here rather it goes much beyond the scope of this research study.

3.4.   Central question of Research

The central question for this research is to explore use of technology in textile architecture. The further aim to be able to design for new forms of living is to be continued for a practice based research study at a later stage.

The time frame for the projections is 25 years from now that is year 2040. Geographical location selected is Europe.

Technology and space are used as two main dimensions to define four different future scenarios and ways of living.

The question of textile architecture is seen in a perspective of understanding the challenges of the changing environments of living. Thus challenging the ways of thinking for designing tools and products for the new forms of living.

4. Methodology

A futures research methodology for understanding the challenges of the changing environments of living in 2040 from now is believed to be appropriate for the theoretical research on this subject.

The narrative descriptions of the futures are completely hypothetical. Although it would not be possible to know about the future, it is possible to know the key drivers and their impact or influence on the future.

The dimensions of society, culture, technology, economics, ecology and politics are explored for their impacts and influences upon one another in this method.

4.1. Future Scenarios

There are four future scenarios.

4.1.1. Scenario Contemplation

Visual 1

Thomas Pieters, 45 yrs, scientific engineer – husband

Katie Pieters, 44 yrs, photo journalist – wife

Teal Pieters, 8 yrs, Kai Pieters, 6 yrs – children of Katie and Thomas

Luna Lang, 14 yrs – daughter of Thomas from his earlier partner

Michelle Pieters, 72 yrs & Richard Pieters, 75 yrs – parents of Thomas

Thomas and Katie along with their children Teal and Kai are now living in the city. They bought this house just a year before. Luna, daughter of Thomas from his first wife lives with her mother in another city. But she enjoys the company of Teal and Kai very much and wishes to see them more often. But due to the fact that apartment of Thomas and Katie is too small Luna could not stay there longer. Few years back as one day Michelle, mother of Thomas was participating in their regular garden tea get together in the neighbourhood, she came into the conversation about the new developing co-housing urban area in the city. She happened to mention that to Thomas and Katie if this is not something they were interested in.

Since Thomas and Katie are both working and their work involves lot of travel nationally and internationally. They both love to travel and working while travelling is an interesting option for both of them. They both are equipped with special clothing that has automatic warmth control systems reacting to the individual body temperatures and outside temperatures. When required the garment could be inflated partially or completely to serve as a sleeping bag. Katie is working in a co-shared workspace. She shares the office space with other creative professionals. She loves the flexibility of the space and also this keeps her creatively stimulated for her work. Due to the technology and cloud Thomas and Katie are able to work and manage their lives at home and at work very flexibly. But only one thing that disturbed them in their older apartment was not being able to participate in the neighbourhood activities or being part of a community. As all families were busy in their own lives, hardly people saw each other accept on a few occasions.

Katie being highly creative and skilled in baking and cooking, she loves to bake together with kids. Thomas is always glad to work on repairing his bike, but wants to learn more about growing vegetables at home. Their elder daughter Teal is very good at Music. She is trying to learn different instruments in her free time. Whereas her brother Kai who is 2 years younger to her admires the nature and is interested in drawing. He often takes long walks in nature with his father or plays outside with other kids.

The idea of Co-housing came just at the right time for Thomas and Katie. They communicated with their friends and neighbours about their interest and to their amazement many of them were ready to be part of this project. The whole campus of this co-housing community has 20 houses well equipped with latest technology in all areas making life easy. There are different types and sizes of the families residing there. Each one of them has their own private areas of the houses and in addition the common areas of interactions on a very regular basis. This co-housing is encouraging for the communal ways of living. Recently a group of three people from the generation millennial moved in together in the neighbouring house of Thomas and Katie.

One of the weekends Katie baked the bread and cookies for the teatime gathering in the common house. Very soon she was filling up her time slot for teaching baking. The neighbours who included kids and grown-ups were very much interested in learning. Off-course Katie was more than delighted as she enjoys this. Thomas could support her for this by fetching the baking materials from the store not far from the community. He could not take his bike, due to pending repairs. But he quickly could find a pool car on the common board that was available to drive.

Teal goes together with other kids from the neighbourhood to her music lessons. If Katie and Thomas are not at home, other parents drive the kids together. Luna is also very happy to help her siblings out. Since they moved in this Co-housing society, Luna is thinking of also moving

together with them, as this place offers her lots of opportunities to learn new skills on computers or textiles from the neighbours which she does not have in segregated housing where her mother is living. She is excited to use her new jacket which helps her navigate her to her new school, she just has to locate herself by tapping her sleeves and the projected directions are right there while she is riding her by-cycle.

One afternoon Thomas was working from a distant location for his client and he received a message on his device about his father, Richard being admitted to the hospital. This made him quite anxious to see his father immediately, but due to his assignment he could not fly back. He was thankful to the technology, as he could regularly monitor Richard's health and could interact with his doctors. Once Richard was moved back home, Katie bought him a sweater with inbuilt wearable device, which notes movements, heartbeat and other essential data for monitoring his health. Not just the doctors but also Thomas and Katie could easily connect with the device remotely while on travels and ensure his well-being.

Having technical tools to help household and work is giving a lot of quality time to Thomas and Katie and they are able to lead a well-balanced life. While Katie takes her time in the busy day to meditate and relax, Thomas relaxes himself learning to do farming in the kitchen garden of the community these days.

Last afternoon Kai was busy observing the flowers in their local garden as he got a fantastic idea to create a robot together with his playmates from the neighbourhood. So the kids approached Thomas to supervise them for their ambitious project and today the mini team is enjoying working on their first play project.

4.1.2. Scenario Regression
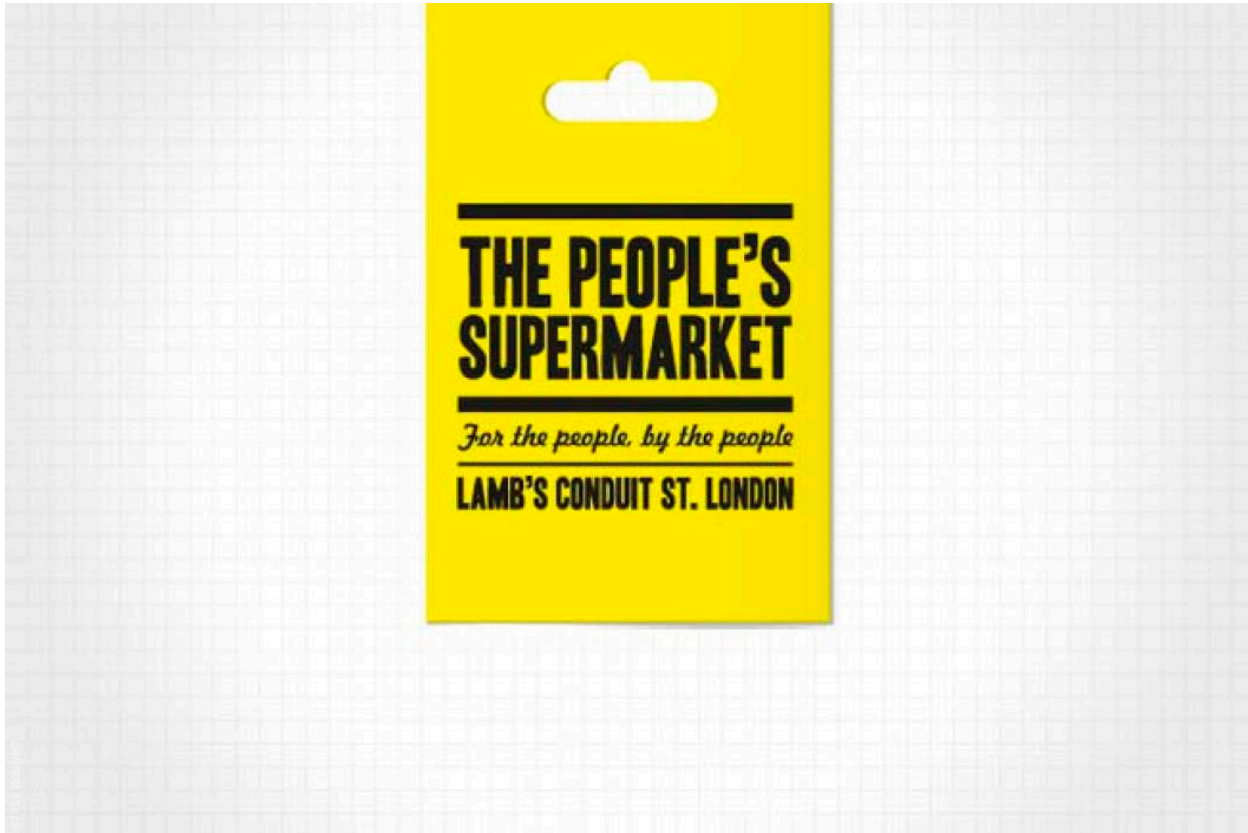
Visual 2

Joseph Hilger, 50 yrs, carpenter and furniture shop owner – husband

Jessica Hilger, 46 yrs, school teacher – wife

Noona Hilger, 18 yrs, – children of Joseph and Jessica

Linda Hermann, 70 yrs – Mother of Jessica

Zen Severs, 22 yrs – boyfriend of Noona

Roony, Hilger's family dog

Joseph and Jessica along with their daughter Noona are living in one of the suburbs to a big city. The architecture of their house is rather very traditional but they are conscious of the ecological factors and therefore they are using geothermal heating system. On a normal weekday the routine in the family of Hilgers is very peaceful and well spaced out. Everyone seems to have his or her rhythm. Usually Joseph wakes up 5 o' Clock in the morning and takes Roony for a walk. In the mean time Jessica is ready with her morning cup of tea and reads her newspaper. Noona wants to prepare the breakfast today. She is very fond of the fresh eggs and milk, which she often buys from a local farmer.

Zen has moved out of his family house and is living in a big house in the same suburb as Noona. He recently rented this house together with two other people. Each of them have their own separate private areas in the house and they share kitchen, dining room, living room and an outdoor space where they plan to start a beehive.

Jessica takes her bicycle to the school where she teaches. But today she decided to drive first time with their new electric car and help her mother on way back from the school. Linda lives in another suburb and is not keeping so well lately. Jessica shops for her mother along with from the corner grocery store that keeps only locally produced goods. She brings her mother warm handmade sweater, which is made from re-purposed material from her colleague at work. Linda is very pleased with her gift. Linda showed Jessica her recently acquired medical monitoring shirt from a medical representative. Linda explains that this shirt has in built sensors to monitor her general health and send signals to her doctor if she is not feeling well, which she finds very convenient. Jessica is though curious about this scientific textile but at the same time she wants to inform herself about the safety and security of her mother wearing that.

Joseph has taken off from his work today to help his farmer friend. He rides with his bike to his friend. After the whole day working on the farm they enjoy the local beer and fresh food at the local beer garden. Later Joseph sees that he comes back home early to enjoy his sleep and has a good night rest.

Noona, who is currently attending her college for a bachelor in arts, is a talented artist. She is currently busy in her atelier working on the sculptures commissioned by the town hall. After she finishes her studies she plans to work with other local artists and artisans to learn other hand skills from them and teach her skills in exchange. She is thinking of expanding her atelier at her home, but the non-flexibility of the architecture is getting challenging to do so.

Zen is finishing his higher education this year and in his free time he sometimes helps his father on his farm. His ambition is to make his own business of selling locally produced goods. For that he is learning the farming and the business knowledge from his father and other community people. Every one appreciates his fresh ideas on building up the local currency and an alternate economy system to the existing one. He is getting full support from the local growers and producers for that.

4.1.3. Scenario Hi-Tech @ Any Price

Visual 3

Felix Oke, 28 yrs, Microbiologist – man

Ethan Hill Oke, 32 yrs, Cosmetic Engineer – husband

Jason Hill, 60 yrs – Doctor & a single father to adoptive son Ethan

Maria Falk, 82 yrs – Mother of Jason

Felix and Ethan are so excited to show Ethan's grandmother their new floating home. Maria is living on the land together with her son Jason. As Maria is undergoing her medical implantations she is unable to visit her grandson. Ethan makes it possible for Maria to be virtually present at their housewarming gathering through the new technology. Then Felix announced about his plan to have a genetically engineered baby through a surrogate mother. Every one including Maria started happily talking about the good genes the baby should carry.

For Maria it was very exciting to see her bone implants made right in front of her eyes through the 3-D printers. The medical engineer working on her implants has been collaborating with Maria almost on a daily basis to understand her needs through the nano-particles injected in her body and develop custom implant for her legs. After her surgery she was sent back home immediately for recovery. The special care team has an added non-human member – care robot, which helps Maria move from bed to washroom and helps with routine jobs. Jason is a

senior doctor and is perpetually busy in his work. He is very glad to be able to get her mother this help. In fact he was able to use the radiology-reading rooms to discuss his mothers health problem with other specialists before her supervised surgery was performed.

Jason drives to his clinic with the self-driven car. This new model of the car is made using self-repairing textiles as the outer and is extremely resilient to any situation and weather conditions. Jason enjoys this ritual of driving to work, as he corresponds to his colleagues and looks through the data of his patients from the car, he is simply ready to see his patients as soon as he arrives.

Ethan's work often sees him travelling from one part of the world to the other. His travels are usually short but using hyper fast trains leaving him time to take care of his work using cloud. He is thankful to his social network for his popularity in the business. As a cosmetic engineer he is currently working on new kinds of internally consumable cosmetics, which do not hinder or alter the security of the microchips on the body.

Felix on the other hand is busy with his new project of designing and coding the new DNA for some new species of plants that would help grow cotton textile lace inside the seedpods. His aim is to use plants as tools in producing biological products especially the textiles. Felix himself is quite health conscious and connected with his doctors continually monitoring his values through the micro electronic chip on his skin as he has been lately experimenting on the bio fabrics and growing textiles on his body. He is already excited to launch very soon his own commercial range of bio fabrics and textiles. He sees the wide applications of such materials and also self-repairing textiles for individualized textile architecture and also for temporary housing systems for the humanitarian purposes.

As a celebration to Marias recovery, Felix and Ethan threw a party at their connected home. It is convenient to use the automatic delivery services of hyper tech markets, which correspond to the kitchen equipments at home sending information of missing groceries.

4.1.4. Scenario Isolation
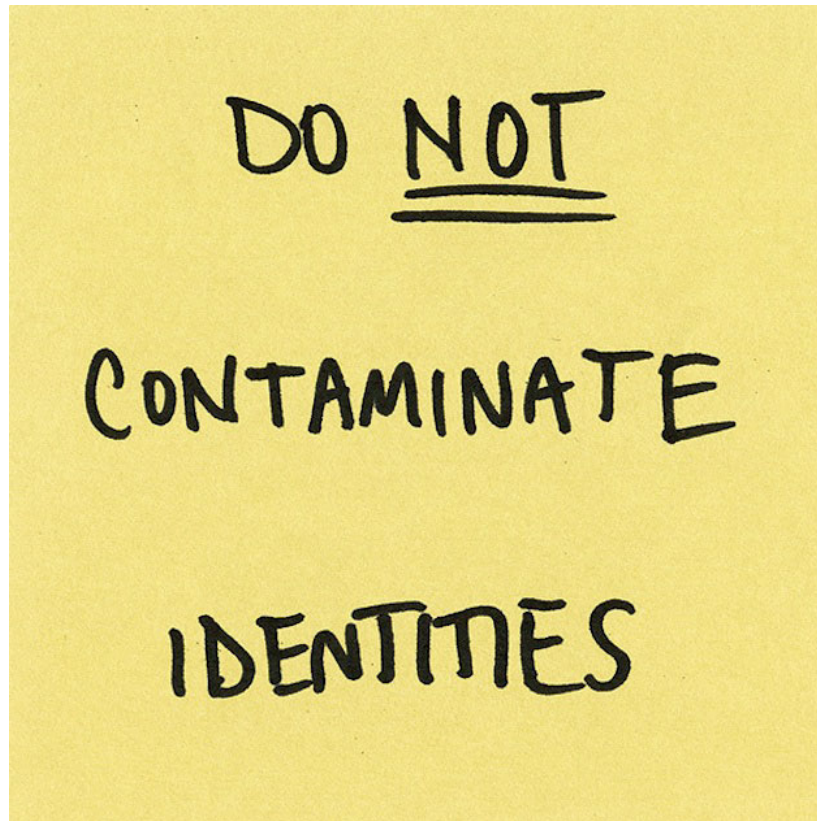
Visual 4

Patrick Fisher, 57 yrs, Finance Accountant – husband

Jasmine Fisher, 50 yrs, housewife – wife

Milo Fisher, 20 yrs & Grace Fisher, 16 yrs – children of Patrick and Jasmine

Edward Fisher, 90 yrs & Margaret Fisher, 82 yrs – parents of Patrick

Charles Miller, 84 yrs & Elizabeth Miller, 77 yrs – parents of Jasmine

Family Fisher lives in an apartment in one of the high-rise developments of the city. These apartment blocks are segregated neighbourhoods in the older part of the city. The architecture of the apartment is quite inflexible for accommodating four members of the family; still they prefer whole family living under one roof even if the space is very cramped up and cluttered. Milo, who just celebrated his 20th Birthday, is in discussions to move outside of the family apartment and live with his friends. Jasmine is totally against this idea and is continuously worried about their son.

Grace, who is finishing her school, is already looking forward to do mechanical engineering. But she is not allowed to, as this profession will not help her for her future as Patrick explains her. Grace is confused about her future and as to how she should earn her money. Her mother assures her of other better options, of being a homemaker and taking care of family of her own.

Moreover being a woman Jasmine explains Grace that she cannot travel all alone anywhere, as it is not safe being alone in the public transport and therefore she should consider of getting a husband.
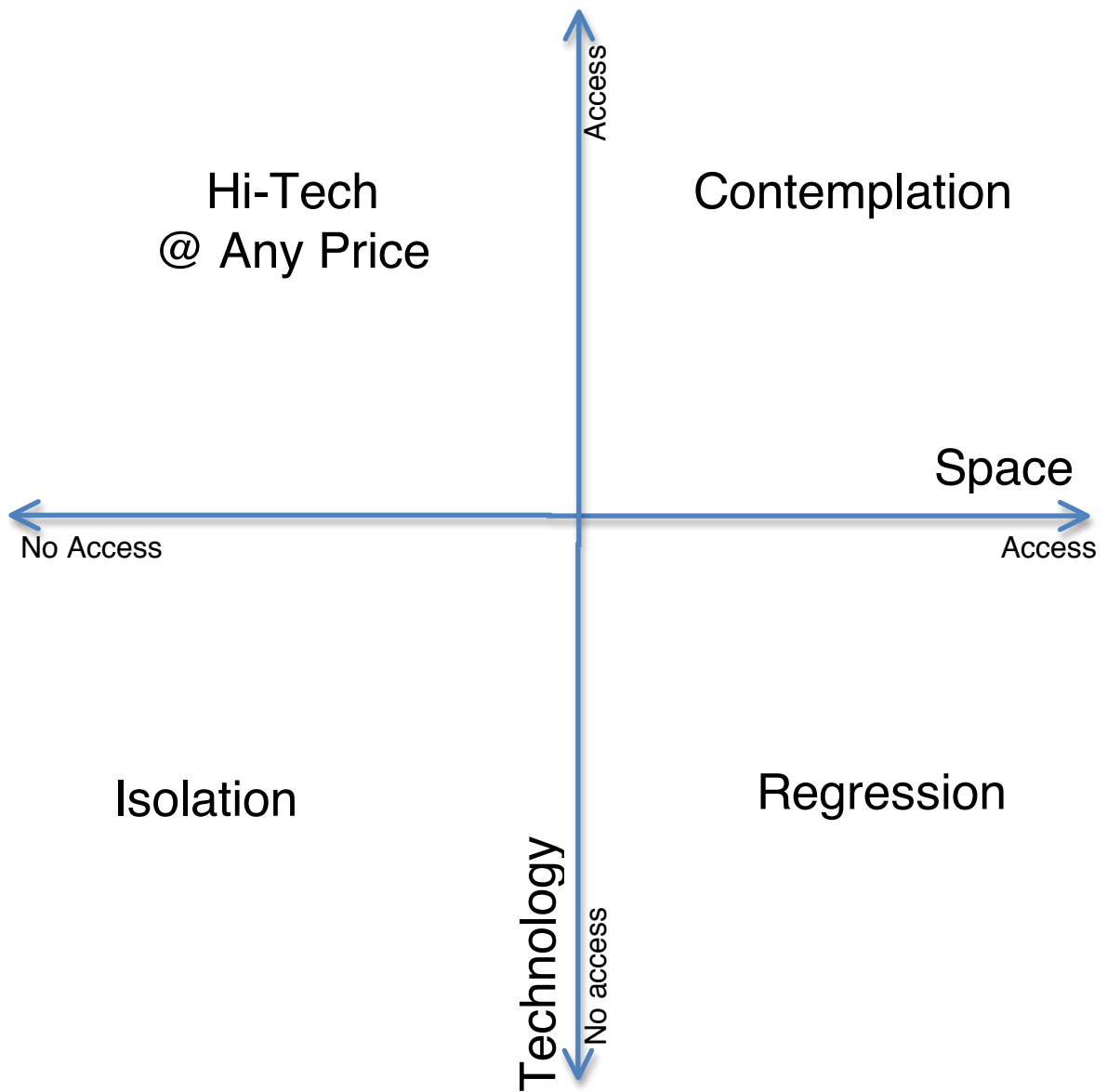
Jasmine is a housewife, takes care of the household completely. Recently while doing her clothes shopping she bought a jacket made of self-cleaning textile material. The salesman introduced her with the special coating and finishes on the garment. She is very proud to buy that jacket for her husband. On regular basis Jasmine goes for grocery shopping in the near by mall as it is not only convenient to her but she feels safe walking there from her home and back. Lately she has been complaining about new unknown faces who happen to be the residents in the near by apartment blocks. Jasmine is extremely cautious about her and her family's security. She does not want to see or live in the area of the city where foreigners are living.

On regular basis family Fisher gets together with the grand parents who live separately in the apartment blocks very near by. Usually they prepare meals at home, but last weekend as the weather was very inviting they decide to have an outside picnic in the park few blocks away their apartments. But as they were enjoying preparing the meals on the communal grill stations, another family joined the location to use the grill. Both the families could not make each other clear of the intentions due to language problems; they all ran into an argument. Edward and Margaret could not understand the behaviour of the foreign family and they left the scene as quickly as possible to avoid any kind of further confrontations.

The whole incidence left family Fisher very disappointed into the political system of allowing people to immigrate into another countries.

Milo is currently studying economics. He is constantly worried about the changing landscape of job opportunities around and thinks about the possibility of moving from here. But his ideas do not match the ideas of the family. They believe in staying together and if moving then it should be the whole city on the wheels like an urban caravan. As this way they would not be any loss of work force and also they can keep enjoying other services and products they know from years. They do believe that this would be the best solution to the economic problems.

4.2.   Basis for building Scenarios

Access

Hi-Tech
@ Any Price

Contemplation

Space

No Access

Access

Isolation

Regression

Technology

No access

4.2.1.   Contemplation

Urban spaces are expanding as more and more migrants move out from rural areas and there is a big movement of experts from foreign countries. The hyper-fast emerging public spaces are creating interest for the population to meet up and mix beyond the cultural and social barriers. The social interactions are much improved compared to the past. There is other kind of interactions or stimuli offered at such spaces, which makes it more playful for people. Such sensory experiences are equally welcome from all age and gender groups of the multi-cultural society. Overall the social capital of the cities is increasing depending upon the size of population and spaces offered. As the society is self-motivated in being a part of neighbourhood collaborations for developing the public spaces, there are no or less economic hurdles from state or local budgets. As being more of a mobile working society, the public spaces take more of an important role as in the past. Shared infrastructures in private and public spaces make it hassle-free for people. Private spaces are becoming more clutter free, packable & moveable especially while using the new solutions of sitting made of soft textile materials. The individualized wearable textile architecture is becoming more popular as the acceptance of this technology is increasing looking to its benefits in the applications. The sensors on the clothes are not just monitoring the health of the wearer, but also being caught in a sudden rain is out of question - the built in sensors simply allow to gather weather information and communicate to the wearer through built in weather and traffic update and one can decide to take shelter or carry an umbrella along with. There is a shift in the activities from the private to the public spaces and vice a versa in some cases. Wearable built in music library in the hoods of a jacket offers the wearer to shuffle through just by a tap on the ears of the hood which houses a perfect sound surround experience. This is helping a lot in public spaces for safety reasons especially of the youngsters, as now they are able to interact with physical surroundings while hands-free carrying the music along. Due to internet and technology completely embedded in the way of living, it opens up multi-disciplinary fields of education. The education is no longer gender typical. There is no limitation on mobility for female worker any more. The economic grants in the state offer financial help to the less privileged for bridging up the education or vocational trainings for missing skill-sets. Due to more females in the labour market compared to the past, has given a positive push in the economy.

- Way of Life

    Individuals and societies as a whole have a sustainable and reflective way of living. Technical innovations are totally embedded into the way of living. Mobile working and living is a well-accepted way of balancing ones life. Making the best use of available spaces in private homes or in public, they strive for participative social life. Education in schools and universities but also learning skills outside is an important part of living. To be able to make smart choices for a healthy life style social skills are equally important as being technical savvy.

- Space

    The concept of co-housing and co-working for communal activities are well accepted. The shared spaces encourage the use of public and private spaces for the purpose of practicing individual or communal skill-sets. Participation is key to this culture and supportive communities encourage individuals to succeed. Shared infrastructures in private and public spaces make it hassle-free for people. The spaces are clutter free and easily packable and moveable.

- Time

    Time is the most limited resource. Living in a flexible and mobile way using time along with other resources is important. Here technology plays a well defined and important role for taking care of jobs from humans and let humans be humans.

- Technology

    Technology is used wisely and is embedded into the daily lives of people. This way the technology is not obtrusive. Rather it makes the life easier by managing certain tasks and takes away the burden from the humans. People are able to get more time enjoying the life and doing human things. Innovation of technology is a focus in the European countries. Especially in the area of health and security there is a wide acceptance of new technologies.

- Society

    A more holistic approach to work, life and communication. Flexible and mobile. Looking for possible places for regeneration of mind and body to have a healthy and balanced life. Socially active life style by participating in neighbourhood collaborations.

- Culture

   The social capital of the cities is increasing as the hyper-fast emerging public spaces are creating interest for the population to meet up and mix beyond the cultural and social barriers. There is other kind of interactions or stimuli offered at such spaces, which makes it more playful for people. Such sensory experiences are equally welcome from all age and gender groups of the multi-cultural society. Being more of a mobile working society people are self-motivated in being a part of neighbourhood collaborations for developing the public spaces. Shared infrastructures in private and public spaces make it hassle-free for people. There is a shift in the activities from the private to the public spaces and vice a versa in some cases.

- Economy

   Pop-Up solutions. New kind of products and services are available to support the mobile and flexible life-style. Technological innovations are given importance. Higher education and research plays a key role here to maintain the status of Europe as a world-class performer in science.

- Ecology

   Ownerless concepts are very popular. The ever-growing solutions are today looking across all age groups and genders. There are online communities for swapping and sharing. The percentage of single driven cars have reduced a lot and has given space for lounging and finding a relaxing corner in the public spaces. More interactions among the citizens make it possible for local businesses to flourish. Kinetic, solar and tidal energy is exploited instead of finite fuels. New models of cars emphasize on social and ecological sustainability. The car reflects local manufacturing capabilities and the needs of various societies.

- Politics

   Self-sufficient solutions for humanitarian purposes are fully supported by political authorities. The pop-up solutions in terms of providing warmth, shelter, food, and medicine are easily transported, assembled and fully functional without use of an external energy source in the areas struck by natural or other catastrophes. The personalized wearable identities in form of the smart technology inside the clothes are helping the mobility of individuals for border surveillance.

4.2.2.   Regression

The sensory experiences in the physical world are getting limited. In order to have more control of our own lives, we need to have distance to the technology and not let technology dictate us. Being human is of concern. Fear of losing the skills among the new generations what one knew before the digital age is engaging the seniors and old agers. At stake here are the core attributes on which our social, political, and economic worlds are built: our individual freedom, our trust in one another, our capacity for good judgment, our ability to choose what we want to focus our attention on. The distorted perception of time and space for some cultures while interacting with technology is leading to serious problems in their value systems within the family. There is a fear of techno-dependency. Being connected 24-7 is reducing the relaxation and sleep times of individuals. This has a social and economical impact. People are left with less time to engage themselves in physical social activities within their communities. Having wearable digital sensors woven in textiles and clothes for medical monitoring system is effective and essential. Where as localization of the wearer surpasses the privacy of an individual. Locally produced and grown products are favoured.

- Way of Life

    Family life is important. At the same time people thrive in work. A very ecological and sustainable way of living integrating all aspects of life like community, animals, plants, buildings and people. A re-use philosophy becomes a part of life. Re-commerce or picking up locally made products is a conscious choice.

- Space

    Use of private and public spaces is treated as two separates. Being concerned with privacy issues, there is a selective way of mingling within the community. There are common areas where communal interactions and activities are encouraged. Beyond that ones home is strictly private.

- Time

    Time is taken as the currency and is valued. Slow work is an alternative to doing things in an unsustainable way. In a work situation it is appreciated to take the time and walk over to talk to someone even if it's a 10-minute walk. It inculcates mindfulness and enhances relationships and performance, through openness and creativity.

- Technology

    In order to have more control of our own lives, we need to have distance to the technology and not let technology dictate us. At stake here are the core attributes on which our social, political, and economic worlds are built: our individual freedom, our trust in one another, our capacity for good judgment, our ability to choose what we want to focus our attention on. With continuous interactions with our devices we are using some or our senses less than what would be used while interacting with our physical surroundings.

- Society

    Suburban lifestyle. City dwelling is far too expensive and over crowded by migrant workers and expatriates. Independent owners of homes and cars. Connected to members of family and neighbours by frequently visiting them. Health conscious by growing & consuming own vegetables in the garden.

- Culture

    Privacy concerned society. Sustainable living with focus on experiencing life in its physical environments rather than using devices at all times. Importance of maintaining higher value systems within family and society. Education is important in order to get a valued position in society by ways of working and being a part of the economic system.

- Economy

    Alternative economies. A no money economy is a new solution to reach out, share and help out. Time becomes the currency and individuals can pool and trade time and skills. Micro currencies or local currencies are helping build the local community and local economy.

- Ecology

    Home farming solutions not only provide food but can also help to purify air and generate energy through photosynthesis. Bio fuels are grown using synthetic biology and cellular manipulation. The transition companion is an evolution of the transition movement, where towns become autonomous, using their own currency and energy sources. Green Economy today is a one on which socio-economic systems are organized. By increasing the resource efficiency the harmful emissions and waste are minimized. Permaculture is a locally sustainable agriculture that mimics the relationships found in natural ecologies.

- Politics

Security is more of an individual issue rather than local authorities, be it a physical security of persons & belongings or digital security. Having Internet of things on clothes for medical monitoring systems is perhaps acceptable but for localization of the wearer surpasses the privacy of any individual.

4.2.3. HI-Tech @ Any Price

Interactions with the technology are that of a mutual relationship of responsiveness. Continuous researches have finally made it possible to make technology do more than its programmed function. We are in the era of humanized technology. Our bodies, thoughts, feelings, preferences, conversations, and whereabouts are interlinked with technology with an individualized signature. At all age groups and in various health situations, this humanized technology accompanies us through the life. The youngest baby boomer is around 76 years of age, has a good health, is sportive and open minded to the technologies that makes his life much simpler and easy in handling day-to-day tasks. He is a senior citizen and preparing for an easier old age. The "post generation-Z" belongs to the digital age. They are innovating every day new things. Social networks are the strong pillars of the community and therefore sharing of varied skill-sets is a well-accepted norm. Radical democratization enables the patients to find doctors & medical facilities anytime-anywhere. With the urge of making "Smart-Cities" political institutions are open to use technology for Pro humanitarian purposes and not only for surveillance. With the on-going technical innovations in various fields like textiles, biotechnology or synthetic biology, it is possible to graft and grow culture of microorganisms to create textiles and clothes or even treat certain anomalies in our bodies by creating synthetic organs. This is leading to very independent economy. The skills and professions today are re-defined and therefore new working models are developed. Everyday more and more services are easily bookable over cloud, either performed through humans or through machines. This is widely acceptable within different cultures and age groups. Perception of time and space is totally different as to what we knew. Distances are measured in speed of connectivity. In these fast moving times where the information flow is quite high, technology helps us keeping our memories at a fingertip. Due to easy flow we are able to manage our times better and able to experience the spaces around us in a more qualitative way as in the past.

- Way of Life

     An Individualistic society. People care for personalized products and services. The crafting and making skills have been transferred to the technology with individualized signature. Education is no more a matter of gaining degrees from traditional Universities of brick & motor. Open online courses are offering a new generation of study subjects like game design, neuroscience or happiness psychology for individuals to self-educate and increase their value. Being 24-7 connected and using social media is an accepted and serious business tool. One can see real-time analysis of social metrics and use this to inform business decisions internally and externally.

- Space

    Hyper fast emerging urban spaces are in response to the rapid developments in the cities. Extreme mobility of working experts from all over the world makes it essential to have connected spaces. Connected homes and connected public spaces, which are making these boundaries blurred. Interactions within these spaces are more of human to machine than human to human. At a given time one is Omni present with the help of holographic technology. The spaces are experienced rather virtually.

- Time

    Real time communication and information sharing is the requirement to move with this fast pace. The cloud is making it much easier for employees to sync all their data so they can access their information at any time and through their mobile devices. Distances covered in fast mode of travelling are measured in connecting times than in speed.

- Technology

    Multi-taskers and hyper connected. It's important to be equipped with cloud, social, and mobile technologies to be able to deal with transactional functions and more modern strategic roles. Bodies, thoughts, feelings, preferences, conversations and whereabouts are interlinked with technology with an individualized signature. Internet and cloud are the life-saving technologies.

- Society

    Individuals. Instant gratification is important therefore using web to self-publish, participating in building online communities and social networking is a constant. Spontaneity is a priority; therefore virtual travel assistants become a new business model. Speed remains the ultimate goal for air travel. The lines between business and leisure are blurring.

- Culture

    Digital Nomads. Communal activities are not important. Aesthetics to the physical surroundings are a thing of wasting time and thoughts. Pro-sumers in a highly technical world takes a front seat. Individual is manufacturing his own utilities for home and work. Healthy competition between socially connected netizens.

- Economy

    Independent economy. Making individuals learn certain skills to be able to create themselves is opening up a new era of researchers. The consumer is able to produce many things by himself at home or as a local community project. Individualization is an important factor for the consumer. Thereby pushing for new alternative economies and thereby making the communities more independent. This way of living promotes the mind set for innovation.

- Ecology

    New urban transportation. User- friendly concept of the electric Hackable Car. It offers a simple set of electric wheels with a body that can be easily customized for different tasks. An electric concept vehicle that drives itself. Devoid of a driver, the car takes directions from a voice-activated system. The interior hub features floor-to-ceiling windows, a sleek coffee table and a pop-up flat screen television. These new types of vehicles could make congestion, car-related accidents and pollution things of the past.

- Politics

    Laws and policy makers have controlled applying technology not just in computing but also in other spheres of applications in the past. Though today the society has become more open to the changes due to the positive impact of technology. The question of privacy is not of much an importance anymore as the private and the public spheres are more or less blended in. The data collected is used for research purposes and thereby citizens are benefiting directly and indirectly from the new medical services or consumer products.

4.2.4.   Isolation

Women take up more socially inclusive roles in society whereas men are up for masculine roles at home and at work. This also in turn keeps the mobility rate among women lower they being the homemakers. Difference today from past is that the homemakers of today are far better equipped with technology to make a difference for their families. Today being connected helps the mothers to keep an eye on their children inside and outside. The expected freedom of movement in public spaces, either public owned or privately owned is still not perceived to be safe by certain demographic groups, women and children. Privacy and security issues of individual remain of prime concern. Though surveillance is of political concern but individuals have taken up the security issues in their hands. With growing number of migrants from other cultures, it is difficult to build up trust and many people shy away from utilizing these possibilities to mingle in public spaces. Bringing about the scientific skills and knowledge to be able to innovate things in a trans-disciplinary environment is challenging. The social values are at stake and are far from accepting this technology. The quality of products cannot be expected as the same from mass production. In the end ecologically perceived to self-produce products may require lots of raw materials that are not producible by an individual. Without certain special skills self-designing & self-producing can be challenging.

Growing food in the backyard is a time consuming process. More and more people are moving to the cities Europe wide thus leaving less space for undertaking such activities on an individual consumer level. Today the textile producers are largely banking on the technological advancements for reaping and producing natural fibres with modified properties. The self-cleaning properties of the textiles are making big rounds of propaganda.

- Way of Life

    Private. Traditional values in gender roles in way of living. Actively involved in family activities and bringing up new generations is the key role of the women. Male members of the families are usually the ones with higher education and bread earners. Higher mobility is not very prevalent in day-to-day life style.

- Space

    Spaces are used for their function. Homes for private activities and any outside space that is public space is used with a purpose allowed. Using of public spaces is not safe especially for women and children.

- Time

    The time after work or school is invested in homes with the family. Connecting socially on a daily basis is not so important. As using social networking websites are not safe to use only telephones are used to connect to family and friends.

- Technology

    Hardworking and motivated. Doing things with hands, making oneself useable for ones family and oneself. There is a fear of accepting the technology for various obvious social reasons within different generations and gender. Being human is of concern. Fear of losing the skills among the new generations what one knew before the digital age is engaging the seniors and old agers.

- Society

    Private and conservative. Public spaces, either public owned or privately owned are perceived to be not to be safe. Privacy and security issues of individual remain of prime concern. More due to the fact that long distance mobility has resulted in multi-cultural workers and thereby social interactions are quite limited.

- Culture

    Gender specific. Women taking up more socially inclusive roles in society whereas men taking up more masculine roles at work. Mobility is restricted for women. Communal activities are not important than the individual household activities and taking care of family members. Higher education is limited for the male members of the society only.

- Economy

    Mass production is better than individualized products as quality is best only when produced in bigger volumes. Learning one skill and working for a living is enough. Best price offers cheaper goods and in bigger quantities.

- Ecology

    Cities on wheels is a solution to mobility, not of an individual but for entire cities. The physical home remain permanent but the location is transient. Static suburbs are transformed into a dynamic and deployable flow. New road infrastructure accommodates this urban caravan. Houses, supermarkets, food production and power plants have capabilities for mobility, serving these new communities on the move. This model will offer no loss of local economy, or work force.

- Politics

Building up on the values in the European Union is a fulfilled mission rather than building up the boundaries. The fundamental rights as the right to privacy, non-discrimination based on nationality, ethnic or racial origins, right and access to effective remedies, even the right to life itself are the most important. The common values of solidarity, mutual trust and the aim for prosperity on which this union is based and should thrive on further.

4.3.   Projections of dimensions

Descriptors of Technology	Status 2015	Projection 1 towards 2040	Projection 2 towards 2040
Wearables & textile architecture	The technology involving communication, light, heating and power supply is available in health industry, clothing, and industrial usages – some areas are still in initial stages of research, before they could be scaled for production. Aesthetics of the same are questionable. With the research funding, there are numerous ongoing projects within this theme for various applications.	Individualized wearable textile architecture is fully equipped as a mobile home or office. 24-7 connectivity to cloud/internet allows the users to be always connected. Acceptance of this technology from a wider spectrum of society and cultures would increase the demand for textile wearables in various areas of applications. Easy availability of research funds would enable breakthroughs for innovations and scalable solutions. This technology proves to be self-sufficient; our own energy burnt is re-utilized or transformed to charge up devices like wearable watches. Clothing would provide automatic warmth control systems that reacts to the individual body temperatures and outside temperatures. Garment could be inflated partially or completely to serve as a sleeping bag. Rain Sensors, navigation system and built in sound surround music system makes clothing much of an individualized object. It would help individual to relax by in-built made-to-measure trigger point muscle system massage.	Imbedding all the technology inside the clothing may cause serious health hazards due to electro-magnetic fields. Wearing clothes, which covers up head to toe hide the identity of the wearer and thereby makes the wearer susceptible of security violations in public spaces.

Descriptors of Technology	Status 2015	Projection 1 towards 2040	Projection 2 towards 2040
Bio Technology: Growing Textiles/Edible Textiles/Self Repairing textiles	Biotechnology is playing an important role in production of natural fibres with modified properties. Current research scenario in this niche has enzymes, bacteria and insects being biologically engineered and modified. The various applications for such textiles currently in the medicine industry like drug producing bandages or commercial products like fabrics that eat odors with genetically engineered bacteria, self cleaning fabrics, and fabrics that continually regenerate water and dust repellents.	Leaving a minimal ecological footprint, bio fabrics form the basis of a whole new line of commercial products. Cells can be printed onto textile scaffolds to create living structures. Growing textiles on our own body. The consumers are their own producers. Technology that grows and grafts our own textiles allows individuals to design and generate their own decorative or functional appendages. Research on new components and innovative manufacturing methods in the area of textiles would allow creating biodegradable organs, biosensors. A radical concept for combining food and textile production in a world of scarce resources – genetically modified plants produces fruit & lace from its roots. Increasing the life of assets has a potential for huge cost saving for consumers and a positive impact on the economy. The self-repairing textiles are making their way through all areas of applications. Using fewer resources, this technology is economically viable and acceptable.	Producing sustainable textiles with extra functions like self-cleaning, self-repairing or reaping natural fibres with modified properties is a big step ahead for textile producers. Growing own textiles in the backyard would be a time consuming process for a fast professional. More and more people are going to dwell in cities Europe wide thus leaving less space for undertaking such activities on an individual consumer level. Technology of grafting of organs through own tissues on our skins is questionable in perspective to the health and medicinal requirements.

Descriptors of Technology	Status 2015	Projection 1 towards 2040	Projection 2 towards 2040
Internet of things: Communication/ecology/Surveillance	Nowadays it is possible to integrate conductive fibres and electronic components into fabrics. These innovative "Smart Textiles" measure technical or physiological data and thereby offer advanced functionality. They are applied for example in automobiles, In safety clothes for fire-fighters and police officers or in medicine to monitor vital parameters. They are also used commercially in other fields like sports and road traffic and serve the well-being.	Individual clothing's would carry an IP address for monitoring health through localized medical professionals; this allows easy mobility within and outside geographical borders. Radical democratization would enable the patients to find doctors & medical facilities anytime anywhere. With the urge of making "Smart-Cities" political institutions are open to use this technology for Pro humanitarian purposes and not only for surveillance. Having a wardrobe with interactive formal suits or casual clothes is a new attraction to the consumers that allows individuals to communicate to their environments in the private and the public spaces. The new economies are positively influencing societies towards innovations in the area of smart materials, devices and communications.	Having sensors in clothes for medical monitoring system is effective and essential. Where as localization of the wearer surpasses the privacy of an individual. Being connected 24-7 is reducing the relaxation and sleep times of individuals. The sensory experiences in the physical world are getting limited.

Descriptors of Technology	Status 2015	Projection 1 towards 2040	Projection 2 towards 2040
Interactions with Technology	It is possible today to develop interactive, environmentally sensitive fibres made up of conductive, communicating threads. Electronic circuit and GPS systems are smaller, more flexible and water-resistant so they can be embedded into garments.	Interactions with the technology are that of a mutual relationship of responsiveness. Technology is responsive and also reactive to our needs. Continuous researches have finally made it possible to make technology do more than its programmed function. If it does not take place of a friend, it also does not do mere robotic actions. We are in the era of humanized technology. Our bodies, thoughts, feelings, preferences, conversations, and whereabouts are interlinked with the technology with an individualized signature. At all age groups and in various health situations, this humanized technology accompanies us through our life.	In order to have more control of our own lives, we need to have distance to the technology and not let technology dictate us. At stake here are the core attributes on which our social, political and economic worlds are built: our individual freedom, our trust in one another, our capacity for good judgment, our ability to choose what we want to focus our attention on. With continuous interactions with our devices we are using some or our senses less than what would be used while interacting with our physical surroundings. The distorted perception of time and space for some cultures while interacting with technology is leading to serious problems in their value systems within the family.

Descriptors of Technology	Status 2015	Projection 1 towards 2040	Projection 2 towards 2040
Size/Scale	The components and manufacturing of the existing technology is scalable. Currently the research groups specific to new materials and manufacturing methods are looking for more flexible materials, which would have a large impact on scaling this technology to a commercial level.	The Technology is scalable due to inexpensive components and materials thereby making it an economically viable product for the mass market. The range of products offered in the regional markets differs due to the level of acceptance of the technology. Easy DIY designs are encouraging younger generations to make individualized products.	Due to existing laws the technology of textile wearables would be a challenge at political borders. Within the "Smart Border" systems the algorithms would grant or deny entry to travellers. There are great chances of a miss- judgement.

Table 1 References to descriptors of technology are added in the reference list

Descriptors of Society	Status 2015	Projection 1 towards 2040	Projection 2 towards 2040
Home/Mobility	Due to high demand of experts in various sectors, there is a high amount of long-distance mobility within European countries. The proportions are off-course different due to the strong economic and labour market performance. However the mobility from work place to residing place is varied among different demographic groups. In many cases one spouse with children lives in home country or city and other one is travelling on weekends back and forth.	By promoting education in other European countries, the language and cultural gaps are shortened. Younger generations are interested to take up this challenge and travel for studies and later work across borders. The working generation "digital nomads" today is not just working from home; they are rather working while being mobile. Thanks to the cloud technology, working and living from anywhere is possible. It gives them enough freedom for flexibility of work and can therefore enjoy life. This is having a positive effect on the body and general health of the individuals. The gender roles are no more traditional. Both spouses can enjoy being homemaker and working. Social integration of individuals and families in the host countries is easy due to the openness and acceptance of migrants.	The key hurdles of learning another language, culture is keeping people from not moving to another countries. On the positive side, due to the fact that growth in economy in all European states including new member states, makes it attractive in terms of income and benefits for the natives to work within their own countries/cities. The distances between the work place and home are getting longer though. Due to increasing number of foreign work force especially in the urban areas, housing is very expensive. People are forced to move out to suburbs; therefore dependency on owned vehicles is increasing in order to balance work and personal lives.

Descriptors of Society	Status 2015	Projection 1 towards 2040	Projection 2 towards 2040
Relaxation/Sleep	Today's society in the Storm of being "always-on" sleeping less, and the quality of sleep is deteriorating. People are taking fewer breaks during their working hours and continue to be in constant stress with the flexible working models. The performance level of individuals because of lack in relaxation or sleep is decreasing. Sleeplessness is a big health issue.	Sleeping is no more only an essential need of a human being rather it is a lifestyle today. It is a luxury to have a refreshingly long sleeping experience. The "powernap" is a part of the society, work culture and for everyone on the go. Public spaces are offering not just a meditation or prayer room, rather personalized spaces are created where one can retreat and take a nap. During this time it is possible to regenerate the sensing abilities and powers, thanks to the technology offering new sensory experiences to get oneself into balance. It is about going "inner-net" along with internet. This is helping people remain healthy and gather energy. With the humanized technology or connected home it is now possible to take breaks and sleep, where the technology takes care of the work at home.	Though in the achievement oriented society, more relaxation and sleep is offered and encouraged for workers. This is pushing the individuals and society to be measured more to their performance.

Descriptors of Society	Status 2015	Projection 1 towards 2040	Projection 2 towards 2040
Interactions with Surroundings/ Sense & sensory experiences	In everyday life, people are using public and private spaces for work, travelling, and leisure activities. Walking through several streets, bridges or using public transport or driving and parking in public park houses. Visiting public buildings in the locality for communal activities or for private gatherings. Most of the people react differently to their surroundings. Some of them are indifferent to the developments or deteriorations around them and some are or would like to be involved in the initiatives of building, developing, modifying the usage of public urban spaces. Today more and more people in the urban areas are indifferent to their surroundings in terms of interactions socially as smart devices take-away the attention of an individual to the virtual world.	The quality of social interactions is better. Due to the technological developments individuals are able to find more time for "human things" and certain activities are only done by the machines. The economy today is driven more by individual efforts of being innovative. More and more sustainable and ecologically viable solutions are helping societies to be involved in designing their neighbourhoods in collaborations to the local officials & planers. Being able to create things one-self instead of buying something that is mass-produced as in the past enlivens the sensory experiences. Living life at a slow pace allows individuals to see, listen, smell, taste and touch things. Being innovative is a life-style and this opens up lots of opportunities for economic growth.	Due to the over technological developments, humans have become more insensitive to their physical surroundings. Therefore the aesthetics of their surroundings is no more of a priority. The local communal activities are taking a back seat. Individual efforts in manufacturing things of utilities at home have taken a bigger role in this economy creating a competition between neighbours.

Descriptors of Society	Status 2015	Projection 1 towards 2040	Projection 2 towards 2040
Body	Reaction of a body to the environment changes or to different situations is difficult to quantify. Today the technology is not completely blended into our physical environment, but the ongoing researches in various areas of applications aim for such a goal.	Body is an interface between the environment and technology. Not only the clothing is tailored to the size, shape & function to the body, rather architecture is made by understanding and moving along the flow of the body. It is about making the environments responsive to the needs of the body. Hacking our own body, by growing organs and tissue on our skins as adornment. Using synthetic biology, we are creating synthetic immune systems to fight against anomalies in our body. Mutations of the body with parasitic organisms allow individuals to adapt to the challenges of new environments. Today it is a given that the economy and innovation are in cooperation as never before. An individual is more responsible for own contribution to this model and therefore the growth is inevitable. Technology is widely accepted across different cultures and gender groups.	Heart generates the most powerful electromagnetic field within the body. And heart has an intelligence/brain of its own. Mind and heart are in a balance. A more holistic approach to work, life and communication. New economies are based on mindfulness, are generating business success through calmness, focus and wisdom. Contemplating technology is a wide accepted way of working in different cultures. An accepted ways of interacting is compassion, social-connectedness and altruism.

Descriptors of Society	Status 2015	Projection 1 towards 2040	Projection 2 towards 2040
Health	Health care industry today is most benefitting using wearables with sensors for the analytics and remote patient monitoring. Smart textiles and clothing are available in special applications of care industry in addition to the sports and fashion.	With the help or research grants technology has made its breakthrough for finding treatment for Alzheimer's, which is at the moment only at its later stage. Leaving about 75% of patients not treated. But as the bi-product of the researches, its been possible to undertake certain activities with the patients helping them with the memory re-building and thus making it easier for the patients, their families and care takers. Smart textile technology becomes a very important part of these care products. In the age of "fluid life" society, today the health issues are addressed in a much more open way while working collaborative with the patients, health institutions and medical insurance companies. For a mobile home, it also counts to have a "cloud-Doctor" who in turn gives an immediate and accurate diagnoses and treatment to the patient.	Today health is the biggest issue within the ageing society. The proportion of caretakers to patients is too low. Though the technological advancements allow employing the robots for certain routine activities like taking a walk with the patient, yet many patients in the old-age segment do not accept or trust the technology enough. Due to the longer life expectancy the medical aid is getting more important. This is differentiated in different gender groups and thus demanding more specialized personnel for individualized care.

Table 2 References to descriptors of society are added in the reference list

Descriptors of Culture	Status 2015	Projection 1 towards 2040	Projection 2 towards 2040
Private & Public Space	People have a very differentiated perception about the public spaces. Security becomes one of the biggest concerns. Members of society from different cultures and genders engage themselves or perceive spaces in different ways. For the local officials it becomes a challenge to improve social interactions among people. There are blurring lines between the private and the public spaces.	Urban spaces are expanding as more and more migrants move out from rural areas and there is a big movement of experts from foreign countries. The hyper-fast emerging public spaces are creating interest for the population to meet up and mix beyond the cultural and social barriers. These interactions and sensory experiences are equally welcome from all age and gender groups of the multi-cultural society. Overall the social capital of the cities is increasing depending upon the size of population and spaces offered. As the society is self-motivated in being a part of neighbourhood collaborations for developing the public spaces, there are no or less economic hurdles from state or local budgets. As being more of a mobile working society, the public spaces take more of an important role as in the past. Shared infrastructures in private and public spaces make it hassle-free for people. Private spaces are becoming more clutter free, packable & moveable. There is a shift in the activities from the private to the public spaces and vice a versa in some cases.	The expected freedom of movement in public spaces, either public owned or privately owned is still not perceived to be safe by certain demographic groups like women and children. Privacy and security issues of individual remain of prime concern. More due to the fact that long distance mobility has resulted in multi-cultural workers and thereby social interactions are quite limited. Though surveillance is of political concern but individuals have taken up the security issues in their hands. Privacy in physical and on virtual environment is still a big issue.

Descriptors of Culture	Status 2015	Projection 1 towards 2040	Projection 2 towards 2040
Acceptance of Technology	Within Europe, there are big differences of accepting technologies like internet, modern personal computing or interactive devices such as smart phones, tablets and wearables. There are differences among genders, women are thought to be accepting the technology lesser than their male counterparts. The baby boomer generation is very open in accepting the new technologies and making an effort to learn the same.	The youngest baby boomer is around 76 years of age, has a good health, is sportive and open minded to the technologies that makes his life much simpler and easy in handling day-to-day tasks. He is a senior citizen and preparing for an easier old age. The post "generation-Z" belongs to the digital age. They are innovating every day new things. The size and scale of the technology is not much of a concern, as there are more from human to computer interactions compared from human to human interactions. Perception of time and space is totally different as to what we knew. Distances are measured in speed of connectivity. Social networks are the strong pillars of the community and therefore sharing of varied skill-sets is a well-accepted norm.	There is a fear of accepting the technology for various obvious social reasons within different generations and gender. Being human is of concern. Fear of losing the skills among the new generations what one knew before the digital age is engaging the seniors and old agers. The prosumer society is opening up lots of questions to the quality and standardizations of products from the past.

Descriptors of Culture	Status 2015	Projection 1 towards 2040	Projection 2 towards 2040
Gender Roles	Age, gender, household structure, education, employment situation, and past mobility experiences are the key microeconomic determinants for mobility. Men are more mobile than women; high-skilled people are more mobile than the low skilled. Gender segregation strongly appears on the labour market, but it is already visible in education. In education we can find typical female and male areas. Though this has changed substantially over time and varies considerably across states, in some states boys and girls predominantly choose gender-typical occupations.	Due to internet and technology completely embedded in our lives, it opens up multi-disciplinary fields of education. The education is no longer gender typical. There is no limitation on mobility for female worker any more. The economic grants in the state offer financial help to the less privileged for bridging up the education or vocational trainings for missing skill-sets. Due to more females in the labour market compared to the past, has given a positive push in the economy.	Tendency of women taking up more socially inclusive roles in society whereas men taking up more masculine roles at work. This also in turn keeps the mobility rate among women lower they being still the homemakers. Difference today from past is that the homemakers of today are far better equipped with technology to make a difference for their families. Today being connected helps the mothers to keep an eye on their children inside and outside. These typical gender roles within certain cultures pose a threat to some extent in the public spaces like schools for example.

Descriptors of Culture	Status 2015	Projection 1 towards 2040	Projection 2 towards 2040
Perception of Time & Space	New technologies are proliferating that enable people to live both their own busy social and working life while enabling them to take an active part in their family life. With the use of communication tools between long distances people are transcending boundaries of both space and time. But today still there are many cases of burnout. Work-life balance remains still a dream for many amidst these new technological tools for work and personal life.	Today the distances are much shorter and time taken to get connected is fractional to what we are used to from the past. The skills and professions today are re-defined and therefore new working models are developed. It is very human to feel and therefore miss the spaces visited in the past. To reminiscence the times spend with our families and friends through easy sharing of visuals, audio and videos has created new experiences of being connected over longer distances. In these fast moving times where the information flow is quite high, technology helps us keeping our memories at a fingertip. Due to easy flow we are able to manage our times better and able to experience the spaces around us in a more qualitative way as in the past. This makes us personally less mobile and thereby reducing the costs of travelling.	Personal spaces are encroached more with the technology. Today we live and use technology and have become more dependent upon computing. There is a growth of techno-dependency. With the amount of information flow and the need to be constantly connected in personal and in work, is leading to lesser time and space around individuals. This has a social and economical impact. People are left with less time to engage themselves in physical social activities with in their communities.

Table 3 References to descriptors of culture are added in the reference list

Descriptors of Economy	Status 2015	Projection 1 towards 2040	Projection 2 towards 2040
Innovation	Europe is currently at fourth position on the index of innovation. The countries are investing in R&D and therefore hoping for a better economical future.	The public and private sector are working hand in hand to be partners in innovation. Europe is a world-class performer in science. The internal market for skills, patents, venture capital and start-ups is opening up. Economy gets a boost with innovation. Ecologically better for the communities. Industry is profiting by the same as businesses get boost and competitive edge. There is improved cross border mobility. Education and trainings are of high standard and prepare the new generations for the upcoming challenges.	Europe continues to have world-class researchers, entrepreneurs and companies matched with the unique strength of its values, creativity and diversity. But the resources are fragmented.

Descriptors of Economy	Status 2015	Projection **1** towards 2040	Projection **2** towards 2040
Pop-Up Solutions	In the current economical situation, many businesses are not able to withstand tough times. The complex business structures do not allow being agile and are not flexible enough to adapt to the changes well in time.	Pop-up solutions give way to the new perspectives looking at a problem. The agility to adapt to a situation is the key word today. Sustainable solutions come as a step afterwards. This is helping up the businesses to improve. The very idea of pop-solutions has encouraged opening up a totally new kind of life-style products and services especially for the mobile worker. Quick and easy shifting of public spaces is improving the interactions between the communities.	The pop-up solutions by being flexible for a quick fix are helping in the moment. But these still cannot guarantee the economic gains. Thinking of alternative economies is much wiser. A no money economy is a new solution to reach out, share and help out. Time becomes the currency and individuals can pool and trade time and skills. Micro currencies or local currencies are helping build the local community and local economy. The reputation economy is a more significant and reliable way to develop trust. Using online activities ones credit ratings can be looked up. For a job or bank loan, applicant's online activity is looked up.

Descriptors of Economy	Status 2015	Projection 1 towards 2040	Projection 2 towards 2040
Radical Democratization	Only in its infancy stage, the concept of über is making people see its benefits in saving time. Money perhaps can be saved if this concept takes over in future.	Calling up a doctor, lawyer, bank consultant or for a taxi all is possible over an app from a smart device. The skills and services are offered without paying for the infrastructure or overheads. Here the individual professionals or start-ups are gaining economic freedom and receiving more returning customers. This is increasing the community feeling, as trust is one of the capitals in this model of working. Everyday more and more services are bookable, either performed through humans or through machines. This is widely acceptable within different cultures and age groups.	This concept is losing out on individual interactions at the supermarkets, banks or meeting with the neighbours on the street. People are living busier in their own spaces and the human touch is just missing using certain services. With growing number of migrants from other cultures, it is difficult to build up trust for ordering such services. As there is no human face behind such apps, many people shy away from utilizing these possibilities.
Consumer-Prosumer	The consumer becoming the producer himself. Especially in the food sector, with the idea of urban gardening this has come to reality in many ways. For future there are many more areas where consumer wants to have best fitted solutions and self designed products.	The consumer is able to produce many things by himself at home or as a local community project. Individualization is an important factor for the consumer. This is the life style today for fashion, kitchen or services and skills. There is a great opportunity for the communities to come together and share these. Thereby pushing for new alternative economies and thereby making the communities more independent. This way of living promotes the mind set for innovation. Bigger institutions are benefiting from new generations with this frame of mind.	The quality of products cannot be expected as the same from mass production. In the end ecologically perceived to self-produce products may require lots of raw materials that are not producible by an individual. Without certain special skills self-designing & self-producing can be challenging.

Descriptors of Economy	Status 2015	Projection **1** towards 2040	Projection **2** towards 2040
Manufacturing/Pre-fabrication/Fab-Lab/Print @home	Coming from mass production to manufacturing, today the trends are leading to self-producing or printing at home.	With the ongoing technical innovations in various fields like textiles, biotechnology or synthetic biology, it is possible to graft and grow culture of micro-organisms to create clothes or even treat certain anomalies in our bodies by creating synthetic organs. This is leading to very independent economy. Making individuals learn certain skills to be able to create themselves is opening up a new era of researchers.	Bringing about the scientific or medical skills and knowledge to be able to create things in a trans-disciplinary environment is challenging. The social values are far from accepting this technology.

Table 4 References to descriptors of economy are added in the reference list

Descriptors of Ecology	Status 2015	Projection 1 towards 2040	Projection 2 towards 2040
Self Sufficiency	Urban gardening today us the buzzword. Becoming self-sufficient in the city is a concern for urban citizens who realize the need for resilience in terms of providing for their immediate food and energy needs. Today the communities are making ground-up efforts to inculcate practices in daily life style. Disillusionment with globalization and impersonal service means consumers are turning back to local products and producers. Purchasing nationally made products is seen as a way to re-establish trust between producers and consumers and a way to bolster national economies.	Home farming solutions not only provide food but can also help to purify air and generate energy through photosynthesis. Bio fuels are grown using synthetic biology and cellular manipulation. The Transition Companion is an evolution of the transition movement, where towns become autonomous, using their own currency and energy sources. Today not just growing own food is a part of daily life, rather also growing own textiles. This democratization and power to make small businesses in way are giving way for micro economies and lot of freedom of growth for singular communities. Local authorities encourage the use of public and private spaces for the purpose of practicing individual or communal skill sets.	Learning new skills of farming, growing, grafting, cellular manipulation and applying synthetic biology to our own farmyards open up a big discussion of fears & social ethics. There are risks involved in performing the genetic mutations. Giving the tools of scientist to every individual would create chaos. The political interventions in this case are unavoidable and rather wished for maintaining law & order.

Descriptors of Ecology	Status 2015	Projection **1** towards 2040	Projection **2** towards 2040
Ever Growing Solution	There are few companies who are starting with little efforts to find ecological solutions. Like buying back used goods in exchange of coupons as an acknowledgement to the customers. Or bringing in the community by self-efforts to exchange and barter within the same brand. There are some unique efforts of teaching customers how to repair and to increase the life of their goods.	The ever-growing solutions are today looking across all age groups and genders. There are online communities for swapping and sharing. Ownerless concepts are very popular. The prosumers are coming up with innovative solutions to challenges of living in the urban neighbourhoods. The percentage of single driven cars have reduced a lot and has given space for lounging and finding a relaxing corner in the fresh air. More interactions among the citizens make sit possible for local businesses to flourish and therefore a positive impact on the local economy.	Cities on wheels is a solution to mobility, not of an individual but for entire cities. The physical home remain permanent but the location is transient. Static suburbs are transformed into a dynamic and deployable flow. New road infrastructure accommodates this urban caravan. Houses, supermarkets, food production and power plants have capabilities for mobility, serving these new communities on the move. This model will offer no loss of local economy, or work force.

Descriptors of Ecology	Status 2015	Projection **1** towards 2040	Projection **2** towards 2040
Sustainability	Depending on fossil fuels is a matter of great concern. There are few alternatives already present and new sustainable alternatives are under research in order to cater ever increasing population.	We are in the age of low-energy. As energy resources become a major cause for concern, engineers and architects are devising new, more sustainable methods of energy production and usage. Kinetic, solar and tidal energy will all be exploited instead of finite fuels. New models of cars emphasize on social and ecological sustainability. The car reflects local manufacturing capabilities and the needs of various societies. It responds to local differences and uses local labor, know-how and materials in production.	Resilience is a concept that is replacing sustainability and offers a more complete solution to issues of climate change, economic downturn and globalization. Slow Money is a movement that aims to promote an economic shift towards local investment to improve food access and preserve ecological diversity. Valuing humans the design of products and solutions are more sustainable. Seeing a massive growth of micro economic solutions, there are less national political interferences.
Ecological footprint	All over, the transition to high levels of human development has been achieved by adopting production and consumption patterns that put a disproportionate burden on the environment. As a result, some countries today live well, while others live within the limits of the planet.	Green Economy today is a one on which socio-economic sytems are organized. By increasing the resource efficiency the harmful emissions and waste are minimized. Permaculture is a locally sustainable agriculture that mimics the relationships found in natural ecologies.	In the last years progress in reducing environmental pressures has not always been matched by improved ecosystem resilience or reduced risks to people's health and well-being. Loss of soil functions, land degradation and climate change are threatening the ecosystem resilience. This is jeopardising the social resilience of communities reliant on them.

Table 5 References to descriptors of ecology are added in the reference list

Descriptors of Politics	Status 2015	Projection **1** towards 2040	Projection **2** towards 2040
Wearable Identities	In technology it is through wearable smart devices or through having an individual digital identity. Both the areas are yet to be explored. Though quite many people have already experienced unpleasant situations for their digital identities. Socially seen wearable identities are in form of clothing as to how individuals want to be seen or not be seen as.	The personalized wearable identities in form of clothes today have secured codes. The smart technology inside the clothes has the ability to stop the hackers to the digital data of an individual. Making this as one of the big breakthroughs in the technology led privacy questions and helping the mobility of individuals. Border Surveillance is totally equipped with reading individual secured data. Socially these wearable identities help an individual communicating with their peer group easily and remotely.	Wearable digital Identities today are creating a collection of sensitive data about an individual. All the information is secured in a master data form where ones financial, medical, social, private informations are collected. This is a big security risk for any individual.
Humanitarian applications	In an event of a disaster, it is possible to localize the affected area remotely over satellite and get the help to the people. Still many areas are under development for the applications.	The new technological and consumer tools like 3D Printing, Biometrics, Robots, Environmental Sensors, Smart Homes, Cars and Appliances, Wearable Technology, Unmanned Aerial Vehicles and Augmented Reality are all making it possible for reaching to disaster hit areas and helping people. Thus making it possible to divert the big crisis in time and save people and avoid big economic setbacks.	Just by creating resiliency within the society might not help us facing adverse natural catastrophes. The pop-up solutions in terms of providing warmth, shelter, food, and medicine are easily transported, assembled and fully functional without use of an external energy source. Development of such self-sufficient solutions are backed up by economic institutions and political authorities.

Descriptors of Politics	Status 2015	Projection **1** towards 2040	Projection **2** towards 2040
Internet of things (Communication, ecology, surveillance)	Nowadays it is possible to integrate conductive fibers and electronic components into fabrics. These innovative "Smart Textiles" measure technical or physiological data and thereby offer advanced functionality. They are applied for example in automobiles, In safety clothes for fire-fighters and police officers or in medicine to monitor vital parameters. They are also used commercially in other fields like sports and road traffic and serve the well-being.	Individual clothing's would carry an IP address for monitoring health through localized medical professionals; this allows easy mobility within and outside geographical borders. Radical democratization would enable the patients to find doctors & medical facilities anytime-anywhere. With the urge of making "Smart-Cities" political institutions are open to use this technology for Pro humanitarian purposes and not only surveillance. Having a wardrobe with interactive formal suits or casual clothes is a new attraction to the consumers that allows individuals to communicate to their environments in the private and the public spaces. The new economies are positively influencing societies towards innovations in the area of smart materials, devices and communications. Due internet makes distances appear shorter, this technology on individual's clothes is present in its zeitgeist and communicate with other devices and wearables around.	Having sensors in clothes for medical monitoring system is effective and essential. Where as localization of the wearer surpasses the privacy of an individual. Being connected 24-7 is reducing the relaxation and sleep times of individuals. The sensory experiences in the physical world are getting limited.

Descriptors of Politics	Status 2015	Projection **1** towards 2040	Projection **2** towards 2040
Privacy Question	Privacy within the digital landscape today is becoming questionable for most of the people. The big-data is posing a threat but also there are opportunities for future.	Laws and policy makers have controlled applying technology not just in computing but also in other spheres of applications in the past. Though today the society has become more open to the changes due to the positive impact of technology. The question of privacy is not of much an importance anymore as the private and the public spheres are more or less blended in. The data collected is used for research purposes and thereby citizens are benefiting directly and indirectly from the new medical services or consumer products.	The digital landscape is expanding every day. People are using technology every moment of their life and therefore leaving a big digital footprint on the internet and cloud. The social values are at stake. Moreover security is now more of an individual issue rather than local authorities- be it physical security of persons & belongings or digital security.
Borders	Increasingly the technology can do almost anything, sometimes invading people's privacy and also sometimes protecting it. Thus the issue of how technology should be used to enhance border control is political, not technical. So far homeland security is depending a lot on human judgement. But technological applications are in the development phase to be applied & implemented.	There are "Smart Borders" implemented across Europe that reflect security concerns and the responsibility to protect human rights of migrants and travellers. With new economies it is indeed possible for the countries to invest in a sophisticated Border Security system. This is helping European states to have a coordinated, well functioning system that facilitates the easy access of tourists, business travellers and students into the Union and, at the same time, prevents irregular migration and cross-border crime.	Building up on the values in the European Union is a fulfilled mission rather than building up the boundaries. The fundamental rights as the right to privacy, non-discrimination based on nationality, ethnic or racial origins, right and access to effective remedies, even the right to life itself are the most important. The common values of solidarity, mutual trust and the aim for prosperity on which this union is based and should thrive on further.

Table 6 References to descriptors of politics are added in the reference list

4.4.   Defining the descriptors of dimensions

4.4.1.   Technology

- Wearables and textile architecture

  o What technology is available today in Europe?

  o In what areas of life is wearable technology implemented?

- Bio-technology: growing textiles/ Eatable textiles/ Self repairing textiles

  o How much of bio-technology used in/for textiles today in Europe? What processes are implemented?

- Internet of things (communication, ecology, surveillance)

  o What Technology is available today within textile industry?

- Interactions with technology –

  o Do interactions with technology pose a threat for social communication/interactions?

- Size/scale

  o How scalable is the technology?

4.4.2.   Society

- Home/Mobility –

  o Working and living distance- measurable in time and distance

  o Working while being mobile (not in a physical office – home office/public spaces)

- Relaxation/Sleep –

  o How much time is spend relaxing & sleeping in a day

  o Measurable in money & time – quality of relaxation and sleep

- Interactions with surroundings / Senses & sensory experiences

  o How do we perceive our surroundings? What senses do we use? How much of these senses do we use? What is the quality of these interactions to the

surroundings?

- Body –

  o How does a body react to the changes in environment /situations

- Health –

  o What textile thought technology exists for health related issues

4.4.3.　　Culture

- Private & Public space –

  o Are there different activities in Private & Public spaces within different cultures in Europe?

- Acceptance of technology –

  o What are the differences in % within European cultures in accepting new technology?

- Gender Roles –

  o In different cultures, what gender specific behaviour/roles are visible in Public?

- Perception of Time & Space –

  o How different is the perception of time & space in different cultures in Europe?

4.4.4.　　Economy

- Innovation –

  o How many innovative solutions are marketed?

  o What is the relation of innovations and innovative start-ups is the same area of research in Europe?

- Pop-up-solutions-

  o How many European financial models have a Bottom-up approach vs. top-down approach?

- Radical democratization (über-everything) –

  o How many countries in Europe favour/promote democratization (Public Space/Transportation/Health & Care services/applied technology…)

- Consumer – prosumer

  o How does local economy (European countries) get affected (positive + negative) by the Prosumers?

  o How many companies/which industries are using the benefits of Prosumer?

- Manufacturing/Pre-fabrication/ fab-lab, print@home –

  o Which country in Europe is using Pre-fabrication tools the most?

  o What areas of living/working are most pre-fabricated?

4.4.5. Ecology

- Self sufficiency –

  o Which ways are individuals today in Europe self-sufficient?

- Ever growing solution –

  o Is there a ever growing solution for living?

- Sustainability –

  o What sustainable wearable technology is available today?

- Ecological footprint –

  o What is the ecological footprint of housing/working/communicating/clothing for an individual today in Europe?

- Growing your own textiles –

  o How much of natural fibres Cotton (plant), wool, silk (animal) are grown in Europe – as in industry or individual farmers?

  o What are the other raw materials/textiles grown or planned to grow in Europe?

4.4.6.   Politics

- Wearable identities –

  o How many countries in Europe are using digital identities?

  o What are the benefits and threats of the wearable digital Identities?

- Humanitarian applications

  o What technology is currently used/applied in disaster management for humanitarian applications?

- Internet of things (communication, ecology, surveillance)-

  o How many smart cities exist in Europe? How is IOT used in Public spaces?

- Privacy question –

  o Awareness of threat to privacy in digital world vs. real world

- Borders – (are highly Public spaces but carry highly sensitive private data)

  o How many European Countries have "Smart Border" systems?

  o What are the existing technologies used in European Border Surveillance?

5. Opportunities and Risks

5.1.1.　　Scenario Contemplation

This scenario is sustainable.

- Opportunities –

  o Though there is a full access to technology, the applications of the technology are well thought of from the perspective of social, cultural and economical parameters.

  o Today already there is a wide acceptance of technology in the areas of medicine and security. And at the same time there are wide ranges of applications of technology in these fields, which need to be researched further and made available to the consumers.

  o Imbedded responsive technology in textiles is an area to research on for various applications in the architecture, fashion and health and care industry.

  o The same technology needs to be looked at for applications in the society. Different age groups could very well benefit of interactions with the technology.

  o Limited resources of space and time are well taken care of in this scenario. Shared and multi usage of public spaces as well of private spaces leads to new ideas for designing new forms of living. This opens up totally new idea of applying textiles for space saving and flexible solutions for the interiors.

  o Using space for ones own health. Taking a step back for a while for relaxing and contemplating builds up resources within one-self addressing the stress related issues. This urges the need to look at the new forms of architecture in public spaces allowing people to have a contemplating interaction within such spaces.

  o Shared mobility is an economical and ecological solution for the heavy traffic zones in the city.

- Risks –

  o Mobility and digital security becomes questionable and how can security issues of individuals be taken care of.

  o Currently the resources are fragmented for making the interdisciplinary

researches in the various technologies work together. For example bringing about the fields of communications, wearable's, and biotechnology together poses a big challenge.

- o Risk of ownerless spaces may lead to no-maintenance and no responsibility of individuals.

5.1.2.   Scenario Regression

This scenario is sustainable without technology.

- • Opportunities –

  - o The ecological balance referred in this scenario provides certain tools for the urban living today. Researching and inventing new alternative sources of energy would lead to a greener environment.

  - o Creating alternative economies opens up lot of opportunities for the local small-scale businesses and pushes local economy as a whole. The handcrafted and individualized way of making things opens up opportunities for innovation. Thinking of traditional textile making process but combined with the new biological raw materials would help us explore these new breed of products and their applications in fashion, sports and in interiors and architecture.

  - o Creating architectural spaces with a conscious learning from nature and biology opens up various possibilities of researching on sustainable solutions.

- • Risks –

  - o Defying totally the access to the technology today would be a big risk. The bigger challenges of the ageing society would be next to impossible without technology.

  - o Increasing the cars in every household adds to the traffic problems and is a non - ecological variant.

5.1.3.   Scenario Hi-Tech @ Any Price

This scenario is purely technology driven making it non-sustainable.

- Opportunities –

  o Making technology accessible for certain areas of life like health and care industry would help us combating certain big issues in the ageing society.

  o Connected public spaces would be an opportunity for the mobile workers, so as not to just sit inside offices but this would also help improve social interactions in the public spaces.

  o In the changing living situations, being a pro-sumer holds a new skill-sets and thinking. This opens up totally new ways of living and working. There is a need of Re-defining of professions and jobs.

  o Using synthetic biology becomes important for seed propagation and agriculture. Creating genetically engineered plants for growing textiles within its roots or seedpods is an area for further explorations and multi-disciplinary researches.

  o Working with new technology opens up immense opportunity for architectural textiles and biology. Certain technologies under research currently delve on responsive architecture and buildings that might move and even feel or think in being responsive to the people.

  o Opportunities for future researches may bring artificial intelligence; synthetic biology and interactive technology together with textiles to create new kind of spaces and interactions with the humans.

- Risks –

  o Applications of technology in life should not come at any price. Over dependency on technology may lead to becoming slaves to technology. At stake here is being a social human being. Along with that it's not just the individual freedom, but also trust in one another, capacity for good judgment and ability to choose what we want to focus our attention on.

  o Big digital footprints and digital security becomes a serious issue to be considered.

5.1.4.　　Scenario Isolation

This scenario is non-sustainable.

- Opportunities –

  o Valuing one's family is an important issue.

  o The fear of security in public spaces is not only a political issue but perhaps social and communal issue as well. Here is the opportunity for societies to come together and work out solutions in a participative way.

  o Openness for technology that is very consumer friendly shows the way for developing innovation on a scalable basis. New textile technologies in the area of home and interiors are the research areas for consumer products.

- Risks –

  o Gender bias is a conservative thinking.

  o Defying totally the access to the technology today would be a big risk. Innovation and technical breakthroughs would be totally hampered in a non-supportive economy.

  o Having no quality interactions in a physical environment and closeness to new cultures, would lead to a total isolation.

6. Conclusions

This research makes way for future trans-disciplinary research between the textiles, architecture and interaction design to create new kinds of spaces and interactions between humans and its environments.

Spaces & Architecture

Creating spaces that are responsive to our needs would necessarily be the spaces that are flexible, easily moveable and multi-purpose useable. This gives way to the thinking of new forms of co-living and co-working. In the private spaces of homes, workspaces and offices there is a need to look at various solutions for interiors, materials and their applications.

The architecture connects the spaces of living to the ways of living. And therefore defines our living environment. The new forms of living are somehow demanding a re-think approach on the architecture and the interiors. Connected spaces like workspaces and houses having the higher accessibility to the technology. Living in such connected spaces opens up the question of human-to-human interactions and the interactions to the environment around. Biotechnology and growing cells not just for the vegetation but also for growing architectural like elements is in its early stages of research. This area of research is very well applicable to design for new forms of living.

Textiles

The new forms of living spaces encourage the use of textiles. So far the most important and likeable materials for fashion and interiors, textiles are opening up the new possibilities of interdisciplinary research. Embedding electronics into the textiles and clothing opens up totally new era of designing clothes. The function of clothing is moving from being a fashion statement to become a wearable identity of an individual.

Using the traditional approach of crafts of textiles with highly technically developed materials will create a new product palette.

I am interested to research further on textile thinking, apply smart and responsive characters of textiles and architecture in perspective to the new forms of living, its needs and challenges.

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