WHITE NOISE

An exploration of tufted surfaces in relation to sound, physical contact and tactility.
1:1 REPRESENTATIVE IMAGES OF THE WORK.
1:2 ABSTRACT

This project is about exploring a textile surface with the design elements of sound, physical contact and tactility. It is interesting to analyse how audio and physical elements can help stimulate the human senses. The aim is to bring these elements into a design context and create a textile surface that can give people a sensory and spatial experience. Through tufting it is possible to work with long and short pile, which adds tactile values in the material. The outcome of this exploration is a vast tufted landscape that partly covers the wall and continues out on the floor. The surface has an abstract visual appearance with irregular shapes that defines the different material. The large scale has an overwhelming effect and invites people to interact and explore the surface. This challenges the fundamental structures of architecture and increases the importance of tactile and human senses, such as curiosity in spatial environments.

1:3 KEYWORDS

Textile design, sound, physical contact, tufting, surface design, interaction and material.
2. INTRODUCTION TO THE FIELD, MOTIVE/ IDEA DISCUSSION & AIM.

“Textile are not just a pleasure to look at; they are to be experienced with all five senses - the feel of textiles in the hand or on the body, the periodic rustling sound, even the taste on the lips”

2.1 INTRODUCTION TO THE FIELD

One can state that the perception of textile has taken new horizons since its origin in protection, covering or decoration. Millar (2005) claims that the Japanese textile designer Reiko Sudo is one of whom who has broaden the view on textile. Her visions of what textile can achieve is far beyond its pure technical features, according to her material can speak to all of the five human senses. The physical and visual experience of textiles is of equal importance as the practical usefulness of the material.

Taking this tactility and placing textile in a spatial context, the experience of textile can taken on even new perceptions and challenge the way we interact with our environments (Toomey 2006). The Dutch artist Claudy Jongstras (Kousidi 2014) made a wall-cover at the Fries Museum in The Netherlands. That shows the usage of textile surfaces as architectural element, noise redactor and mediatory threshold. Figure 1 shows the vast surface made from Drenthe health sheep wool and raw silk. An example that illustrates how an forced installation can encourage people to change their behaviour is Piano Staircase (Volkswagen 2009) by Volkswagen through their campaign The fun theory (figure 2). As you walk on the piano step an electronic sound appears and people feel tempted to explore the stair with its different tones, an encouragement to activate people more.

Figure 1: Claudy Jongstas wall-covering at the Fries Museum 2014.
Photo: Claudy Jongstra.

Figure 2: Piano Staircase situated at Odenplan in Stockholm by Volkswagen, photo: screen print from YouTube video (Rolighetsteorin 2009).
Akane Moriyama is a textile designer and architect that often addresses textile as a part of the space and building as much as architecture. In her work *Reflected Roof* (figure 3), the textile occupy the room in a sensational manner (Moriyama 2014). It is of equal significance that Akane uses movement as a design element and the considerable amount it makes the textile so materialized and physical.

Tufting is a technique that has been used as a spatial interior element since many decades, such as wall covering and carpeted floors. Hand tufting as such is a century old technique; referring to hand tufting in industry, it is carried out by a gun-machine. The principles for hand tufting and gun tufting are the same, with minor technical differences, a piled surface where short cut or looped yarns are fastened to a cloth backing (Mile & Wilson 2007). Bringing tufting in to a modern context, it is relevant to look at the Swedish artist Tina Frausins work *The Coral Reef* (figure 4) (Frausin 2009). Different tufted objects with a variety of pile length and materials are placed in different heights so that all people can approach it. As she states herself this work is meant to be touched and be recognizable for many people. In the different examples human interaction is more or less communicated, which is a key factor that defines the purpose of the installations.
2.2 MOTIVE AND IDEA DISCUSSION

The cases mentioned above exemplify how textiles can be used to enhance the tactile sensation of a spatial environment. They illustrate ways of how to invite people to be a part of their surroundings, thus using installation as forum.

The desire to investigate textile perceptions led to explore the impact of non-visual design elements such as sound and physical contact with material. When reflecting on the previous mentioned work by Moriyama and Jongstras, there is a need of interactive surfaces that have a more integrated role in the space itself. This is strengthened by Toomey (2006) who argues that one could challenge the role of textiles in an architectural context, when looking at textiles contribution to the material perception of the room with following sociable benefits. The purpose is to create a sociable and unpretentious atmosphere by experiencing material and sound, as Piano staircase (Volkswagen 2009) exemplifies by their intuitive fascination for the stairs instead of taking the escalator. Kousidi (2014) highlights the value of the structural surfaces sensory and emotional properties, where one can obtain an intimate and private space by the temporary interaction. Confronting the surface and interact by both audio- and tactile sense could liberate the factor of accomplishment, to rather focus on being a part of something.

By linking together textile design, interaction and spatial encounters, the challenge is to break the boundaries for social behavior in public spaces and provoke the perception of spatial environments. There is a need of objects in public spaces and semi-public space that not only fill aesthetical needs, but also stimulate our physical senses through interactions and physical movement (Edwards 2011, pp. 172). Fox & Kemp (2009 pp.153) states that, daring to be more playful in our daily life and encourage our nonverbal senses can be an interesting thought when considering the wellbeing of people. To make a textile bridge
between what inspire people, such as creativity, curiosity, attention, stress relief and joyfulness is a motivating challenge. A tufted textile surface would be suitable in public areas, for example; libraries, cultural centres, institutions, work environments etc (Fox & Kemp 2009 p. 166). It is relevant to place such a surface where people are on the go, where they could benefit from a spontaneous and unpretentious contribution in their everyday routines (Edwards 2011 pp. 170-171).

THE GAP
The gap is identified by the fact that the majority of the previous mentioned installations do not work with tactile surfaces and uses physical elements as sound and touch as an interactive aspect. As the examples appear as installations or placed decorations, it is of interest to investigate how a textile surface could be integrated in architectural structures. The argumentation revolves around a change in how we experience material and how tangible environments can stimulate our mental conditions to a greater extent than the analysed examples.

LIMITATIONS
The element sound is in reference to friction with in material that creates sound and when it comes to physical contact, it is in reference to hand or body contact. The elements should not be associated with technical terms or a smart textile. The materials are chosen solely for its sound, movement and tactile properties, environmental issues will not be considered in this project. The tufted construction will be based on the finished material that exists at the school, meaning I will not weave my own backcloth to tuft on. Since interactive demands exceed the knowledge area for textile design, the exploration will not include actual interactive consideration, rather as a context and a frame for the concept. Sound absorbing qualities and demands will not be taken in consideration in this project, but will leave it open for discussion. The work will be directed to all individuals; there for a certain target group is not prioritized, mainly because of the focus towards public space.
2:3 AIM

The aim is to explore different textile expressions and surfaces using tufting as technique in relation to physical contact and sound provoking materials.

How can people be encouraged to explore textile surfaces through visual perceptions of pattern and texture?

How can the perception of sound as a design element in a textile context be developed?

How can the material be explored in a spatial and interactive context?
3 METHOD & DEVELOPMENT

"Constructive design research" is a term Koskinen (2012, cap.1) discusses in his writings on design methods. Where the goal is to proceed with a design process in a way that consist of a concrete construction, may it be a prototype, scenarios, systems or likewise, in order to evaluate and understand the choices made (ibid). His way of thinking has been applied in this project. Learning by doing is a crucial factor that enables the work to proceed and eliminate examples that do not live up to the wanted criteria. Following such a method is also necessary when having a strong focus on the relationship between the object and the user, because the criteria is connected to the users actions on the surface (ibid, cap.1). Jones (1992) states that with input and output one can decrease generality and increase certainty. The further experiments will be based up on the result from a pre-study (input), and the exploration will be done in the context of sound, physical contact and tactility (output), which will be the criteria throughout the project.

The listed design elements are to explain how the words have been considered and thought of while working:

Sound:
Meeting of materials, echo, friction, natural vs. technical, rhythm, frequency, contrast.

Movement:
Rhythm, pattern, flow, energy, still vs. alive.

Physical contact:
Perception, meeting point, soft vs. sharp, wet vs. dry, sensitive, rough, comfort vs. discomfort.

Tactile:
Material, visual perception, physical perception, expectation, scale.

Texture:
Monochrome, surface, scale, contrast.
3.1 DESIGN METHOD & DESIGN OF EXPERIMENTS

With the result from a pre-study, a selection of material that had both sound and non-sound properties gave the base which became the starting point for experimenting with sound and tactility and the experience of these. Listing different aspects of sound related factors (see 3.2) became the base in which to compose from.

When sketching the visual expression a line up was made (figure 5) explaining different steps for the process, which to some extent can be related to Thornquists Solitude and rhythm (2010, p 43). The first step was to record the sound of the material, and then listening to the sound on repeat while sketching with paper and paint. The sketching continued with collage technique in order to work with clear areas, which is a suitable sketching method with the tufting technique. The results from the collages were then translated to the different material, in order to compose the sound experience and physical contact. By working with this method an internal cycle is created, where the actual work is a catalyst for the visual expression.

A model was used to test the spatial and interactive benefits. Further try-outs were then produced in order to evaluate the criteria mentioned in the previous section. The final result serves as an example of the concept - not a finished product, to open up for further development to maximise the wanted result.

Figure 5: shows a sketch of how the method was structured up according to the aim and goal. Authors photo, all following pictures are the authors pictures.
3.2 DEVELOPMENT

It is important to mention that the development described is based on a pre-study. The pre-study aimed at exploring different kinds of sound in material, material as in fabric and yarn. The material was then gathered in a formation where they had the freedom to move. The movement lead to a friction in the material that then generated different sounds. The first step in the process was to evaluate the most appropriate outcome of the pre-study. The tufted samples was of most interest because of its ability to produce long fibres and yet in a solid construction. The different materials also gave a broad selection of sound and properties, which opened up possibilities in the design process. Figure 6, 7, 8 and 9 shows some of the material that were discovered.

When finding the material that could provoke sound, an examination of the schools material both fabrics and yarns was done. The yarn had the out most advantages because they could be used in the tufting machine, and it was also easier to find nuances in the sound. The first prediction of the material was to find bast qualities, because they could provoke a distinct rustling sound. Hard plastic yarns were also interesting to analyse. As materials where tried out, material that had contrasting qualities where tested to see if they could be of interest on comparison to each other. A map was structured up to position the sound in comparison to each other, from the highest to the lowest (figure 10). As the different material where tested and positioned after the criteria’s of sound and tactility, it became obvious which material that suited the aim best.
A factor that was important to consider in the next development was the effect of mixing both non-sounding material with sound material, in order for the user to really detect and appreciate the sound. It was important to identify the different materials by their properties, firstly because of the sketching process, in order to make the translation (as described in the method). Secondly it was important to work with the materials and how they would benefit in the visual composition. A list of the chosen material can be seen below, see also complimenting figure 11.

The different qualities in the material:

- **Polyester non-woven**: dull, lightweight, silent, dry bass sound, volume, dry touch.
- **Polyester film**: lustre, lightweight, cracking sound, transparent.
- **Polyester bast**: lustre, lightweight, hair like, soft rustling sound.
- **Paper bast**: dull, lightweight, dry rustling sound, volume.
- **Linen**: dull, heavy fall, silent, whimsical, volume.
- **Polyester intermingled**: dull, silent, dry synthetic touch, lightweight, entangled.
- **Viscose bast A**: shiny, smooth, stiff, clear sharp sound, wet feel, pointy appearance.
- **Viscose bast B**: dull, strong sharp sound, stiff, voluminous and rough appearance. volume, rough.

Figure 11: Lines up the selected material f.l.: Viscose bast B, Polyester film (transparent), Polyester film (white), Polyester intermingled, Polyester bast, Non-woven, Linen, Paper bast, Viscose bast A.
EVALUATION 1
When the selected materials was clarified, a series of technical test where made to test the different angles of perceiving sound. A few words that can be associated with sound was used to distinguish the basics of the compositions:

<table>
<thead>
<tr>
<th>Balance</th>
<th>Contrast</th>
<th>Rhythm</th>
<th>Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gradient</td>
<td>Levels</td>
<td>Surprise/expectation</td>
<td>Pattern</td>
</tr>
<tr>
<td>Scale</td>
<td></td>
<td></td>
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</tbody>
</table>

Figure 12, 13 and 14 shows a selection of material the experiments from the selected words.

A matrix of the primary material and different colors (multi yarn cotton, wool, metal film, plastic rope)). The tests show how the different colors could be hidden underneath the primary yarns and create a surprise when the long piles are pushed aside (Figure 15, 16). This visual effect is partly dependent on that there is a stronger wind power that can push away the material. This test gave me quite a good understanding of how the different material acted in relation to each other.

Figure 12: The first test was to define how different length would affect the sound and tactility for the two primary material: paper bast and polyester bast. The longer the pile - the louder the sound was established.

Figure 13 & 14: Tests were made to see how a gradient of materials that gave sound and no sound where mixed, to see how the perception and expectation of the colors expression and the sound experience. These test resulted in quite a static visual expression, the visual effect has a gravity and felt limiting in using the surface in other ways then as a wall hanging.
COLOUR CHOICE
The choice of colour in this work has been especially difficult considering the multiple design elements (sound, physical contact, tactility and tufting). The thought of adding colour to the work have had a limiting affect; however some samples were made to see how colour could be implemented. Figure 16 and 17 shows two different approaches. The colour samples where quickly eliminated, it became clear that it required a better understanding of the sound composition in order to explore colour more. E.g. the usage of various colours could mislead the user to only consider the obvious visual impression and not sound. Using one colour has both the effect of either exaggerate a sound experience or surprise the user. White also has a calm impression that amplifies the contrast to the sound of the materials. White in tones, structure, texture, lustre and dullness lifts the "colourful" changes in white and invites the user to investigate the different materials.

Figure 15: polyester film, paper bast, polyester intermingled, polyester bast, non-woven, linen)

Figure 16: The back cloth has been painted before tufting.

Figure 17: Different areas are hand painted. In both of the samples the colour does not match the material areas, to possibly trick the reader's perception of the surface.
SKETCHING OF VISUAL EXPRESSION
When sketching by listening to the sound of the materials, the use of intuition and perception of colour, texture and pattern that could represent the different sounds was applied (figure 18). When making the collages, different methods to create different rhythms and flows were used in order to catch a good balance, yet a variety in the composition. The actual colour and the visual textured patterns are not to be seen as they are; the intention is to translate the feeling of the collage into the different material that could be interpreted likewise. Figure 19, 20, 21 and 22 shows how some of the sketches with different sound, rhythm/pattern and shape.
CREATING AESTHETICAL INTERACTION, TESTING IN THE MODEL.
Testing in a model was an important step in the process; it gave insight of proportions, perspective and shape of how the piece could be composed. The spatial perception was analysed through scale, how it is placed in the room and the visual expression. Three main categories appeared to be the clearest direction in the formation of the result. These were installation-based forms, surface-based forms, and expression-based forms. From the installation-based forms the experience as a singular and private event was the outmost advantages. It also changes the focus of being more of an independent installation rather than creating the room as a spatial factor (figure 23, 24, 25). With the surfaced-based examples, one profits from the great span of wall-coverage and has its effect on the integration in the room. Which again has a result on how it invites people to integrate with the wall, rather than a decoration that has a more passive role (figure 26, 27, 28). This leads to the last examples with expression-based forms. The perception of only decoration is quite obvious, which may result in that not many people will approach the pieces and explore its potential (figure 29, 30, 31). Thus a more decorative approach has its aesthetics function and atmospheric influence. A textile designer profits from the strong visual expression, interaction-vice the effect is not as clear. In this project the last two arguments are of equal importance. It is the merge of these two that is the ultimate result and challenge. It requires both the visual effect on far distance yet an unpretentious look, for people to dear to interact.
EVALUATION 2

After establishing the major aesthetical and interaction areas, more tufted samples were made to better visualize the effect of the ideas. A priority was made to make some different variations on surface based forms and expression based forms, because these focus areas were more linked to the method and goal. A test was made where the yarns were not cut open, leaving the surface looking very entangled to see if this would lower the status of the surface and be more inviting for people to touch (figure 32). A second sample visualizes a more decorative look, with separated areas of each material and more shaped pieces (figure 33). The following sample also has a decorative approach, but with short pile. The sound perception is very direct and with a contrasting span of tactility (figure 34). The last sample is a mix of surface and decorative based forms, where different squares built up a surface that covers both the wall and the floor. There is also a mix of short and long piles. By walking on the surface you discover the sound quality and appeals to investigate the surface further (figure 35). My first evaluation of these tests show that both long and short piles can be of equal interest to touch and the experience - and opens up to more possibilities of integrating the material.
To get a better understanding of how people would approach these surfaces, some of the samples were placed in the entrance at the Fashion and Textile Centre in Borås. Two were placed close to the exit (figure 36) and two were placed close to the elevator (figure 37). After some hours of observation, just one incident occurred where a person stroked their hand across the piece which had the entangled look. This event gave a good insight in how difficult and precise one have to be in order to communicate and provoke such behaviour with in people. The visual expression of the tufted surface was not enough to communicate the interaction. Through scale and spatial integration with more fundamentally established value, such as walls, floors, doors, handles or seating areas, it is possible to force an interaction where the user does not have to think “Am I allowed or not…?” (Fox & Kemp 2009, pp 148).

Further model sketches were done to integrate the textile surface where the interaction is more unconscious and intuitive. More landscape based shapes and object where relevant to consider, where levels of piles could be interesting to mix (figure 38, 39, 40). Two sketches from the last session were chosen to be developed in to a big irregular shape (figure 41, 42). The decision to take these two was partly based on the discussion carried out during the second seminar and partly on the field study that took place. The different heights of tufts engaged differently for people and a big scale piece is needed to state its active position rather than decoration as in a small unit. The sketches had both vast and smaller detailed areas, to give a clear statement and to work with short pile in more detailed areas. Decisions surrounding the spacing in between the shapes were taken according to a previous test (figure 33) that gave an airy composition and liberated more movement to the material.
The different material was then translated from the original sketch over to the new sketch, as described in the table beside (figure 44), and how I worked with them in figure 45 and 46. Alterations were also made to find the right balance and right contrast in the different yarns and compositions, based on the physical test. According to the previous argumentations, a dynamic surface consists of both short, long pile and loops are paced in different areas. Figure 45 also shows the colour codes for which areas that were to be short, long and looped pile (see also figure 49 in 4.1). Only one physical example was prioritized in order to produce a larger scale where the most spatial and interactive benefits could be implemented and analysed. The scale of the hole piece was defined by the previous sketches and tests in the model (see figure 33, 34, 35) The two sketches where fitted in to the tufting frame, and adjusted accordingly to fit each other as figure 45 shows.

<table>
<thead>
<tr>
<th>Material</th>
<th>Properties</th>
<th>Sound group</th>
<th>Colour/structure code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viscosebast 4000 den White/off-white</td>
<td>Dull, strong sharp sound, stiff, voluminous and rough appearance.</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Viscosebast 1100 den White</td>
<td>Shiny, smooth, stiff, clear sharp sound, wet feel, pearly appearance.</td>
<td>2,5</td>
<td></td>
</tr>
<tr>
<td>Paperbast 8mm CO white #520</td>
<td>Dull, lightweight, dry rustling sound, volume.</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Polyesterfilm (Transparent and white) Yarn 08-BIO 4mm</td>
<td>Luster, lightweight, cracking sound, and transparent.</td>
<td>1,5</td>
<td></td>
</tr>
<tr>
<td>Polyesterbast 600 den Glänzend</td>
<td>Luster, lightweight, hair like, soft rustling sound.</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Non-Woven Tape Polyester 5mm</td>
<td>Dull, lightweight, silent, dry bass sound, volume, dry touch.</td>
<td>0,5</td>
<td></td>
</tr>
<tr>
<td>Linen Ne 20/2</td>
<td>Dull, heavy fall, silent, whimsical, volume.</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Polyester Intermingled (textured) 1200 dtx</td>
<td>Dull, silent, dry synthetic touch, lightweight, entangled.</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Figure 44
The sound groups are based on their sound in comparison to each other, not official standardisations. The colours/structures are listed based on how they were most frequently used.
4 RESULT, PRESENTATION, CONCLUSIONS & DISCUSSION

4.1 RESULT

The result of this degree work is a large tufted surface with a variety of materials encouraging to experience sound and tactility within the different qualities of the material.

Figure 47- 49 shows the result.
Figure 50 shows the whole construction of the piece with the different materials placed out and colour code for the short, long or looped pile.

Short pile= needle: 35 (with knife).
Long pile= needle 45 (without knife).
Loop pile= needle 45 (without knife).

The materials used:

Viscose bast, 4000 den, White/off-white
Viscose bast, 1100 den, White
Paper bast, 8mm, CO white #520
Polyester bast, 600 den, white, Glänzend
Polyester film, Yarn 0B-BIO, 4mm, transparent and white
Non-Woven Tape, Polyester, 5mm
Linen, Ne 20/2
Polyester, Intermingled, 1200 dtex, (textured)

Dimensions:
Approximately 2.9(A)m x 4.5m(B) (Figure 51).
The areas where there is short pile the areas are tufted without spacing so that the surface appears continuous. The long and looped pile is tufted with spacing in between the areas. Since the whole piece is hand tufted and hand cut the length may differ in the long and looped areas, from 15-45 cm.

Figure 52-56 shows some of the details on the surface, the different materials and lengths.
4.2 PRESENTATION

The physical example presented, represent a mix of the previous mentioned placement areas (installation-based forms, surface-based forms, and expression-based forms). This is to visualize the range of approaches that still communicate the same message: a tactile surface with sound and tactile properties.

To appreciate sound you have to experience silence. By mixing yarn that has shine, dullness, volume, smoothness and textured appearance, the yarns play with the visual expectation of how material might behave. Each yarn is divided up in different fields to experience each yarn’s property (including tactility, visual impression and sound tones). To approach and explore the surface, the best result was to mix short pile, long pile and a looped surface in a landscape-oriented surface. The surface will be placed in such a way where it covers both floor and wall. The multiple surfaces create a perception of a room, which is relevant for the objects placement and how it invites interaction. The large scale of this textile surface excides bodily proportions and meet the proportion of architectural scale, which signals another behaviour for the user.

The two most important factors to communicate are: that one is allowed to interact with the surface and that the material lures the user to explore the different qualities of the surfaces. These factors depend on two aspects, the user and its placement. The user is quite an unpredictable factor, because it is difficult to assume that everybody will find it interesting/fascinating or even dare to interact, though this can be helped by its placement as presented in 4.1. The more fundamental integration in the architecture lowers its status compared to e.g. more static decoration (hence figure 29-31). This will lead to a lower barrier and a higher likeliness to interact. Figure 57 and 58 exemplifies other approaches to such interaction. Figures 57 shows how the surface can be integrated in resting areas suited for more office like environments, creating both atmospheric and tactile qualities to the room.

Figure 58 shows an installation-based usage, intended to bring sound, light and tactile experiences to people. The piece is hanging in a distance so that people can reach and touch it. Both of the examples could also include sound absorbing qualities. These examples are secondary results.
4.3 CONCLUSION & DISCUSSION

CONCLUSION
The discoveries during the pre-study gave clear evidence that noticeable sound can be found in textile materials. That could then be used for its qualities in an audio and visual composition. As mentioned earlier the contrast of sound and silence lifts the experience of the whole composition. The aim was to explore different textile expressions and surfaces using the technique of tufting in relation to physical contact and sound provoking materials. With the questions mentioned below the investigation was carried out.

How can people be encouraged to explore textile surfaces through visual perceptions of pattern and texture?

How can the perception of sound as a design element in a textile context be developed?

How can the material be explored in a spatial and interactive context?

The first question can be answered by the chosen technique - tufting. Such a technique makes it possible to create depth and volume in the surface. Through observation and discussions awareness and proof was given which showed that the piece has an intuitive effect of people wanting to touch the surface. The different textures and volumes of the materials create contrasting effects and could support this discussion. The explored yarns from the pre-study are a vital parameter when reflecting on the second question. Flat, smooth and “hard” yarns such as bast and films where the ones that gave the best sound, meaning a sharp and distinct noise (See Figure 44). Combined with the previous comment about using contrast it would be relevant to say that it is possible to design sound experiences with the material through tufting.

Through working in a scale model spatial and interactive aspects have been explored. This illustrated how the surface also appears more decorative or as something that people could use. Two minor field-studies also gave quite obvious indications that it requires thorough exploration of 1:1 scale pieces in order to get a more relevant response. It was only possible to work with smaller experiments, which appeared as decoration. So far the interaction had not fully been established. So to achieve the most spatial and interactive experience, the decision was to make a landscape oriented piece. The result show a piece where people are physically surrounded by the textile surface, which plays with the recognition factors towards walls and floors. Most people know that you can walk on the floor and lean against a wall, but in this example you get additional benefits, which could have surprising and positive effects on the user, in terms of a sensory experience.

Furthermore the investigations also conclude that the surface can be integrated in different ways, depending on how people should interact, meaning the three fields that appeared in the research (installation-based forms, surface-based forms, and expression-based forms). They suggest both interaction through a certain event and an intuitive interaction.
DISCUSSION
The latest arguments sums up the core goal in this project, where textile can be both a sensory bridge between people and their space, but also a bridge between solid architectural structures and flexible structure. A quote from Kousidi (2014) pin-pointes the qualities that can strengthen these bridges:

"Textile constitutes an interface between the permanent and the vulnerable, the resilient and the delicate, the public and the intimate."  
(Kousidi 2014, p.38)

This work positions itself with her visions on exploring tactile architecture. The result could be placed in a context between surface design and interior design, since it suggests that you can be on the surface and experience it, as well as it creates areas that send tactile, soft, textured and visual expression in more decorative aspect.

With Kousidi in mind a possible placement that can lift its social values even more, could be to use such a textile landscape in health institutions, clinics, kindergartens and schools, to reach further in Tina Frausin’s (2009) direction (with a tactile experience in a waiting room). A possible argumentation could be to create a vast surface in a more closed area. In order to focus on an interaction with tactile surfaces that can stimulate physical and psychological needs, that appeals to a multi-sensory experience.

Placing such a textile surface in places that normally are expected as calm areas could be an effective contrast in the experience and expectation of touching the material and interacting with it, areas such as libraries, elevators, waiting rooms, hallways etc. could be of interest. As Fox & Kemp (2009 p. 161) states that sound is an individual sense, yet tangible in a direct way, which makes the experience very emotional and private. In this context it could strengthen the purpose of the concept, making the sound louder than it actually is.

The choice to make a large-scale example was motivated earlier in 4.2. Discussions surrounding decoration contradicting integrated spatial element have also been done, where the goal was to develop how to make an integrated spatial element. It is now obvious that the mix of short, long and looped areas might send a mixed signal to the reader. The visual impression might be too overwhelming to properly communicate the intended invitation to interact with the piece without hesitation. If not, it could be perceived more as an installation-based element. This challenge was also mentioned earlier and can clearly be developed further, e.g. with more repetitive aesthetics.

Another critical points is the use of white in comparison to public spaces. Noticeable dirt and maintenance are recurring topics when something is to be suited for well-visited areas. Some of the materials are also not an optimal choice regarding public space, e.g. paper bast, which is sensitive to moist, though it is the material that makes the most sound. The use of white would most likely not be in favour, though a one coloured surface is most relevant for this textile surface. The white colour puts the focus on a surface and distinguishes the different textures, which again pinpoints the fact that the materials have different qualities and will therefore sound different. A multi-coloured composition could easily be mistaken for an art-piece, and discourage the user from actually interacting and experiencing sound. Thus another option could be to use colour in order to further enhance the contrast between the visual and physical experience, by using coloured areas that mismatches with the sound giving areas similar to the example shown in figure 17. Saying this, the action of searching for and detecting the sound is the main purpose of this project, and keeping the piece completely white helps to enhance this. Furthermore, the placement of the piece is crucial for communicating the invitation to interact with the surface.
POTENTIALS
To ensure further evaluation and evidence to the concept a test panel should be formed. Such a test panel could rule-out certain indications, e.g. how people would approach the surface and how they respond to it: is it easy to read, does it fulfil the purpose of stimulating the user’s feelings or senses and which in that case? The answer could be in the line of my personal motivation mentioned in 2.2, which listed a range of feelings. These results could lead to further developments and spatial demands that could help with finalising and fulfilling the purpose of the surface. Further aesthetical developments could then be explored when the basics (material and placement) have been determined.

Sound absorption is a quality that has been excluded in this project, because it was rather the opposite that was interesting and the focus of the main investigation, although the construction and the density of the surface can make one assume that it has sound absorbing qualities. Returning to what is suitable for public space or not, this is certainly something that can be a positive addition to its core properties. Testing the surface through SP (Technical Research Institute of Sweden) would be an interesting continuation, both regarding its sound absorption and sound releasing properties. Tufting is usually associated with sound absorbing qualities when used in wall-decoration/wall-coverings, while this work aims at the opposite – to make sound. This is still of interest when trying to create a comforting event. A suggestion to motivate this, is that one can still feel satisfied and at ease while being distracted and occupied in an intuitive modus, compared to a calm area where a more forced relaxed atmosphere takes place. Analysing this suggestion could be of interest when testing the sound qualities of the surface.

To reach a level comparable with the Piano staircase (Volkswagen 2009), a second factor of movement can be included in the experience. Strong wind could be such an element; this would create quite a strong impression when the long pieces of yarns are pushed aside. As the wind creates friction, different sounds will appear as the wind travels over the surface. The user can then use the wind as a brush on the surface. The integration will then be more audio and visual, but it does not rule out that you could approach it with physical human contact. The way Piano staircase (ibid) appeals to people’s intuitive behaviour is the preferable approach when developing the interactive part of the textile surface. To get there is still a few steps away, thus a motivating challenge.

Toomey’s (2006) argumentations on how textile can play an even more vital role as an architectural element, was highlighted with a discussion that occurred when presenting the work to an audience. The relationship between the textile surface and other materials can play an important factor in the audio experience of the surface. By placing the piece in a wooden environment reflecting sound would be absorb more easily than it would in an concrete or metal environment, where the sound would reflect and bounce more. Through positioning a vast textile surface with altering complementing surfaces, the sound experience could differ as one touches the surface in different areas of the room. The awareness of the tactile surfaces could have an overall effect on how one experiences the space itself. Another direction in adding other elements to these materials, is adding light to the surface as figure 58 shows. Natural light that shone through the back of the surface created an inner glow and additional depth to the surface, which was noticeable both in full and miniature scale (Figure 24). The notion of touching light with an audio and tactile experience could be an addition that would widens the experience of this textile landscape.
Furthermore the concept and technique allows a range of different aesthetics. Its restrictions may be in relation to its actual placement, in attempt to make a balanced integration. The sound experience can take on many shapes, as my result visualizes. It is the mix of material and how they relate to each other that is constant. As the textile designer, I believe that the gap is only partly fulfilled, due to the fact that there are certain factors, such as a test panel, that could not be explored due to a lack of time and resources. Most of all I am satisfied with the discussions and opinions that lift and motivate the concept and opens it up for further development.
5 REFERENCES


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Figure 5-56, authors private photographs.
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