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knowing through making

An investigation into the construction of hand-knotted textiles
and their collective application as textile space-defining elements
within the interior.

by Liesl Wherry

Submitted in partial fulfilment of the requirements for the degree Master of Interior Architecture
(Professional) to the faculty of Engineering, Built Environment and Information Technology.
UNIVERSITY OF PRETORIA

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Co-Study leader: Elana van der Wath

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"Now all glory to God, who is able, through his mighty power at work within us, to accomplish infinitely more than we might ask or think."

(Holy Bible, Ephesians 3:20)

PROJECT SUMMARY

Full Dissertation Title: Knowing through making: An investigation into the construction of hand-knotted textiles and their collective application as textile space-defining elements within the interior.
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Practice-based Research
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ABSTRACT

Currently textiles are mostly employed within the interior in a very traditional and conventional way. The discipline of Interior design does not exploit the uniqueness of the material nor does it fully explore its potential. Textiles offer underutilised potentials. If the evolution of the interior design discipline from upholsterer to decorator to interior designer contributed to the devalued status of textiles within the interior, the research aims to re-evaluate this position and to reclaim valuable lost territory through alternative textile applications. These alternative textile applications are a re-interpretation of traditional textile applications and construction techniques.

The dissertation investigates the construction of hand knotted textiles and their collective application in the formation of textile space-defining elements. The process culminates in textile space-making. The in-depth exploration that leads to the creation of these textile space-defining elements, is initiated by the translation of traditional rope knotting techniques into alternative textile fabrication methods. Through this translation the project exploits the unique, and often latent characteristics of textiles as a material that can be flat but three-dimensional, weak but structural and soft but rigid.

With this in mind, the dissertation employs a hybrid research strategy which combines the Practice-based Research method and the Action Research method. 'Knowing through making' therefore signifies a definite shift away from the more established research methods that operate from the 'known to the unknown' towards Practice-based Research which operates from the 'unknown to the known'. Further, 'Knowing through making' implies research processes where data is 'created' or made instead of 'collected'.

UITTREKSEL

Tekstiele word tans op 'n baie tradisionele manier toegepas in die binneruim. Die dissipline van binne ontwerp benut nie die material ten volle nie en kan dus ook nie die volle potensiaal daarvan verken nie. Tekstiele bied daarom onderbenutte potensiaal. As die ontwikkeling van die dissipline van binne ontwerp van stoffeerder tot versierder tot binne ontwerper, gelei het tot die verminderde tatus van tekstiele in die binneruim, beoog die navorsing om hierdie waardevolle grondgebied te herwin deur tekstiele op alternatiewe maniere aan te wend. Hierdie alternatiewe toepassings is dus 'n herinterpretasie van tradistionele tekstiel gebruike en konstruksie tegnieke.

Die verhandeling ondersoek die vervaardiging van handgeknoopte tekstiele en gesamentlike toepassing daarvan in die vorming van tekstiel ruimte-defineerende elemente. Die omvattende ondersoek wat lei tot die skepping van tekstiel ruimtevormende elemente, begin by die vertaling van tradisionele touknoop tegnieke en alterntiewe tekstiel vervaardigings metodes. Deur vertaling ontgin die projek die unieke en dikwels verborge eienskappe van tekstiele as 'n materiaal wat plat maar drie-dimensioneel is, swak maar struktureel is en sag maar rigied kan wees.

Met dit in gedagte, pas die verhandeling 'n saamgestelde navorsings strategie toe wat 'n kombinasie van die Praktykgebaseerdenavorsingsmetode en die Aksienavorsingsmetode is. 'Knowing through making' dui 'n definitiewe skuif weg van meer gevestigde navorsingsmetodes af, wat gewoonlike beweeg vanaf 'die bekende na die onbekende' na Praktykgebaseerdenavorsing wat benader word van die 'bekende na die onbekende'. Verder impliseer 'Knowing through making' navorsings prosesse wat data 'skep' of maak in plaas van 'insamel'.

In accordance with Regulation 4(e) of the General Regulations (G.57) for dissertation and theses, I declare that this dissertation, which I hereby submit for the degree Master of Interior Architecture (Professional) at the University of Pretoria, is my own work and has not previously been submitted by me for a degree at this or any other tertiary institution. I further state that no part of my dissertation has already been, or is currently being, submitted for any such degree, diploma or other qualification.

I further declare that this dissertation is substantially my own work. Where reference is made to the works of others, the extent to which that work has been used is indicated and fully acknowledged in the text and list of references.

Liesl Wherry

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Figure 1.1. Micro Macrame, Simone Samuels, 2012 (YTIMG, 2012).

introduction

CHAPTER 1

“To me the simple act of tying a knot is an adventure in unlimited space. A bit of string affords a dimensional latitude that is unique among entities. For an uncomplicated strand is a palpable object that, for all practical purposes, possesses one dimension only. If we move a single strand in a plane, interlacing it at will, actual objects of beauty and utility can result in what is practically two dimensions; and if we choose to direct our strand out of this one plane, another dimension is added which provides opportunity for an excursion that is limited only by the scope of our own imagery and the length of the rope maker’s coil. What can be more wonderful than that? “

-Clifford W. Ashley, The Ashley Book of Knots, 1944: 8.

The dissertation investigates the construction of hand-knotted textiles and their collective application in the formation of textile space-defining elements. See Figure 1.1. Hand knotted macramé, (left and on poster 1). This process culminates in textile space-making. The comprehensive exploration that leads to the creation of these textile space-defining elements is initiated by the translation of traditional rope knotting techniques into alternative textile fabrication methods. Through this translation the project explores the unique, and often latent characteristics of textiles as a material that can be flat but three-dimensional, weak but structural and soft but rigid.

Chapter one provides a short discussion on interior design and decoration as background to the study. This is followed by the design premise. The design premise leads into a series of research questions, whereafter it introduces the concept of ‘Research through making’. This is followed by the aims and delimitations clarifying the intent of the study. Further, a hybrid research strategy is introduced. This hybrid research strategy forms part of the dissertations contribution and is therefore discussed in more detail later within the document. The section describing the research methods is followed by the definition of terms. The chapter concludes with a chapter to chapter summary of the dissertation.

research through making

1.1.
BACKGROUND

The acknowledgement of the interior design discipline as separate from that of architecture is primarily a twentieth century phenomenon (Gurel & Potthoff, 2006: 218). As construction and material technologies have advanced, interior design has evolved and grown with it. As a result, this specialised discipline is rapidly becoming more predominant in the building industry (Edwards, 2011: 231). This contributes positively to the complexity of the field, but creates conflict between the disciplines of Architecture and Interior design as professional boundaries need to be redefined.

For a number of years Interior designers have emulated the process of architecture in order to legitimise the profession of interior design (Hill & Matthews, 2007: 11). Hill and Matthews (2007: 11) states that the interior design profession should assess its relationship with architecture and re-position itself in terms of its masculine counterpart. Further, Havenhand (2004: 35) states that this emulation of the architectural profession unintentionally '*…supports the system that ensures* [interior design's] *supplemental position*.' Not only does this place interior design as supplemental to architecture but also defines interior design as less than architecture (Havenhand, 2004: 35). The idea that emphasis should be placed on the differences between the disciplines of architecture and interior design is expressed by Havenhand (2004: 40) in A view from the margin: Interior design:

> "In a new strategy of interior design that celebrates its marginal position, and therefore a wider, more complete and more robust view of interiority, issues such as materiality, sensuousness, decoration, nurturing, self-expression, desire and mothering which have been de-emphasized in a male, rationalist, architectural framework would be brought to the foreground" (Havenhand, 2004: 40).

Havenhand (2004: 42) refers to elevating the theoretical position of the feminine within the discipline and acknowledging its marginality, as a strategy for establishing a distinct identity for interior design.

Instead of emulating architecture, interior design should emphasize its uniqueness and draw attention to its otherness.

Additionally, the emulation of architecture by the interior design discipline could be seen as an attempt by the discipline to distance itself from interior decorating (Chalmers & Close, 2007: 78; Havenhand, 2004: 35; Hill & Matthews, 2007: 11; Sanders, 2002). However, Königk (2010: 40) states that '*…interior decoration (especially as far as colour, surface treatment, furnishings and material choice is concerned) is an intrinsic aspect of interior design.*' And that to deny [interior decoration] would be '*…to deny a portion of the discipline's being.*' Hoskyns (2007: 85) is of the opinion that interior decoration utilises many materials and tools that are also key to the discipline of interior design. Hoskyns (2007: 96) further mentions that the discipline of interior design should not exclude these processes but rather '*...unpick...transform and reclaim them...*'

Zamberlan (2013: 110) is of the opinion that it is precisely the decorative aspect of interior design that allows it to '*…operate as a specialist discipline distinct from architecture*.' Similarly Hill and Matthews (2007: 12) states that by distancing itself from interior decorating, interior design negates the component of the discipline that ensures that it remains unique and its services desirable.

See Figure 1.2. Representation of the perceived relationships between interior design, decoration and architecture, poster 1 (page 6). The diagram is a representation of relationship between interior design, decoration and architecture as part of the reflection process employed within this dissertation. Refer to section **1.5. Methods** and **CHAPTER 2: Methodology** for further clarification.

1.2.
DESIGN PREMISE

Historically, textile was the material of choice for the upholsterer and later the decorater (Sanders, 2002). The evolution of the discipline of interior design, from upholsterer to decorator to interior designer ensures an undeniable link between textiles and interior design.

Hoskyns (2007: 85) mentions that even though interior decoration has a long history with textiles, the relationship between interior design and textile is currently problematic. See Figure 1.3. The issue of decoration, on poster 1 (following page) for an overview of the possible reasons for the interior design discipline's issues with decorating (Sanders, 2002).

Currently the use of textile within the discipline of Interior design is mostly employed in a very traditional and conventional way. The discipline of Interior design does not necessarily exploit the uniqueness of the material and it doesn't fully explore its potentials. **If the evolution of the interior design discipline from upholsterer to decorator to interior designer contributes to the devalued status of textiles within the interior, the research aims to re-evaluate this position and reclaim this valuable lost territory through alternative contemporary textile applications**. These alternative textile applications are a re-interpretation of traditional textile applications and construction techniques.

1.2.1.
RESEARCH QUESTIONS

1.
What are the possibilities or restrictions that hand-knotted rope and rope-like materials offer when making interior textile space-defining elements?

2.
What does the construction process and fabrication drawings of a manually constructed textile-based artefact look like?

3.
How does 'Research through making' manifest when conducted within the interior design discipline?

4.
Does the Practice-based Research method offer an alternative approach to the manner in which research is typically conducted within discipline of Interior design?

Due to the nature of the study, these research questions merely form an outline for the study. Further research questions become part of research through making, and can thus be found integrated into **CHAPTER 5: Design application**. See Table 5.5. Test matrix, poster 12 (page 58). Section **1.2.2. Project overview** on poster 1 on the following page, recapitulates some of the points discussed in this and earlier sections. Also see section **1.3. Aims and Objectives** and section **1.4. Delimitations** on poster 1 (following page).

1.2.3.
RESEARCH THROUGH MAKING

This dissertation conducts research through the act of making. Knowing through making therefore does not apply traditional or conventional research methods employed within the discipline of interior design, but investigates, learns and designs by making. Refer to **CHAPTER 2: Methodology**, for a description of the methods utilized and their application in the design process.

Section **1.2.4. Research through making at Taubman College**, poster 2 (page 7) offers an example of an educational facility that offers a research course based on the act of making. The poster section also offers example images of projects completed at educational facilities that offer similar courses to Taubman College. See sections **1.2.4.1. -1.2.4.5.** for example images of projects completed at these facilities.

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knowing through making :

An investigation into the construction of hand-knotted textiles and their collective application as textile space-defining elements within the interior.

Liesl Wherry 11008581
Study leader: Elana vd Wath & Raymund Konigk
Field of study: Heritage and cultural landscapes

“To me the simple act of tying a knot is an adventure in unlimited space.
A bit of string affords a dimensional latitude that is unique among entities.
For an uncomplicated strand is a palpable object that, for all practical purposes,
possesses one dimension only. If we move a single strand in a plane, interlacing it at will, actual
objects of beauty and utility can result in what is practically two dimensions; and
if we choose to direct our strand out of this one plane,
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What can be more wonderful than that?”

Clifford W. Ashley –The Ashley Book of Knots, 1944: 8.

Figure 1.1. Micro Macrame, Simone Samuels, 2012 (YTIMG, 2012).

1.2.2. PROJECT OVERVIEW

Currently the use of textile within the discipline of Interior design is mostly employed in a very traditional and conventional way. The discipline of Interior design does not necessarily exploit the uniqueness of the material and it doesn’t fully explore its potentials. **If the evolution of the interior design discipline from upholsterer to decorator to interior designer contributed to the devalued status of textiles within the interior, the research aims to re-evaluate this position and reclaim this valuable underutilised asset through alternative contemporary textile applications.** These alternative textile applications are a re-interpretation of traditional textile applications and construction techniques.

The dissertation investigates the construction of hand-knotted textiles and their collective application in the formation of textile space-defining elements. This process culminates in textile space-making. The comprehensive exploration that leads to the creation of these textile space-defining elements, is initiated by the translation of traditional rope knotting techniques into alternative textile fabrication methods. Through this translation the project exploits the unique, and often latent characteristics of textiles as a material that can be flat but three-dimensional, weak but structural and soft but rigid.

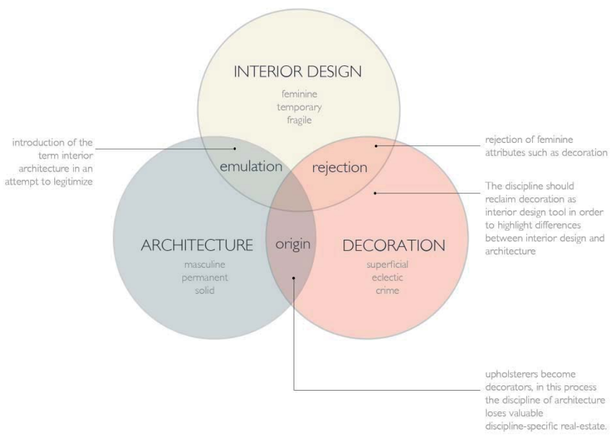
1.3. AIMS AND OBJECTIVES

The dissertation aims to:

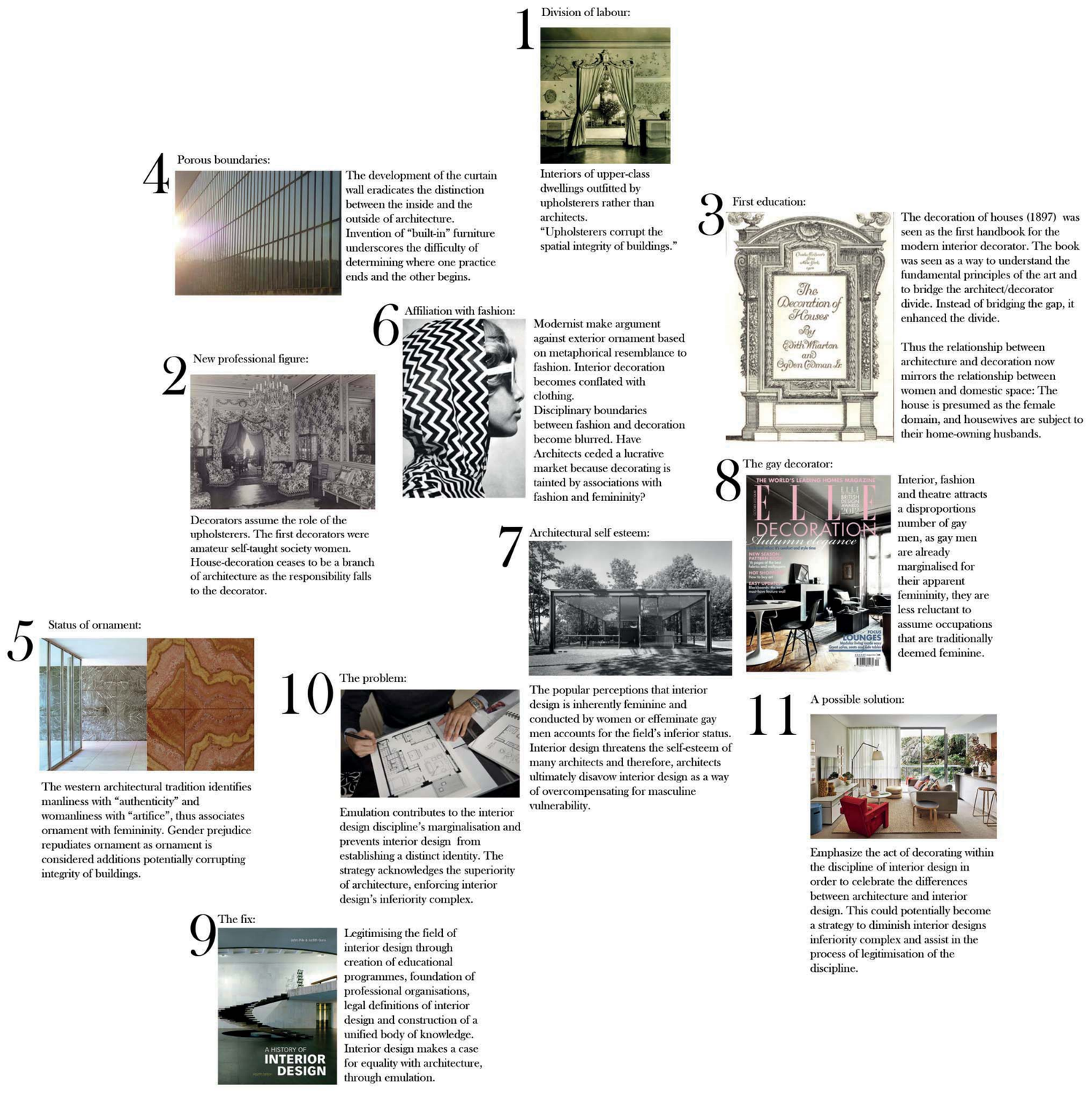
1. Explore the use of hand-knotted rope and rope-like materials in the formation of space-defining elements within the interior
2. Manually construct a textile-based artefact/object as the creative outcome of this exploration
3. To explore and advance knowledge through the act of making by hand within the discipline of interior design
4. To explore and advance the use of the Practice-based Research method within the discipline of interior design

1.4. DELIMITATIONS

- The study will not investigate the chemistry or science involved in the composition of textiles
- Although the study considers a varied selection of textiles, the design investigation is limited to the specific use of hand knotted rope and rope-like materials as the primary manual construction material
- The study does not investigate textile use within the domestic interior but places focus on textile use in public spaces
- Although the test samples that are made employ found material, the study is not an exercise in the upcycling, recycling or re-using of found materials.
- The study submits to the method of Practice-based Research where the artefact is the creative outcome of the study, therefore the site for intervention is mainly an application space for the final design and will not be analysed in depth.



(above) Figure 1.2. Representation of the perceived relationships between interior design, decoration and architecture (Based on authors own understanding).



(right) Figure 1.3. The issue of decoration, photo collage by author, text as summary from (Sanders, 2002).

research through making

PRECEDENT STUDY

Knowing through making signifies a definite shift away from the more established research methods that operate from the 'known to the unknown' towards Practice-based Research that operates from the 'unknown to the known'.
Further, Knowing through making implies research processes where data is
'created' or made instead of 'collected'

(Sullivan, 2009: 48, 50; Nimkulrat, 2012: 2).

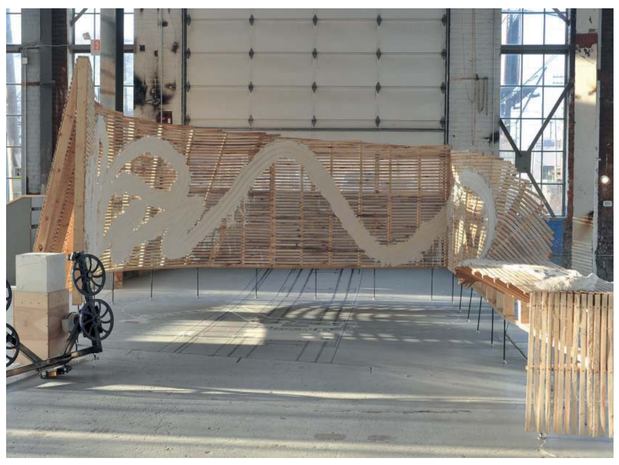
1.2.4.
RESEARCH THROUGH MAKING at TAUBMAN COLLEGE

"Historically, research and creative practice have been constructed as "opposites." This is not an unusual struggle in architecture schools, particularly in the context of a research university. This perceived tension between design and research is indicative of age-old anxieties within the architecture field to understand its nature as an "applied art." Design can be a purely creative activity not unlike creative practices in music and art. In other cases, design can be a purely problem solving activity, not unlike research in engineering and industrial production." (Taubman College, 2014).

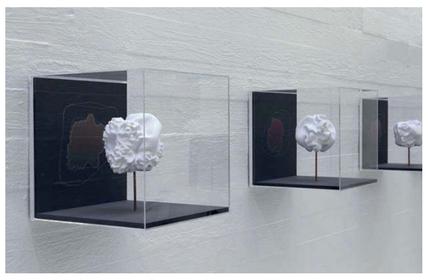
The Research Through Making programme at Taubman College is focussed on research and creative projects that are grounded in the act of making. Since the inception of the Research Through Making programme in 2009 seed funding has been awarded to realize up to five projects yearly. Projects produced by faculty and student members are publicly exhibited in the Liberty Annex Gallery. The Research Through Making programme is innovative, bringing knowledge back to the studios and to the students themselves.

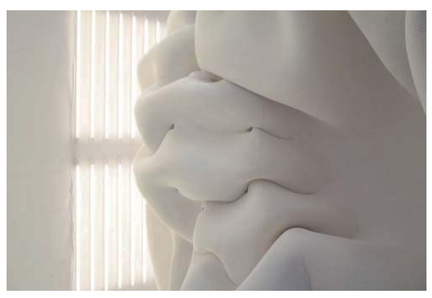
1.2.4.1.
Morphfaux...Recovering plaster as architectural substrate
TAUBMAN COLLEGE
Steven Mankouche, Joshua Bard, and Matthew Schulte
Research Through Making
2011

MORPHFAUX (See images below) explores the lost craft of plaster. It considers it's potential for producing thickened architectural environments by means of contemporary digital technology. The research project opposes the flatness of contemporary, standard dry wall construction by exploring the malleability of plaster. Plaster is a material that can be textured and smooth; and thick and thin. In essence the research seeks alliances between human ability and automated capacity (Taubman College, 2014).

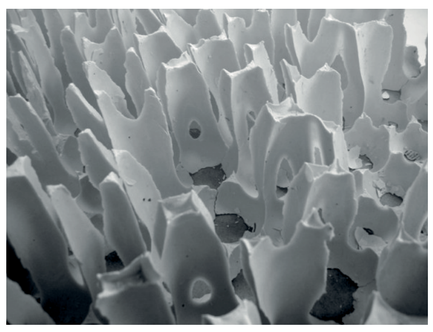


1.2.4.2.
Erratic - Digital Geometry and Unwieldy Matter
ARCHITECTURE IN THE MAKING: Architecture as a making discipline and material practice
Daniel Norell and Einer Rodhe
Research project
2014

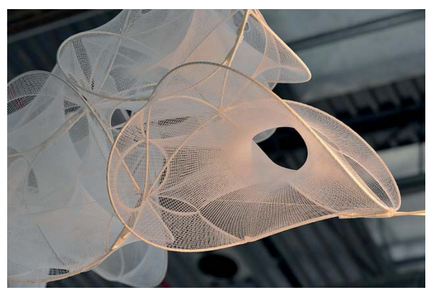




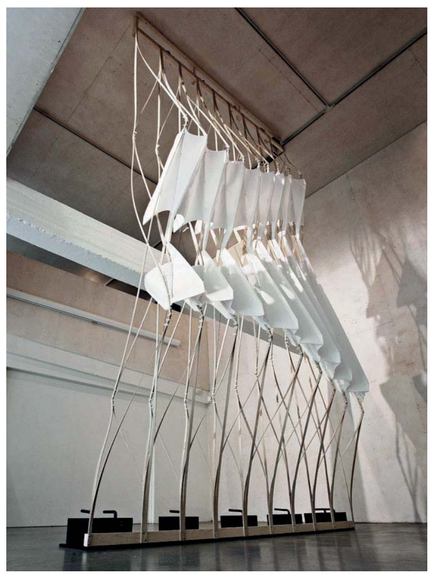
1.2.4.3.
Honeycomb morphologies
MATSYS & ARCHITECTURAL ASSOCIATION
Andrew Kudless
MA Dissertation in Emergent Technologies and design
2004



1.2.4.4.
Knit Architectures
TAUBMAN COLLEGE
Sean Ahlquist, Wes McGee, Anthony Waas
Research Through Making
2014



1.2.4.5.
Thaw
CENTRE FOR INFORMATION TECHNOLOGY AND ARCHITECTURE
Mette Ramsgard Thomsen, Karin Bech and Behnam Pourdeyhimi, NC State University, College of Textiles
Masters research project
2010



(above) Figure 1.4. & 1.5. Morphaux (TAUBMAN COLLEGE. 2014)
(top right) Figure 1.6. & 1.7. Erratic - Digital Geometry and Unwieldy Matter (architectureinthemaking, 2014)
(middle right) Figure 1.8. & 1.9. Honeycomb morphologies (matsysdesign, 2004)
(middle right) Figure 1.10. & 1.11. Knit architecture (matsysdesign, 2006)
(bottom right) Figure 1.12. Thaw (cita, 2010)

1.5.
METHODS

The dissertation focusses on the making of hand knotted rope-like textiles as part of the manual fabrication of textile space-defining elements. With this in mind, the dissertation employs a hybrid research strategy which combines the Practice-based Research method (Candy, 2006) and the Action Research method (Dick & Swepson, 2013).

The Practice-based Research method demonstrates a contribution to knowledge through the making of an artefact as creative outcome. **In this dissertation both the process of making and the products of making are an essential part of the research.** The method's success relies on the rigorous documentation of the research process as well as the artefact's role within the creative process. Finally, it requires clear research questions, methods for answering these questions and a context in which the research is carried out (Creativity & Cognition studios, 2015; Makela, 2009: 4; Biggs, 2002: 1). See Figure 1.13. Hybrid research strategy (left). **Section 1.5.1. Methods overview** on poster 3 (page 16), recapitulates this section.

The incorporation of the Action Research method within the framework of Practice-based Research, assists with the act of making. The iterative and cyclical nature of the Action Research method contributes positively to the development of a well resolved artefact. Within this dissertation the Action Research method will allow for questions to be asked and answered within a specific context. Knowing through making therefore signifies a definite shift away from the more established research methods that operate from the 'known to the unknown' towards Practice-based Research that operates from the 'unknown to the known'. Further, Knowing through making implies research processes where data is 'created' or made instead of 'collected' (Sullivan, 2009: 48, 50; Nimkulrat, 2012: 2).

The hybrid research strategy incorporates various research techniques. Research techniques include:

- Literature reviews
- Precedent studies
- Drawings/sketches
- Observation and documentation
- Analysis and Synthesis
- Making and material exploration

The research strategy is discussed in more detail in **CHAPTER 2: Methodology**. The Design Process derived from the research strategy (plan, observe and respond) is considered further in **CHAPTER 5: Design application.**

Figure 1.13. Hybrid research strategy.

1.6.
DEFINITION OF TERMS

NOTE: The following terms are collected and composed from various sources, including knowledge acquired through making. Sources are indicated where necessary.

TEXTILES: The term textile is derived from the Latin textilis and the French texere, which means 'to weave' (Whewell, 2015). Originally the term represented only fabrics produced by means of weaving. Later however, the term also encompassed fabrics produced by additional methods. Therefore lace, embroidery, nets, threads, cords, ropes, braids and fabrics made through methods of weaving, knitting, felting, bonding and tufting are considered textiles (Whewell, 2015). The term textile within the confines of this study consequently refers to any filament, fibre, yarn or rope that can be processed into cloth or fabric as well as the resultant material.

ROPE: A length of thick strong cord made by twisting [braiding or plaiting] together the strands, plies or yarns of hemp, sisal, nylon, or similar material (oxford dictionary online, Meriam-Webster online). Rope is also refered to as cordage.

ROPE-LIKE: Any textile that exhibits similar characteristics to those of rope as defined above or that can be knotted and handled in a similar manner to rope.

KNOT: An interlacing of the parts of one or more flexible bodies forming a lump or knob (as for fastening or tying together) (Meriam-Webster online). An intertwined loop of rope, used to fasten two such ropes to one another or to another object. A knot even when not in use, will hold its shape or form (Ashley, 1993).

TENSILE STRENGTH: The average strength of new rope under laboratory conditions (Boatsafe, 2009).

BREAKING STRENGTH (BS): The greatest stress especially in tension that a material is capable of withstanding without rupture. The minimum BS is considerably greater than the safe working capacity (Boatsafe, 2009).

SAFE WORKING CAPACITY (SWC): Safe working capacity, also known as safe load or work load limit, is the maximum load that can safely be applied to a particular type of rope. The safe working capacity for most kinds of rope is between 15% and 25% of the tensile strength. The difference between the BS and SWC is due to the application of a safety factor (SF) (Boatsafe, 2009).

BLOCK AND TACKLE: A Block and tackle is a system of two or more pulleys with a rope or cable threaded between them, usually used to lift or pull heavy loads. The pulleys are assembled together to form blocks and then blocks are paired so that one is fixed and one moves with the load. The rope is rove (threaded) through the pulleys to provide mechanical advantage that amplifies that force applied to the rope (Royal Canadian Sea Cadets, 2015).

DEVELOPED TERMS: The following terms were developed during the design and making process. The terms relate specifically to the fabrication of the textile samples. Application of the terms can be seen in **CHAPTER 5: Design application.**

CORD TYPE SET: (CTS) Any collection of cords within one sample that are of the same material.

PRIMARY CORD: (Pr) The main carrying cord in any cord type set.

SECONDARY CORD: (Se) The cord secondary to the primary cord in any cord type set.

STRUCTURAL CORD: (SC) Any cords forming the structure or carrying the weight of any Filler cord type set.

FILLER CORD: (FC) Any cords forming the infill or body of a sample and is fixed by means of knotting to any Structural cord type set. The Filler cord does not carry the weight of the sample unit.

ANCHOR POINT: (AP) Any point or fixing place to which a textile can be fixed using various configurations of rigging hardware. (See Rigging details on poster 32, page 84 + 85 for selected rigging configurations).

1.6.1.
LIST OF ABBREVIATIONS

ABOK: Ashley Book Of Knots
AR: Action Research
PBR: Practice-based Research

1.7.
CONCLUSION: OVERVIEW OF CHAPTERS

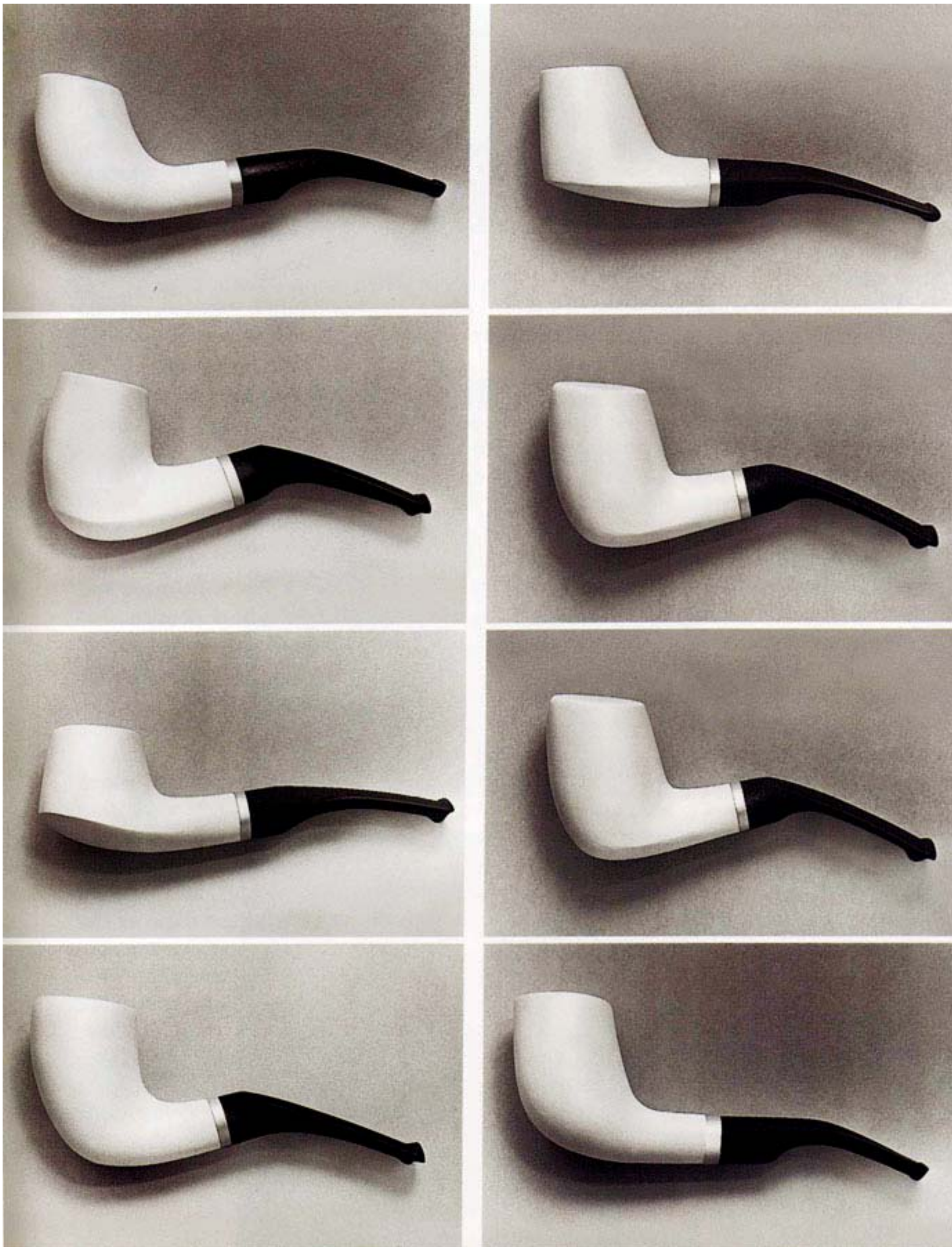
CHAPTER 1: Introduction, is a concise outline of the dissertation. It introduces the reader to the aims of the study as well as provides the boundaries and extent to which the study will take place. CHAPTER 2: Methodology, provides a description and justification for the use of the Practice-based Research method and the Action Research method. This hybrid research strategy informs the decision making process throughout the design development and production. CHAPTER 3: Literature study, identifies and discusses the concepts and theory of traditional and alternative space-defining elements. These concepts form the basis for the design response. CHAPTER 4: Material overview, introduces the reader to rope and rope-like materials, and situates the material of rope within the larger realm of textile and textile production. CHAPTER 5: Design application, presents the conceptual approach, test sites and design response. (All data for the design process is located within the Appendices). The chapter also contains the final technical design solution. CHAPTER 6: Final reflections concludes the dissertation with a personal reflection, a description of the contributions of the dissertation as well as recommendations for further study. See Figure 1.14. Chapter summary (right).

The dissertation document is structured to contain posters as part of the document. The poster number is indicated at the bottom of the page next to the page number. The table of contents indicate posters in yellow text.

Figure 1.14. Chapter summary.

"look what architecture can't do."

-Petra Blaisse



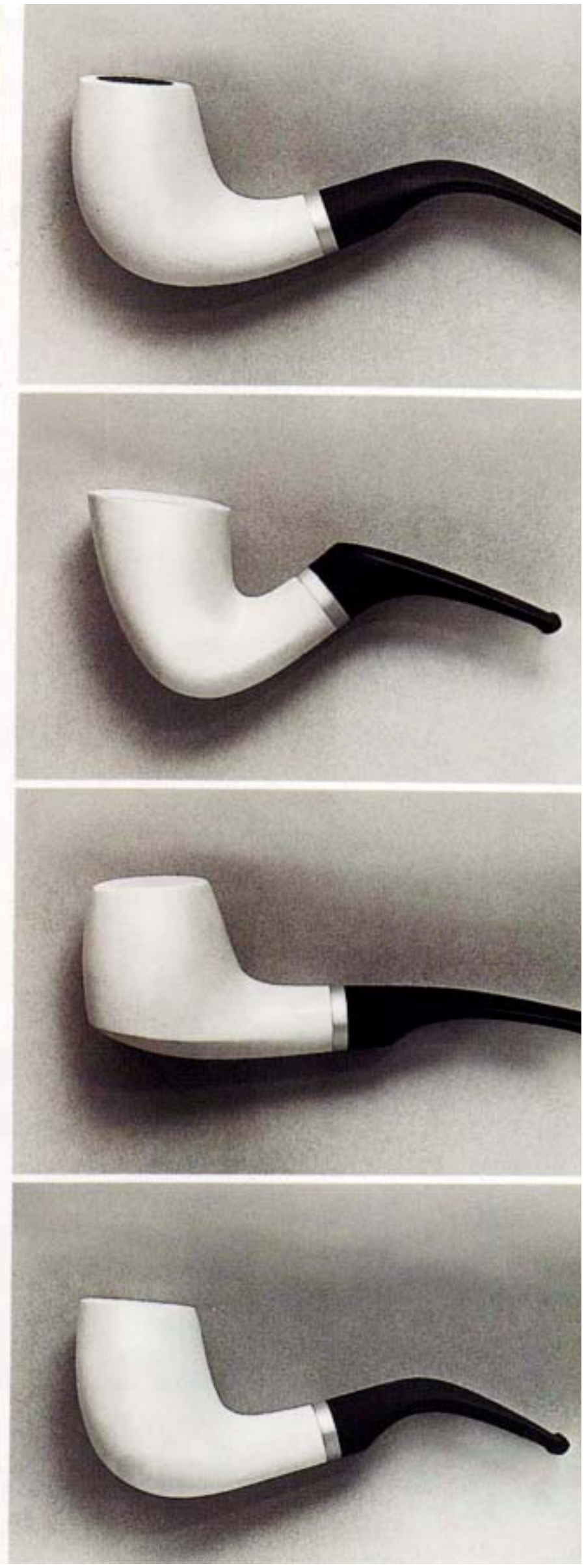


Figure 2.1. Tapio Wirkkala, pipe models (Zifcak, 2015).

methodology

CHAPTER 2

"a true craftsman is not bound to a single idea, as the formal idea often gives rise to a family of variations"

-Tapio Wirkkala, Pipe models, 'meerschaum' (sea foam) and nylon, 1974-6.

The main focus of the Practice-based Research (PBR) method lies with the making and documentation of the process and final creative product. However, the method of PBR does not specifically emphasize the iterative nature of producing an object. With this in mind, the dissertation employs a hybrid research strategy. This hybrid strategy employs the Practice-based Research method as the main framework and the Action Research (AR) method as a supplementary and supportive strategy.

This chapter is concerned with the description and justification of the research strategies and techniques applied in the dissertation. The chapter starts with a short discussion on PBR and the role of the artefact in the creation of research knowledge. This is followed by situating the AR method within the framework of PBR. The chapter concludes by applying the key processes of PBR and AR to the dissertation in order to formulate an overall action plan for the investigation.

research method

2.1.
PRACTICE-BASED RESEARCH AND THE ROLE OF THE ARTEFACT

Since the 1990's various creative disciplines such as architecture, design, art and performance have gradually occupied themselves more and more with academic research (Nimkulrat, 2009: 3; Nimkulrat, 2012: 2). The creative practices employed by these practitioners during research, act as the basis for theoretical inquiry and scholarly research and is known as Practice-led or Practice-based Research (Nimkulrat, 2012, 2).

Linda Candy (2006: 1) defines Practice-led Research as research that '*leads primarily to new understanding about practice*' and

> Practice-based Research as research where the 'creative artefact is the basis of the contribution to knowledge'.

These practice related research methodologies have progressed from being merely supplementary '*…adopted and adapted social science methods…*' to complex intellectual advancement of creative practice as a basis for theoretical questioning (Sullivan, 2009: 62; Nimkulrat, 2012: 2). Even though these methodologies with their practice related frameworks are fairly new in the history of knowledge production they attribute the artefact with an authentic role in research (Candy & Edmond, 2010: 20). The Practice-based Research method therefore encourages creative practice from the researcher. The researcher, as a designer, executes the creative process and the production of artefacts as the main aim of the research (Nimkulrat, 2012: 2).

For creative practitioners the made object is generally the reason for the initial activity. Therefore, it is often the case that practitioners create artefacts which form a central part of the practice, but is supported by little or no formal research process. However, within the realm of research, the process of exploration and making provides the opportunity to generate research and knowledge (Candy & Edmond, 2010: 5). Maarit Makela (2009:1), mentions that artefacts can, and have been, regarded as both the answers to research questions and as part of an argument on a particular topic. Makela (2009:1) also suggests that the artefact can be seen as a method for '*…collecting and preserving information and understanding*.'

Even though the artefact is the outcome of creative practice, the knowledge of a creative practice lies within the practice itself (Nimkulrat, 2012: 2). Since the knowledge of the process of making is not evident in the object alone, the creative output produced as an integral part of the research process is accompanied by documentation. This includes a description of the process as well as explanation and textual analysis to support the position. The textual documentation demonstrates critical reflection (Creativity & Cognition studios, 2015).
Similar to any other definition of research, the research component of the Practice-based Research method requires that the understanding and knowledge gained as a result of the research process be clearly and easily transferable (Creativity & Cognition studios, 2015).

Therefore the research should:

- Define a series of research questions or problems to be addressed as well as define aims and objectives in terms of contribution.
- Specify a research context.
- Outline the methods applied to answer the proposed research questions.

See section **2.1.1. Practice-based Research**, on poster 3 (page 16) for a listed summary of the Practice-based Research method.

Works by authors such as Nithikul Nimkulrat (*Hands-on intellect: Integrating craft practice into design research*, 2012), Linda Candy (*Practice Based Research: A guide,* 2010), Maarit Makela (*Knowing through making: The role of the Artefact in Practice-based Research*, 2009), may be reviewed under the discourse of Practice-based Research.

2.2.
ACTION RESEARCH

Action Research emerged in the 1920's and has since developed on a constant basis to become a dynamic and evolved research method. Action Research gained distinction during times of change (Zuber-Skerrit, 2001: 1). World War 1 and 2 and more recently, a response to globalisation as well as rapid socio-economic change and advancements in technology ensured the dynamic development of Action Research (Zuber-Skerrit, 2001: 2). Zuber-Skerrit (2001:1) states that Action Research (and Action Learning) is more stable and sustainable than other 'traditional ways of learning, training and research.'

Simply put, Action Research is the cyclical iterative process of an intention or plan, followed by an action, and completed by reflection on that action (Dick & Swepson, 2013: 2; Zuber-Skerrit, 2001: 2).

Once a cycle is completed, a second cycle starts with a revised plan or intention. See Figure 2.2. Action Research process (following page). Action Research is systematic and rigorous (Zuber-Skerrit, 2001: 2). Zubber-Skerrit (2001:3) also mentions that '*Through reflection we conceptualise and generalise what happened (action). We can then investigate in new situations whether our conceptions were right; that is, we try to find confirming or disconfirming evidence.*'

The incorporation of the Action research method within the framework of Practice-based Research, assists with the act of making. Here, the iterative and cyclical nature of the Action research method contributes to the development of a well resolved artefact as well as assists in the documentation process.

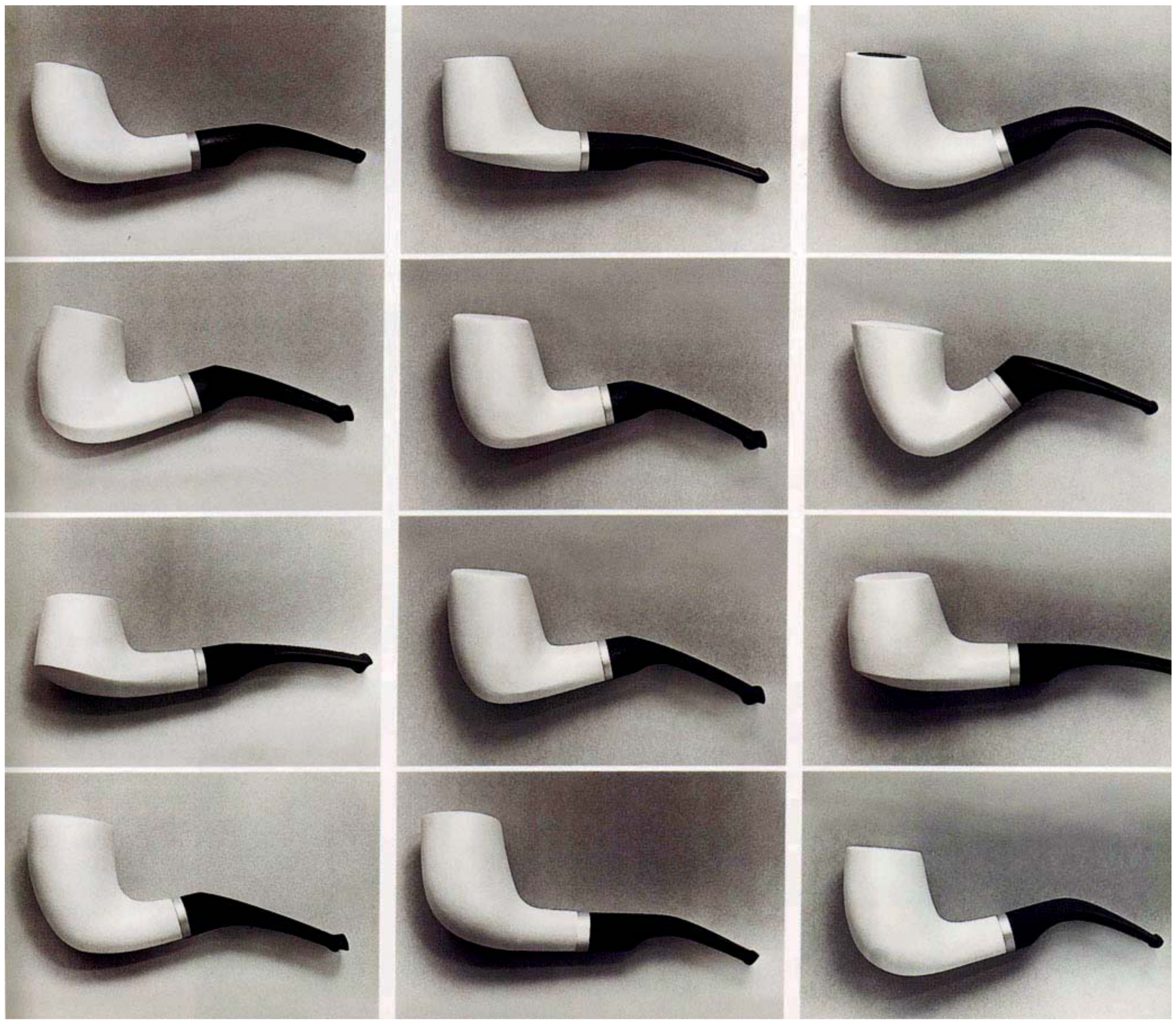
See section **2.2.1. Action Research**, on poster 3 (following page) for a concise list of the steps that make up the process of Action Research.

methodology

PRACTICE-BASED RESEARCH & ACTION RESEARCH

“a true craftsman is not bound to a single idea, as the formal idea often gives rise to a family of variations”

Tapio Wirkkala, pipe models,
‘meerschaum’ (sea foam) and nylon, 1974-6 (Zifcak, 2015)



(above) Figure 2.1. Tapio Wirkkala, pipe models (Zifcak, 2015).

1.5.1.
METHODS OVERVIEW

The dissertation’s main concern lies with an investigation focussed on the making of space through the manual fabrication of space-defining elements. With this in mind, this dissertation employs a hybrid research strategy. This hybrid strategy is the product of the amalgam of the Practice-based Research method and the Action Research method. The Practice-based Research method demonstrates a contribution to knowledge through the making of an artefact as creative outcome. The method’s success relies on the rigorous documentation of the research process as well as the artefact’s role within the creative process (Creativity & cognition studios, 2015).

The incorporation of the Action Research method within the framework of Practice-based Research, assists with the act of making. Here, the iterative and cyclical nature of the Action Research method contributes positively to the development of a well resolved artefact.

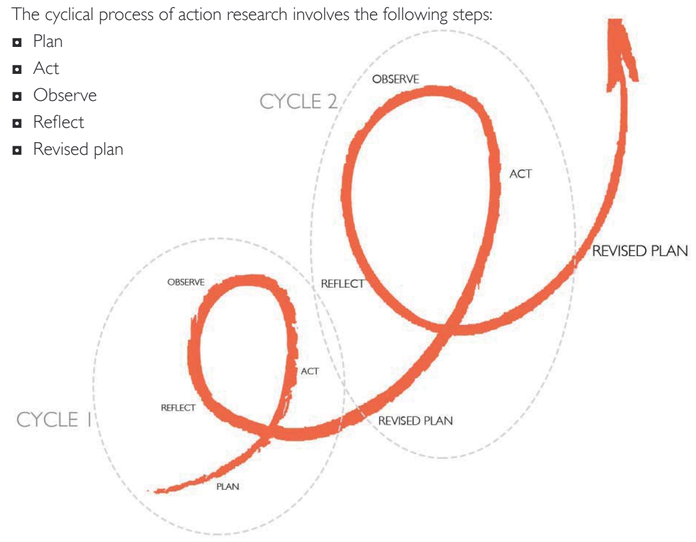
2.1.1.
PRACTICE-BASED RESEARCH

Practice-based Research is a research method by which:
- New knowledge is gained partly by means of practice
- The creative outcome is illustrated by means of an artefact
- The significance of the artefact is described in words
- Documentation of the process is of importance
- A textual analysis supports the position and
- The textual analysis demonstrates critical reflection

2.2.1.
ACTION RESEARCH

Action research, is the cyclical iterative process of action and reflection on and in action. Action research is systematic, rigorous, scrutinisable and verifiable (Zuber-Skerrit, 2001: 2).

The cyclical process of action research involves the following steps:
- Plan
- Act
- Observe
- Reflect
- Revised plan



(right) Figure 2.2. Action Research diagram

PHASE	ACTION	RESEARCH TECHNIQUE	SOURCE	MATERIAL	PURPOSE	TIME FRAME	PHYSICAL MANIFESTATION	Notes
1	Design and build testing model 1	Design and construct		MDF, Paint and Hardware	Act as testing site, vessel	4 DAYS	Scale 1:1 model, Fastening frame and backdrop	Test site built with knowledge accumulated during previous research and precedent studies
2	Determine types and characteristics of traditional space-defining elements (As found in built environment) HARD SPACE	Literature Review Drawing/Sketches Examples	CHING BROOKER & STONE EDWARDS	N/A	To understand traditional space, defining elements, To inform design and design process of textile space-defining elements	4 DAYS	Text, diagrams and images of examples	List and illustrate space-defining elements, List and present contemporary examples
	Investigate textiles as alternative space-defining elements SOFT SPACE	Literature Review Examples	KADOLPH KRUGER	N/A	Determine and compare alternative elements with traditional elements		Diagram: Textiles as space-definer, Images and examples	Assess terminology of original diagram
3	Identify types of traditional space-defining elements present in intervention site	Diagrams Photos	SITE	N/A	Define parameters for model 2 and inform design and design process	1 DAY		
4	Establish characteristics of rope and familiarize with terminology of rope	Literature Review Material exploration		Rope	Inform material choices for sample testing	2 DAYS	Sketches	ITERATIVE process, refer back and forth between PHASE 4-PHASE 6
5	Investigate knots, knot types and knot terminology	Literature Review Material exploration	ASHLEY PENN PETTIGREW	Rope	Inform sample testing	Continuous process	Rope, knots, sketches and images	ITERATIVE process, refer back and forth between PHASE 4-PHASE 6
6	Test rope as manual fabrication material Limitations Opportunities	Making Iteration Observation and documentation Observation and documentation	Preceding phases Subsequent phases	Rope and rope-like materials, hardware	Test types of manifestations to consider for large scale textile space-making	Continuous process	Photographs, sketches and process documentation	Iterative process using information from phases 2-5 as well as applying design concepts to intervention site
7	Determine spatial intervention and characteristics	Observation and documentation	PHASE 6		Determine spatial intervention		Sketches, End-to-end; middle of rope; end to hardware; end to plane; etc.	Iterative process, refer back and forth between PHASE 6 & 7
8	Design and build testing model 2	Design and construct	PHASE 2-7 and parameters of intervention site	MDF, Paint and Hardware	Act as testing site, vessel	4 DAYS	Scale 1:10 or 1:20 model	Site parameters informed by preceding conclusions
9	Document conclusions	Analysis and Synthesis	PHASE 6,7		Synthesise data for presentation purposes	Continuous process	Documented information	
10	Present conclusions	Presentation	PHASE 6-9		Relay importance of process and artefact	1 WEEK	Presentation posters and dissertation document	

(above) Table 2.1. Plan of Action, part 1

	MAY																													JUNE													
	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	M	T	W	T	F	S	S	M	T	W	T	F
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
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(above) Table 2.2. Plan of Action schedule, part 1

2.3.
APPLICATION OF THE HYBRID RESEARCH METHOD

The creative outcome of the project is demonstrated by means of the hand knotted, textile element, while the significance of the knowledge obtained through making is described by means of words. The hand knotted textile plays an essential role in the bearing of the research, and therefore the research could not have been conducted without the hand knotted textile. The written description includes documentation of the research process, in other words, the process of making and knotting the textile space-defining element. The documentation takes the form of tables, sketches and photos. This process of research through making is represented in cycles as prescribed by the Action Research method.

The following key elements are identified by the Creativity and cognition studio as part of the process of Practice-based Research. The basic framework includes:

- A motivation for the project
- A time frame for the works to be performed. See Tables 2.1. Plan of Action, part 1 and 2.2. Plan of Action schedule, part 1, on poster 3 (left).
- The role of the creative artefact in the creative process
- Environments and tools needed to achieve the required output
- Information to be gathered
- Methods for the research and design process **(Action Research method)**
- Expected outcomes of the research process
- The relationship of the practice outcomes to the argument of the dissertation

The hybrid **research strategy** is initiated with the provision of an articulated and structured plan that incorporates a variety of **research techniques**. See Table 2.1. Plan of Action part 1. The plan of action table incorporates some of the key elements as suggested by the Creative and cognition studio and forms a basic framework for the process of making.

The plan of action table includes a number indicating the **phase**, a description of the **action** performed within that specific phase, the **research technique** applied and the **purpose** for the action. Further information such as the primary source used as basis for the action, the time frame to perform the action, as well as the **physical manifestation** of the action performed is included. The plan of action is divided into two parts. Part one was planned before the mid-year exam and part two was planned as a response to the results of part one as well as in response to feedback received during the exam. See Plan of Action part two in **CHAPTER 5.**

2.4.
CONCLUSION

The discussion on Practice-based Research and the role of the artefact as well as the Action Research method provides the outline for the hybrid research method. Further, the chapter introduced a research strategy based on the plan and act components of the Hybrid research method. The Plan of action indicates foreseeable situations where the Design Process allows for more dynamic situations. The Design Process (observe and respond) is discussed further in **CHAPTER 5: Design application.**

Reflection follows each round of observation and response, as well as each design cycle. Final reflection on the dissertation follows in **CHAPTER 6: Final reflections.**

Figure 3.1. Cloud textile, Bouroullec brothers (bouroullec, 2009).

literature study

CHAPTER 3

"We put thirty spokes together and call it a wheel; but it is on the space where there is nothing that the utility of the wheel depends. We turn clay to make a vessel; but it is on the space where there is nothing that the utility of the vessel depends. We pierce doors and windows to make a house; and it is on these spaces where there is nothing that the utility of the house depends. Therefore, just as we take advantage of what is, we should recognize the utility of what is not."

-Lao-tzu, Tao Te Ching, 6th century B.C.

The chapter firstly provides an overview of **traditional space-defining** elements, and secondly, introduces textiles as **alternative space-defining** elements. This information is summarised in a comparative diagram. The diagram provides an overview of various examples of both traditional and alternative space-defining elements found within the interior and acts as a way-finding mechanism for the ensuing visual investigation. The visual investigation includes sketch diagrams as well as images of the contemporary interior examples presented in the comparative diagram. The unique character of textiles are discussed shortly as well as associations related to textiles.

space and textiles

3.1.
TRADITIONAL SPACE-DEFINING ELEMENTS

Space is perhaps one of the most complex aspects of the interior. Space could be considered from a number of viewpoints. Clive Edwards, in the book Interior design, a critical introduction (2011:115) states that space is a permeable volume, bounded by the physical nature of a building. This suggests that interior spaces are volumes bound by the organisation of the building around it. Francis D.K. Ching (2007: 94) similarly states that space constantly surrounds us. He explains that the volume of space allows us to move, '*see form, hear sound, feel breezes, smell fragrances…*' and although the volume of space manifests as a material substance, it is also a formless vapour (Ching, 2007: 94).

Ching (2007: 96) further describes form and space as opposing elements that produce an inseparable reality and that the combination of form and space results in architecture. Therefore, form cannot exist without the consequence of space, and space is undetermined without form. Just as a flat two-dimensional figure on a sheet of paper influences the shape of the remaining space surrounding it; a three-dimensional form is capable of articulating the volume of space around itself. This affords the three-dimensional form with a territory of its own (Ching, 2007: 102).

Ching (2007: 124) divides the elements of form that define space into the two main categories, namely horizontal and vertical. Horizontal and vertical elements of form consist of various configurations which define specific types of space. Where vertical boundaries are simply inferred rather than clearly defined, horizontal planes are still able to define fields of space (Ching, 2007: 124). **Ching (2007: 103) refers to horizontal elements that define space as: Base plane, Depressed base plane, Elevated base plane and Overhead plane.** Refer to section **3.3. Comparative visual study**. Number **3.3.1. - 3.3.4.** provide examples of traditional and alternative HORIZONTAL space-defining elements. Further textile-only examples can be found in number **3.3.5. - 3.3.7.**

Vertical elements of form play a critical role in establishing visual limits within our spatial fields. Visually, vertical forms manifest more prominently than horizontal planes, facilitating the formation of volume, enclosure and a sense of privacy. Further, vertical elements separate spaces from one another and so establish mutual boundaries between exterior and interior environments (Ching, 2007: 124). **Vertical elements that define space are listed by Ching (2007: 125) as: Vertical linear elements, Single vertical plane, L-shaped plane, Parallel planes, U-shaped plane and Four-planes that form an enclosure.** Refer to section **3.3. Comparative visual study**, number **3.3.8. - 3.3.13.** provide examples of traditional and alternative VERTICAL space-defining elements. Further textile-only examples can be found in number **3.3.14. - 3.3.16.**

Traditional or 'hard' space-defining elements refer to elements and materials such as: concrete walls, -floors and -roof slabs, dry-walling elements, suspended ceilings, brick walls, steel frames, -structures and –floors.These materials would typically make up the horizontal and vertical planes that Ching (2007: 94-125) describes.

3.2.
TEXTILE AS ALTERNATIVE SPACE-DEFINING ELEMENT

Textiles have the capacity to be light, flexible, transparent, opaque, thick, bulky, fine and delicate, foldable, textured and much more. They provide protection from heat and cold, absorb noise, and give control over the amount of light that enters a space (Kruger, 2009: 6). Textiles also possess unique, sensually tangible, often poetic aesthetics that other static architectural materials often cannot mimic.

While much of the current textile technologies are highly advanced, the basic principles of fabrics have ancient roots. The earliest evidence of woven textiles goes back approximately 7000 years, placing it almost immediately after the last ice age. Textiles were also found in the Palaeolithic settlements in the form of portable tent-like huts clad with animal skins; an example of its long history as an architectural material (McQuaid, 2006: 106; Quin, 2006: 23). The shelters of the Palaeolithic settlements also created some of the first man-made interior spaces.

Further examples of textiles applied in the interior throughout history (As written in A History of Interior Design by John Pile, 2005), are as such: The early Christian, Byzantine and Romanesque interior attributed its colourful spaces mainly to the use of textiles. Here textiles could be seen as furniture covers, bed curtains and various wall hangings (Pile, 2005: 66). Islamic interiors were sparsely furnished, with low benches and couches covered in textiles, rugs and carpets (Pile, 2005: 74-76). Likewise, the Indian interior space mostly consisted of rugs of varied design as furniture did not play a major role in the historic Indian interior (Pile, 2005: 85). In China, interior spaces initially consisted of only mats or sacks of fabric for seating as furniture was only developed at a later stage (Pile, 2005: 92-93). From the Renaissance up until the early 20th century textiles were seen mostly in interior applications. Furniture items such as chairs, loose cushions, carpets, rugs and curtains became evermore commonplace. The basic living space of the Renaissance period can be seen as the inception of the "fully furnished" interior (Pile, 2005: 143). Furniture design of the Baroque and Rococo design shared the scale and rich ornamentation that characterised the interior design of the period. Textiles were prevalent in wall and floor coverings as well as upholstered armchairs and sofas (Pile, 2005: 178 and 181). The industrialisation of the first decades of the 20th century brought about change in the use of textiles.

The fathers of modernism believed that a simplification of form by the reduction of ornament was a hallmark of good architecture. Furniture items included simple, anonymous, mass produced bentwood and upholstered chairs, purist paintings on plain white walls and rugs (Pile, 2005: 342). The modernist aesthetic encouraged the production of a vast range of geometric pattern and solid colour textiles suitable for drapery and upholstery. Unlike the functional orientation of modernist design, the Art Deco style was a more fashion oriented and strongly decorative style. Furniture and textile designs included specially designed patterns in the Art Deco style.

Over time textiles were replaced with timber, stone, concrete and masonry structures, diminishing the use of textiles as building material (Garcia, 2006: 14). The transience of textile materials means that textiles are often perceived as flammable, temporary and weak with a vulnerability to water, whereas architecture is associated with mass, permanence and solidity (Quin, 2006: 25; Kruger, 2009: 26). Therefore, as a building material, textiles are often incorporated as decorative elements but rarely exploited specifically for utilitarian purposes.

Clive Edwards (2011: 115) explains that other than horizontal and vertical space-defining elements, contained elements also have the potential to define space. They allow for the occurrence of events and accommodate people. Cathy Smith (2004: 96) mentions that contained elements - such as decoration and other interior objects - are often viewed as inferior to the space that is defined by traditional space-defining elements. Smith (2004: 93) focusses specifically on alternative ways of formulating the physical interior environment. She states that the re-appropriation of typical interior materials and objects as traditional space-defining elements challenges the boundaries that make up the architectural envelope. In this case the internal and external limits of interior spaces are questioned, allowing for objects to be associated with functions other than what they were originally intended (Smith, 2004: 96).

In the book Textile Architecture by Sylvie Kruger (2009),

contemporary textile installations similarly illustrate a departure from the traditional applications of textiles and indicate an inclination toward the innovative use of textiles as space making agent.

The diagram on the following page is based on the categories as defined by Kruger (2009). See Figure 3.2. Textile as space-defining element (following page). It identifies the two main categories of VERTICAL and HORIZONTAL ELEMENTS, similar to those found within traditional space-defining elements. The diagram also identifies a third category as three-dimensional space-defining elements. Further, each category is divided into subcategories as identified in the book Textile Architecture (Kruger, 2009). Even though the main categories correlate directly with those of traditional space-defining elements, the subcategories represented within the diagram do not. Refer to section **3.3. Comparative visual study,** number **3.3.17. - 3.3.18**. provide examples of alternative THREE-DIMENSIONAL space-defining elements.

3.3.
COMPARATIVE VISUAL STUDY

Figure 3.3.Comparative diagram, poster 4 (opposite page) provides an extensive overview of various examples of both traditional and alternative space-defining elements found within the interior. The diagram situates each example within the categories Horizontal elements, Vertical elements and Three dimensional elements. Further these categories are divided into various sub-categories. This ensures a clear and visible link between the familiar traditional elements (left) and the possibly unfamiliar alternative opportunities (right). Sketch diagrams illustrating the traditional manifestation of the space-defining elements are included on the right-hand side of the diagram for reference. This is contrasted by a set of icons for the alternative examples on the left-hand side.

The Comparative overview diagram is the culmination of literature as found in sections **3.1. Traditional space-defining elements** and **3.2. Textiles as alternative space-defining element**. It also serves as an index or reference point for the succeeding exploration of space-defining elements within this section. The succeeding exploration is divided into three sections namely: horizontal elements (nr. 3.3.1.-3.3.7.), vertical elements (nr. 3.3.8.-3.3.16.) and three-dimensional elements (nr. 3.3.17.-3.3.18.). Lastly it acts as a discussion area for the concepts presented in section **3.4. The unique character of textiles.**

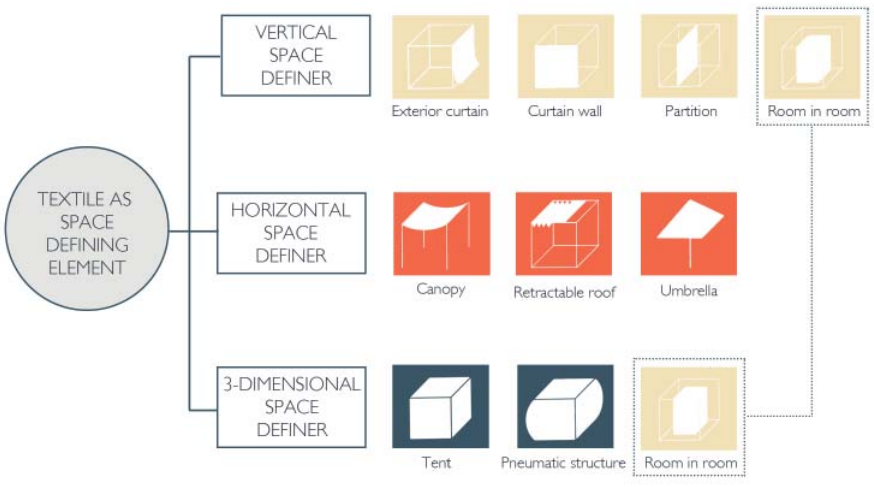


Figure 3.2. Textile as space-defining element.

The diagram is adapted from the theory as available in the book, *Textile architecture*. (Kruger, 2009).

space-defining elements

A COMPARATIVE DIAGRAM

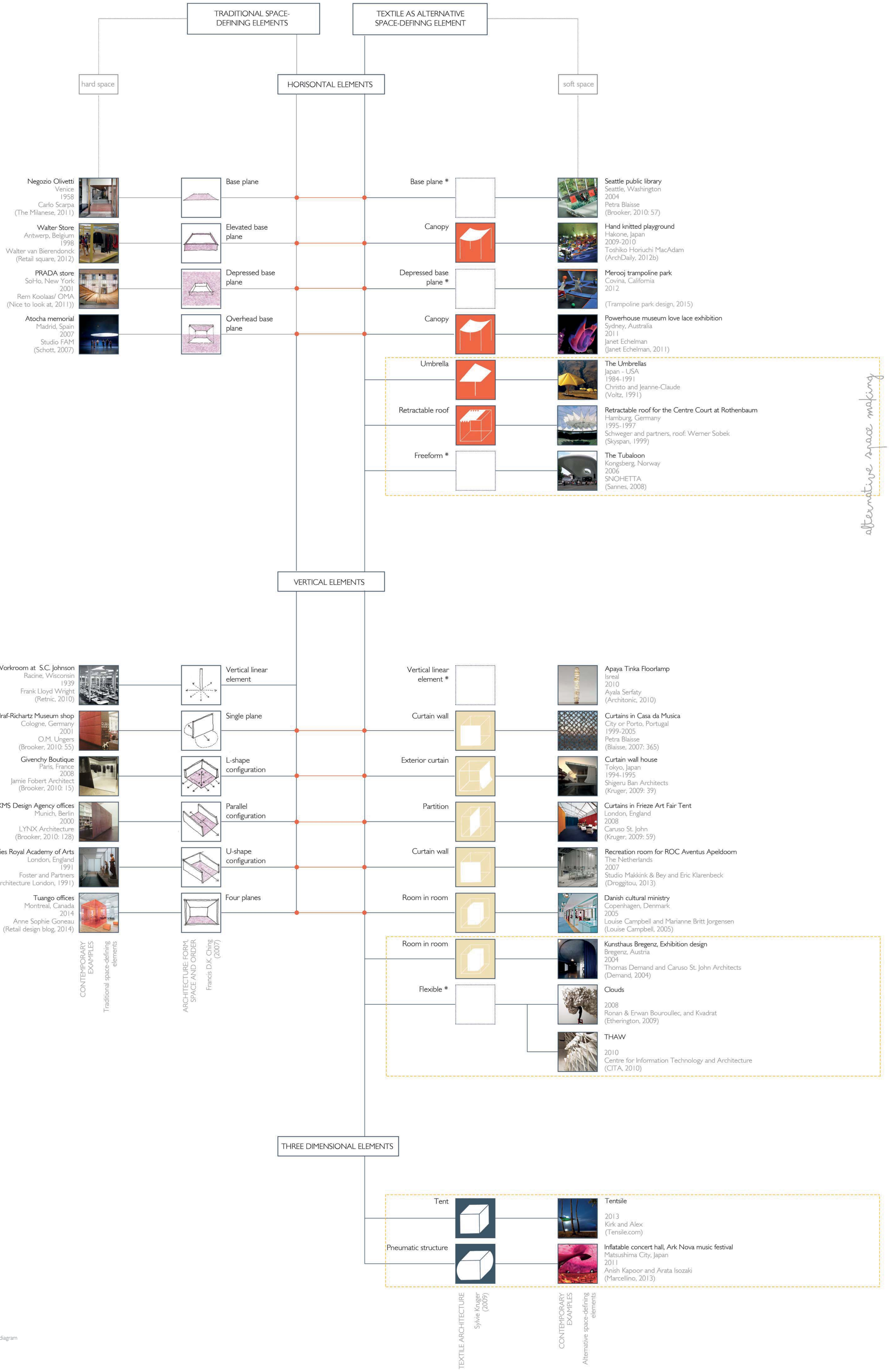
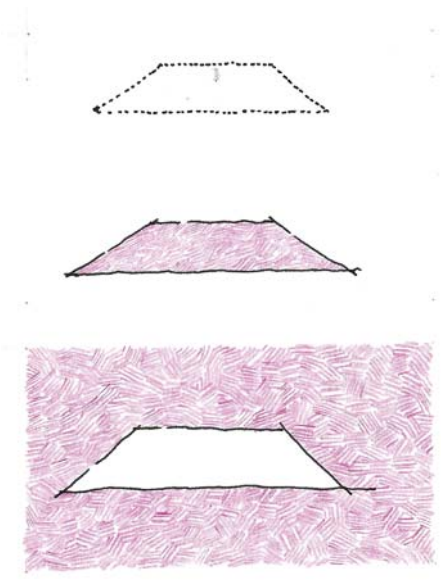


Figure 3.3. Comparative diagram

3.3.1.
HORIZONTAL ELEMENT
BASE PLANE

A base plane is a spatial field defined simply by a horizontal plane or figure placed on a contrasting background. Perceptible colour contrast, texture or tonal change between a surrounding area and a surface can define this spatial field. The boundaries of the spatial field do not block the flow through the zone (Ching 2007: 103-105).

Figure 3.4. Sketches of base plane (adapted from Ching) below



(top) Figure 3.5. Negozio Olivetti, Venice, 1958, Carlo Scarpa (The Milanese, 2011).

Figure 3.6. (above)
SEATTLE PUBLIC LIBRARY
SEATTLE, WASHINGTON
2004
PETRA BLAISSE
(Brooker & Stone, 2010: 57)

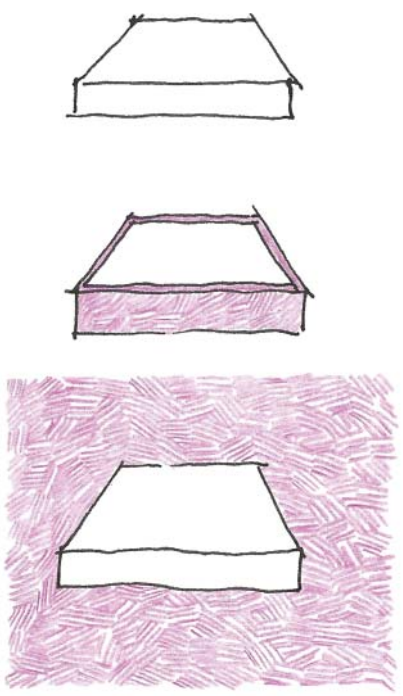
The huge graphic carpets within the Seattle Public Library delineate specific areas of the library. These soft spaces demarcate the limitations of particular activities within the large open plan area. Thus the carpet or base plane creates a spatial zone that allocates specific functions into more defined areas.

Canopy

3.3.2.
HORISONTAL ELEMENT
ELEVATED BASE PLANE

An elevated base plane is an elevated portion with the base plane and delineates a specific territory. The level change defines the boundaries of the spatial zone and interrupts the spatial flow. The boundaries can be accentuated by means of colour of material change. This separates the spatial zone from its surroundings (Ching, 2007: 106-111).

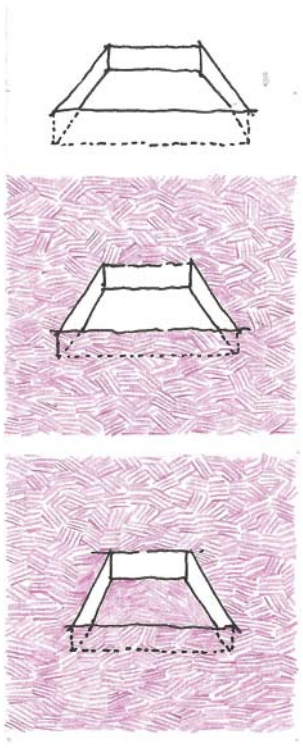
Figure 3.7. Sketches of elevated base plane (adapted from Ching) below

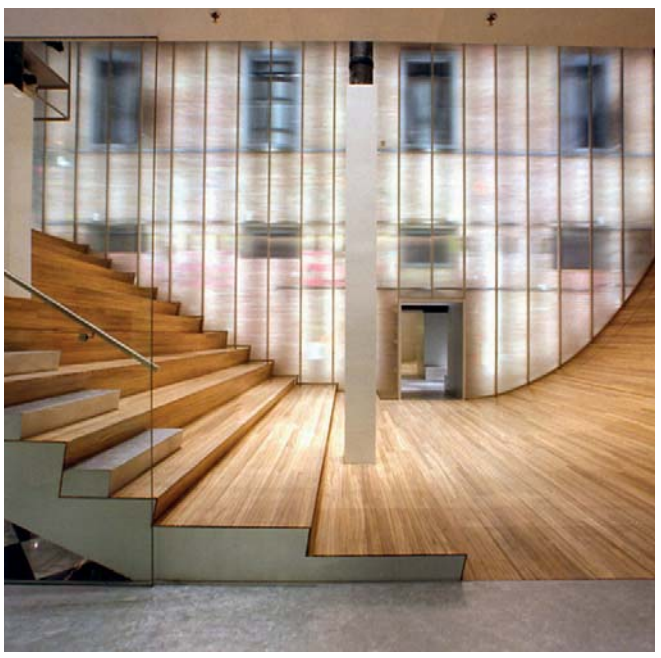


3.3.3.
HORISONTAL ELEMENT
DEPRESSED BASE PLANE

The lowered portion of the Base Plane creates and isolated area. This lowered spatial zone is distinctly different from its surrounding context. The vertical elements formed by the depression creates visible boundaries (Ching, 2007: 112-117).

Figure 3.10. Sketches of depressed base plane (adapted from Ching) below.





(top) Figure 3.8. Walter Store, Antwerp, Belgium, 1998, Walter van Bierendonck (Retail square, 2012).

Figure 3.9. (above)
HAND KNITTED PLAYGROUND
HAKONE, JAPAN
2009-2010
TOSHIKO HORIUCHI MACADAM
(ArchDaily, 2012b)

The large hand knitted playground acts as an elevated base plane on which children can run and play. See section **4.1.2.Hand knitted playground**, poster 8 (page 41). The elevation of the base plane creates a spatial zone that is seperated from its surroundings. The use of colourful rope accentuates the boundaries of the elevated spatial zone.

(top) Figure 3.11. PRADA store, SoHo, New York, 2001, Rem Koolaas/ OMA (Nice to look at, 2011).

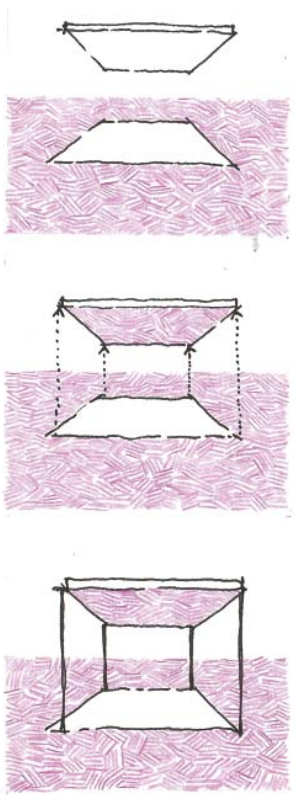
Figure 3.12. (above)
MEROOJ TRAMPOLINE PARK
COVINA, CALIFORNIA
2012
(Trampoline park design, 2015)

A depressed base plane does not naturally form part of soft spatial zones. However the Merooj Trampoline park creates a depressed plane by combining hard and soft elements to form a tensile trampoline structure. This structure includes vertical elements that create visible boundaries to differentiate the depressed zone form its surroundings.

3.3.4.
HORISTONAL ELEMENT
OVERHEAD PLANE

A plane that establishes a spatial zone through the invisible boundaries created by its edges. The formal qualities of the spatial zone is determined by the height, shape and size of the overhead plane (Ching, 2007: 118-123).

Figure 3.13. Sketches of overhead base plane (adapted from Ching) below



(top) Figure 3.14. Atocha memorial, Madrid, Spain, 2007, Studio FAM (Schott, 2007).

Figure 3.15. (above)
POWERHOUSE MUSEUM LOVE LACE EXHIBITION
Sydney, Australia
2011
Janet Echelman
(Janet Echelman, 2011)

The installation by Janet Echelman is a canopy or fixed expanse of textile that is attached to a supporting structure, forming a spatial zone below. Traditionally a canopy is installed mainly for weather protection, but the installation by Echelman acts mainly as a sculptural structure, yet still defines a spatial zone below.


Umbrella

3.3.5.
HORIZONTAL ELEMENT
UMBRELLA

An umbrella consists of a spoked substructure fixed around a ring. This ring moves around a central mast (allowing the umbrella to be put up and down). A textile membrane is spanned over the top creating a prominent spatial zone below (Kruger, 2009: 114). The physical boundaries of the spatial zone is limited to the edge of the substructure and textile membrane and is the most temporary in nature, as the object is often mobile and can always be stowed.

Figure 3.16.
THE UMBRELLAS
JAPAN - USA
1984-1991
CHRISTO AND JEANNE-CLAUDE
(Voltz, 1991)

The Umbrellas, designed by Artists Christo and Jeanne-Claude, were employed in Japan and the USA simultaneously to reflect the differences and similarities between the uses of the object in two inland valleys (Christojeanneclaude). The Umbrellas each articulate their own distinct spatial zones within the vast surrounding landscape. The capacity of textiles to expand and retract around a rigid frame is displayed in the essence of what an umbrella is. Without this characteristic, the umbrella cannot exist.

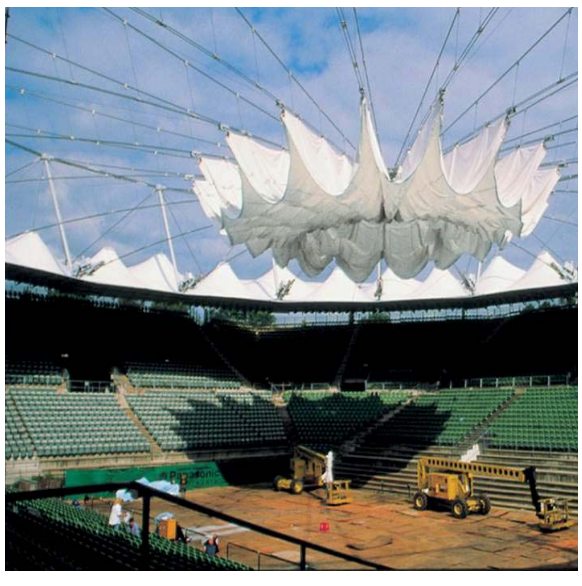

Retractable roof

3.3.6.
HORIZONTAL ELEMENT
RETRACTABLE ROOF

Retractable roofs are flexible textile membranes that can be horizontally opened and closed. The primary function is to provide rain and sun protection (Kruger, 2009: 104). Spatial zones created by retractable roofs are temporary in nature as they can be closed and stowed away, but more permanent than the zone created by an Umbrella as it is mostly fixed into place for the mechanisms to function.

Figure 3.17.
RETRACTABLE ROOF FOR THE CENTRE COURT AT ROTHENBAUM
HAMBURG, GERMANY
1995-1997
ROOF: WERNER SOBEK
(Skyspan, 1999)

The translucent textile membrane used at Rothenbaum provides temporary sun protection but does not block out the sun completely. The retractable nature of the structure allows for a spatial zone to form over a large group of people without inhibiting or influencing movement within the zone formed below.



*


3.3.7.
HORIZONTAL ELEMENT
FREEFORM

Freeform as an element that forms spatial zones, is not defined by either CHING (2007) or KRUGER (2009). However, this type of space-definer can be considered natural to textiles. In other words, it is in the nature of a textile material to be malleable and to be shaped and formed into free forms.

Figure 3.18.
THE TUBALOON
KONGSBERG, NORWAY
2006
SNOHETTA
(Sannes, 2008)

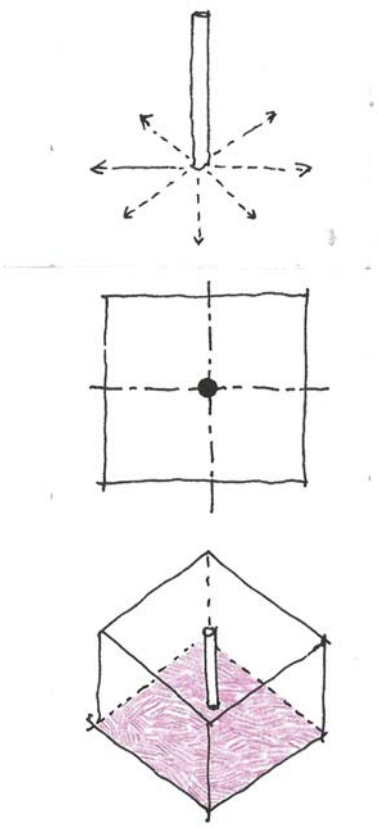
The Tubaloon textile structure serves as the roof of a stage at Scandinavia's Kongsberg Jazz Festival. This freeform structure can be seen as a combination of more traditional space-defining elements: such as a single vertical plane combined with an overhead base plane. This creates a very dynamic spatial zone below that interprets qualities of both traditional space-defining elements mentioned.

textile - only elements...

3.3.8.
VERTICAL ELEMENT
VERTICAL LINEAR ELEMENT

Vertical linear elements establish a point on the ground plane. This makes it visible in space. A single linear element is nondirectional except for that path leading toward its position in space. When located within a defined volume of space a column generates a spatial field by itself by interacting with the defined spatial enclosure (Ching, 2007: 126).

Figure 3.19. Sketches of vertical linear element (adapted from Ching) below



(top) Figure 3.20. Workroom at S.C. Johnson, Racine, Wisconsin, 1939, Frank Lloyd Wright (Retnic, 2010).

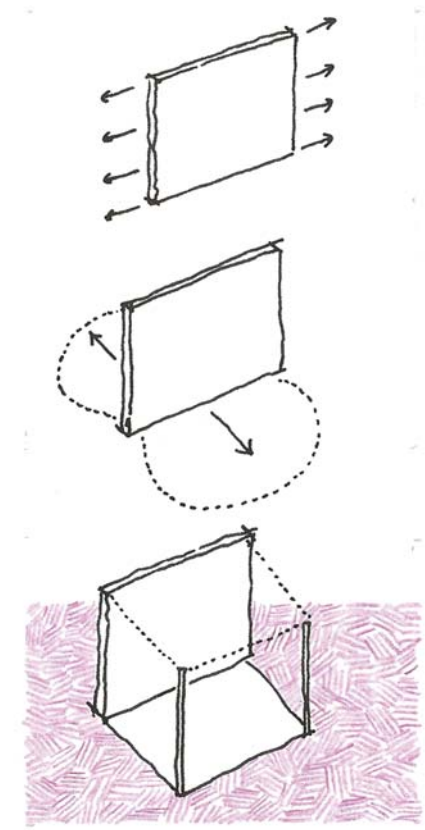
Figure 3.21. (above)
APAYA TINKA FLOOR LAMP
ISRAEL
2010
AYALA SERFATY
(Architonic, 2010)

The Apaya Tinka Floor lamp is a vertical linear element within a defined volume of space. When in use the lamp not only generates a spatial field through its form, but also by its function. Light emited from the lamp increases the effect of the vertical linear element within a room.

3.3.9.
VERTICAL ELEMENT
SINGLE VERTICAL PLANE

A single vertical plane defines the volume it fronts by dividing a volume of space. These frontal qualities establish the edges of two spatial zones. As a dividing barrier the single vertical plane interrupts visual and spatial continuity by means of height which can provide a strong sense of enclosure or division of space (Ching, 2007: 134).

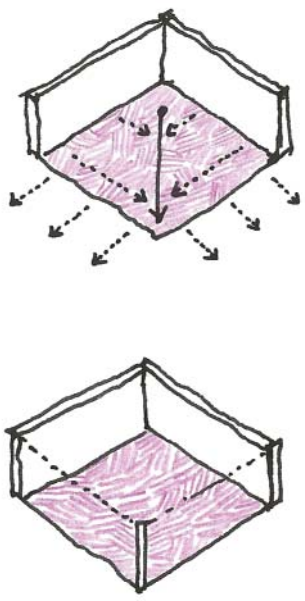
Figure 3.22. Sketches of single vertical plane (adapted from Ching) below



3.3.10.
VERTICAL ELEMENT
L - SHAPED CONFIGURATION

The strongly enclosed and defined spatial zone generates a field of space from its corner outward along a diagonal axis. The two vertical edges are well defined but the remaining edges are ambiguous. An L-shaped configuration provides a sheltered 'room' to which the surrounding context is directly related (Ching, 207: 125, 138-143).

Figure 3.25. Sketches of L-shaped configuration (adapted from Ching) below



(top) Figure 3.23. Wallraf-Richartz Museum shop, Cologne, Germany, 2001, O.M. Ungers (Brooker & Stone, 2010: 55).

Figure 3.24. (above)
CURTAINS IN CASA DA MUSICA
CITY OR PORTO, PORTUGAL
1999-2005
PETRA BLAISSE
(Blaisse, 2007: 365)

The large hand knotted curtains created by Petra Blaisse act mainly as a visual space-definer within the shell of the Casa da Musica. See section **3.4.2. Curtain as architecture**, poster 6 (page 35). The large glass facades however allow an abundance of light to enter the space, and here the textile space-definer not only acts as a view filter but also a sun filter, blocking harsh light. The curtains together with the glass facade, define the boundary between inside and outside.

(top) Figure 3.26. Givenchy Boutique, Paris, France, 2008, Jamie Fobert Architect (Brooker, 2010: 15).

Figure 3.27.
CURTAIN WALL HOUSE
TOKYO, JAPAN
1994-1995
SHIGERU BAN ARCHITECTS
(Kruger, 2009: 39)

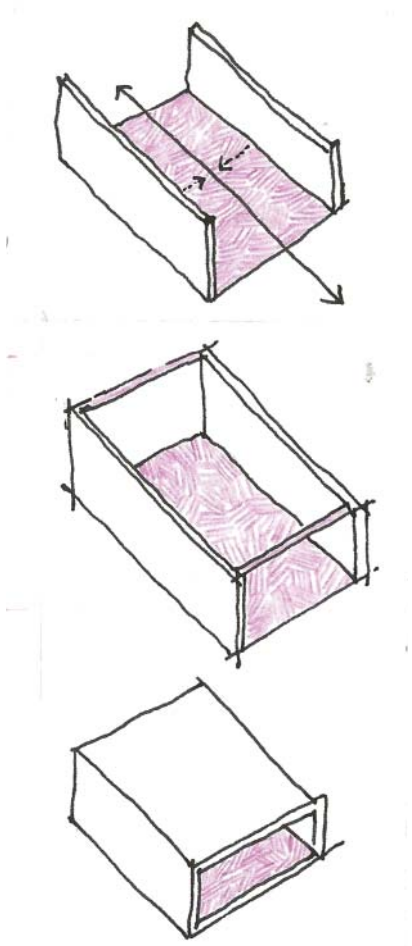
The exterior curtains designed by Shigeru Ban is an example where traditional hard materials (walls) were replaced with an alternative soft material (curtain). The softness of the *exterior curtain wall* makes for a permeable interior space but still creates a boundary defining particular interior and exterior spatial zones. The L-shaped configuration of the curtain is a response to the roof overhang.

Partition

3.3.11.
VERTICAL ELEMENT
PARALLEL PLANES

Parallel planes define a volume of space between them. The spatial field thus has a strong directional quality. The spatial field is oriented primary toward the open ends of the configuration (Ching, 2007: 144, 149).

Figure 3.28. Sketches of Parallel planes (adapted from Ching) below



(top) Figure 3.29. KMS Design Agency offices, Munich, Berlin, 2000, LYNX Architecture, (Brooker & Stone, 2010: 128).

Figure 3.30. (above)
CURTAINS IN FRIEZE ART FAIR TENT
LONDON, ENGLAND
2008
CARUSO ST. JOHN
(Kruger, 2009: 59)

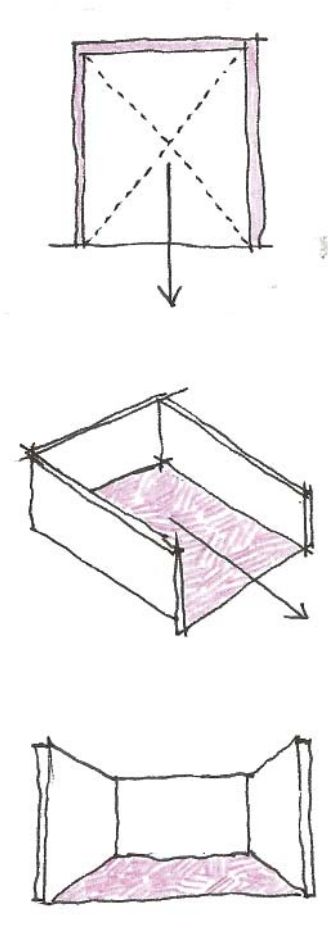
The parallel curtain planes creates a distinct spatial zone that directs the user of the space towards the end of the passage. Here the use of a single vertical plane (curtain) redirects the path of the user. The space-defining elements here are employed mainly for the purpose of circulation and secondly acts as a division of spaces with different functions.

Curtain wall

3.3.12.
VERTICAL ELEMENT
U-SHAPED CONFIGURATION

The field of space defined by U-shaped configuration of vertical planes is focussed both inwardly and outwardly (Ching, 2007: 150).

Figure 3.31. Sketches of U-shaped configuration (adapted from Ching) below.



3.3.13.
VERTICAL ELEMENT
FOUR PLANES: CLOSURE

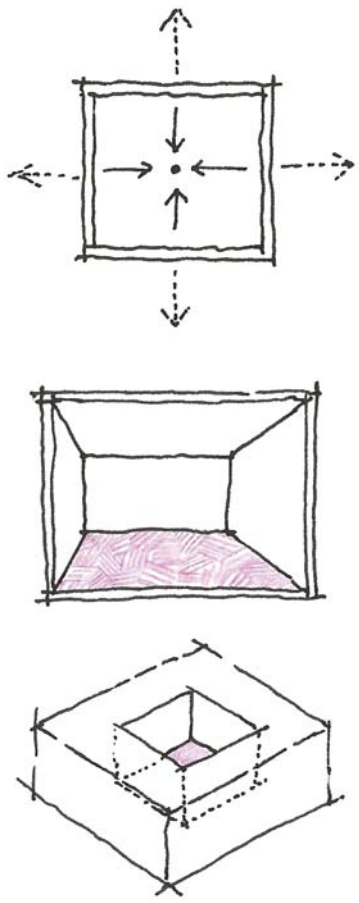
Four planes create a very strong spatial definition. The four vertical planes create as enclosed space with an introverted nature. The boundaries also influence the spatial zones of the larger context (Ching, 2007: 125, 156).

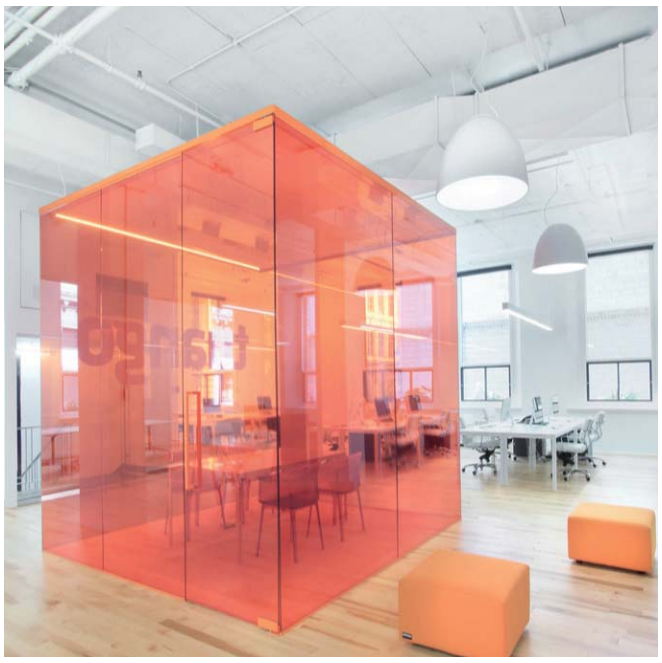
Figure 3.34. Sketches of Four planes closure (adapted from Ching) below

(top) Figure 3.32. Sackler Galleries Royal Academy of Arts, London, England, 1991, Foster and Partners (Modern Architecture London, 1991).

Figure 3.33. (above)
RECREATION ROOM FOR ROC AVENTUS APELDOORN
THE NETHERLANDS
2007
STUDIO MAKKINK & BEY AND ERIC KLARENBECK
(Droggitou, 2013)

The U-shaped configuration of the curtains create a semi-enclosed interior space. Although the curtains form a distinct U-shape, the spatial zone is not completely isolated visually due to the height at which the curtains hang. The curtains thus control and restrict sight lines of users within and outside of the recreation room, creating a specific amount of privacy within the internal spatial zone.





(top) Figure 3.35. Tuango offices, Montreal, Canada, 2014, Anne Sophie Goneau (Retail design blog, 2014).

Figure 3.36. (above)
DANISH CULTURAL MINISTRY
COPENHAGEN, DENMARK
2005
LOUISE CAMPBELL AND MARIANNE BRITT JORGENSEN
(Louise Campbell, 2005)

The four planes created by the structural frame and curtains in the Danish Cultural ministry create a strong spatial definition when closed. However the temporal and mobile nature of the curtains within this space allows the normally introverted space to become part of the larger context. The structure with open curtains however enforce a visual spatial zone without constricting flow and movement through the zone.

3.3.14.
VERTICAL ELEMENT
ROOM IN A ROOM

Vertical expanses of textile allow convertible rooms- that can be opened and closed at will - to be created within solid walled spaces. Closed textile structures can create spatial zones that become self-contained, temporary havens or individual areas for diverse uses (Kruger, 2009: 60).

3.3.15.
VERTICAL ELEMENT
FLEXIBLE

Flexible elements that forms spatial zones, are not defined by either CHING (2007) or KRUGER (2009). However, this type of space-definer can be considered unique to textiles. It is in the nature of a textile material to be malleable and to be shaped and formed and re-formed into textile space-defining elements.

3.3.16.
VERTICAL ELEMENT
FLEXIBLE

See 3.3.15. Flexible elements (left).

Figure 3.37.
KUNSTHAUS BREGENZ, EXHIBITION
BREGENZ, AUSTRIA
2004
THOMAS DEMAND AND CARUSO ST. JOHN ARCHITECTS
(Demand, 2004)

The temporary room within the foyer of the Kunsthauz Bregenz was created for screening a film. The floor-to-ceiling dark blue curtains move by means of a motor to form an enclosed dark room that can disappear when the curtains are opened. The curtains create a very distinct yet temporary spatial zone within a larger interior space. When closed the curtains disrupt the flow of movement, block views and create a certain sense of privacy. When opened these qualities disappear with the curtains. .

Figure 3.38.
CLOUDS

2008
RONAN & ERWAN BOUROULLEC, AND KVADRAT
(Etherington, 2009)

Clouds, by the Bouroullec brothers, are completely flexible space-defining elements. These textile elements can be reduced in size by disconnecting sections of the textile and can be expanded by adding sections. Further, the textile can be used horizontally as well as vertically, or as both horizontally and vertically at the same time. The configuration of spatial zones are endless and the quality of the spaces formed are whimsical and transient.

Figure 3.39.
THAW

2010
CENTRE FOR INFORMATION TECHNOLOGY AND ARCHITECTURE
(CITA, 2010)

THAW, a student project done at the Centre for Information Technology and Architecture, explores tensile structures in architecture. The structure is formed by combining the unique capacity of textiles to expand and retract with the stiffness that timber has to offer. The expansion and retractions qualities of the element is translated into the spatial zone that is formed on either side of the vertical plane. Creating a spatial zone with boundaries that change with the flexible textile element.

textile - only elements...


Tent


Pneumatic structure

3.3.17.
THREE-DIMENSIONAL ELEMENT
TENT

Tents traditionally consist of a supporting structure with a textile skin, allowing for an endless variety of tents. Most tents can be transported, easily set up and taken down. However, certain tents are also used as permanent yet mobile dwellings or as permanent and fixed installations for arenas or exhibition areas (Kruger, 2009: 150). Thus the spatial opportunities offered by tents are very changeable.

3.3.18.
THREE-DIMENSIONAL ELEMENT
PNEUMATIC STRUCTURE

Pneumatic structures are based on the tyre principle, the membrane covering is also the supporting element. The difference in pressure between the interior and the exterior stabilises the structure. Pneumatic structures are often employed to create temporary spatial zones for public events. However pneumatic structures can also be incorporated into building structures as permanent skins (Kruger, 2009: 166).

Figure 3.40.
TENTSILE

2013
KIRK & ALEX
(Tentsile, 2015)

The Tentsile tent exploits the unique ability of a textile to be stretched until it becomes a 'hard' surface, as well as its ability to be rolled into a small element that can fit into a bag. The Tentsile tent creates a spatial zone within the interior of the tent with increased separation from the ground plane. This also allows for a secondary spatial zone to be formed below the stretched textile floor plane of the tent.

Figure 3.41.
INFLATABLE CONCERT HALL
ARK NOVA MUSIC FESTIVAL
MATSUSHIMA CITY, JAPAN
2011
ANISH KAPOOR AND ARATA ISOZAKI
(Marcellino, 2013)

The purple membrane of the inflatable concert hall, forms an interior as well as exterior spatial zone. This pneumatic structure exhibits the unique character of textiles and its capacity to form spatial zones by becoming its own structure. The large interior spatial zone that is formed is temporary in nature, and will once again form part of the exterior spatial zone when the structure is deflated.

textile - only elements...

3.4.
THE UNIQUE CHARACTER OF TEXTILES

Traditionally architectural space-defining elements are static, dense, heavy and 'hard' whereas textiles have the capacity to manifest as the complete opposite. Kruger (2009) identifies a number of characteristics of textiles which can be supplemented by those identified by Hendrieka Raubenheimer (2012: 25) in her dissertation WARP + WEFT: Translating textiles into Interior Architecture. Raubenheimer (2012: 25) conducted a physical exploration of textiles by manipulating various textiles and photographing the outcomes. In response to both Smith and Raubenheimer's findings, this dissertation proposes that textiles have the natural capacity to:

Expand & retract, Drape, Flow, Sway, Fold, Absorb, Crease, Screen, Twist, Tear, Unravel, Ripple, Be soft, Be fluid, Disintegrate, Be irregular, Bleed colour, Be bulky, Be thick, Be transparent, Be fine, Be textured, Fold, Be delicate, Be light, Be opaque, Stretch, Knot, Weave, Be furry, Offer acoustic control, Be structural, Be tensile, Be translucent, Be malleable, Temporal, Cover

See Figure 3.42. Collection of textile images, on poster 5 (immediately right) Section **3.3. Comparative visual study** provides example images that illustrate the character of textile soft spaces. The **precedents** on the opposite page highlight the character of textiles when utilised as space-defining elements. See Figure 3.43. - 3.45. on poster 6 (opposite page).

the character of textiles


EXPAND & RETRACT


COVER

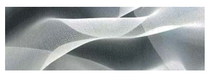

TEMPORAL


BULKY


THICK


TRANSPARENT


SOFT

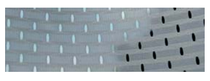

FINE


TEXTURED


FOLDABLE


DELICATE


LIGHT


OPAQUE


BLEED COLOUR

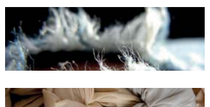

IRREGULAR

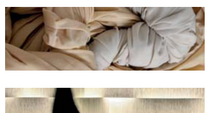

DISINTEGRATE


FLUID

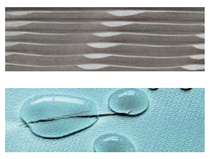

RIPPLE


UNRAVEL


TEAR

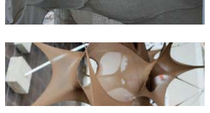

TWIST

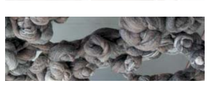

SCREEN

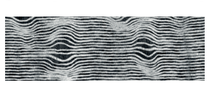

CREASE


ABSORB


SWAY

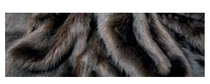

DRAPE


STRETCH

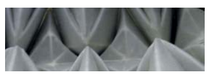

KNOT


WEAVE


BRAID


KNIT


FURRY


ACOUSTIC CONTROL


STRUCTURAL


TENSILE

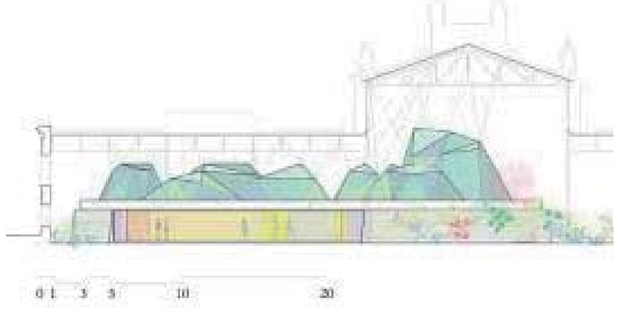

TRANSLUCENT

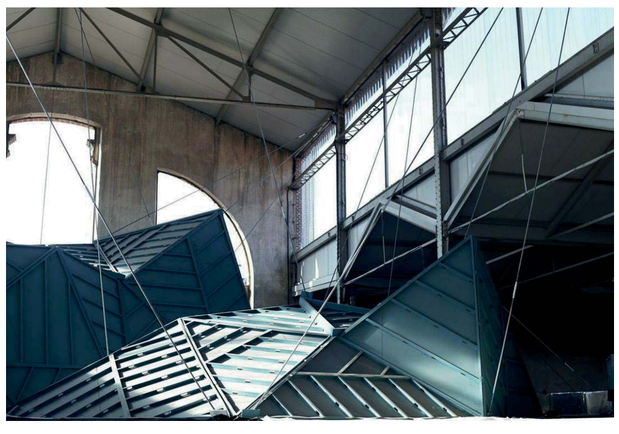
MALLEABLE

textile space-defining elements

PRECEDENT STUDIES

3.4.1.
ANNUAL INTERNATIONAL MUSIC FESTIVAL
RED BULL MUSIC ACADEMY
Langarita-Navarro Arquitectos
Matadero, Madrid, Spain
Event installation (medium-term project)
2011

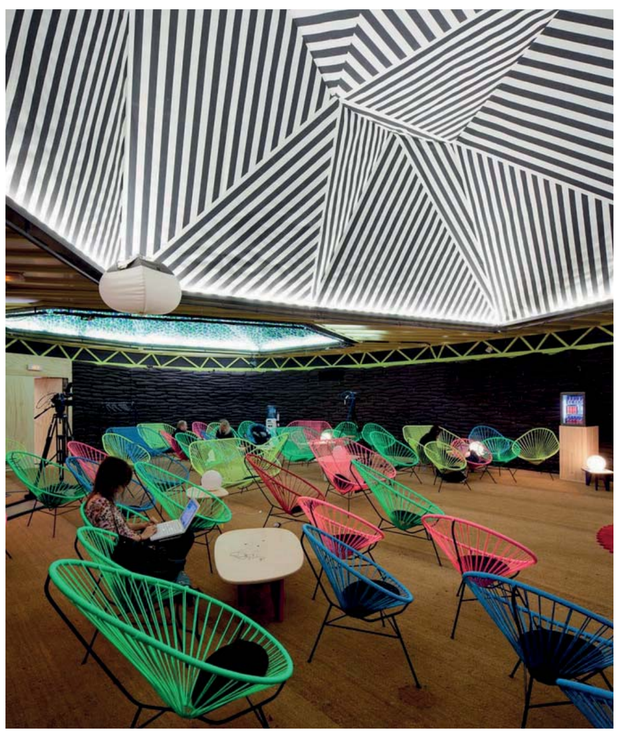




The Red Bull Music Academy (RBMA) is a 'nomadic' music festival held annually. Every year the event takes place in a different city around the world in order for producers, musicians and DJ's to exchange knowledge and ideas on an international scale. In 2011 the RBMA was intended to take place in Tokyo but due to the devastating effects of an earthquake at the time, the location was changed. The city of Madrid became the new location and the event was planned and executed in Matadero Madrid in an industrial warehousing complex (Designboom, 2012; ArchDaily, 2012a).

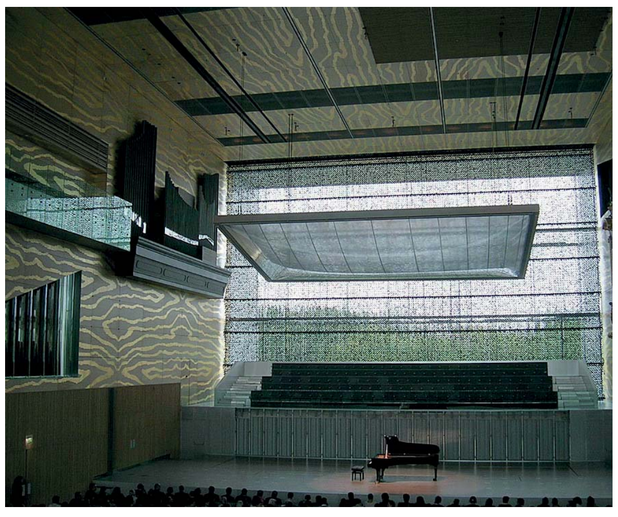
With a time constraint of only five months to design a new venue, local Spanish firm Langarita-Navarro Arquitectos designed a sequence of spaces to be constructed within two months. The design intervention intruded minimally on the existing shell and illustrated ideas such as adaptability and standardization (ArchDaily, 2012a). Due to the experimental nature of the proposed intervention and the heritage value of the warehouse, the construction project was approached as a temporary project with plans for future removal (Designboom, 2012; Langarita Navarro, 2012).

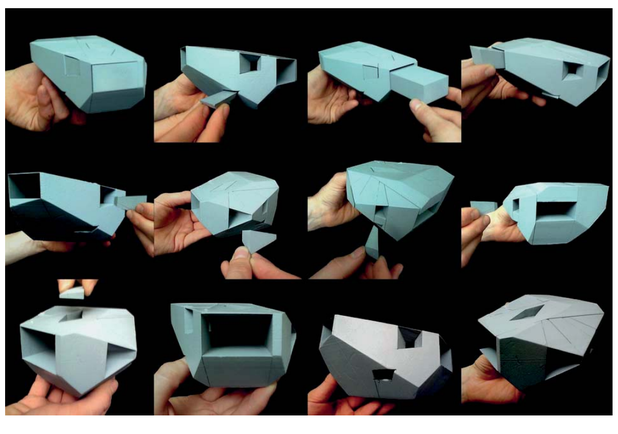
The music based programme **required** internal spaces with very **specific acoustic properties**. These requirements made the design of **textile spaces the perfect solution** and therefore many of the interior spaces consisted of canvas overhead planes and textile bags filled with sand as vertical wall planes. These elements could be **easily constructed and easily removed** but still afforded the spaces with the necessary acoustic properties. This design intervention illustrates the capacity of textiles to be very temporary **yet perform a myriad of other functions**, such as the definition of spaces with different functions, acoustic control, 'softening' of harsh steel surroundings and colourful playful interiors.



Room in room

3.4.2.
CURTAIN AS ARCHITECTURE
CASA DA MUSICA
Rem Koolhaas + Petra Blaisse
City of Porto, Portugal
New build
1999-2005





The Inside Outside studio of Petra Blaisse is concerned mainly with the **exploration of textile spaces**. Blaisse **questions the conventional notion of the wall** with its traditional structures and materials as it occurs in the architectural practice.

The Casa da Musica appropriates textiles as a functional architectural material within the interior. Contrary to conventional performance halls, the Casa da Musica consists of large voids impinging the building perimeter. This is mainly because the halls were 'excavated from the massive volume' that forms the buildings shell. Initially the notion of curtains served a purely visual function within the architect's model and was represented as scraps of textile inserted as place holders (Blaisse, 2007: 365; Weinthal, 2011: 272).

The requirements and expectations of the curtains changed as the design team realized that even the slightest alteration of scale, materials, position or structure significantly impacted on the performance and potential of the rooms. Eventually the use of blackout curtains mediated between the light and acoustic performance within the halls in order to enhance the visual and auditory quality of the spaces (Weinthal, 2011: 274, 275).

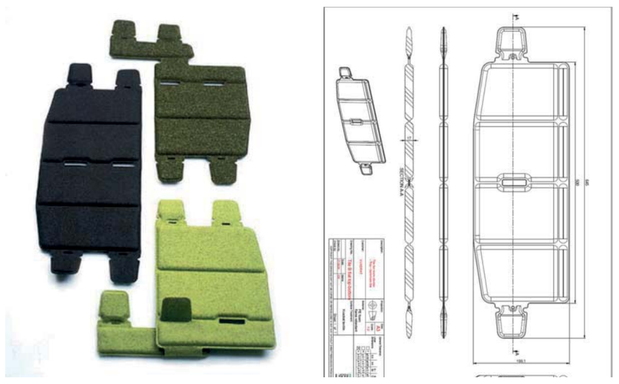
The product of collaboration between Rem Koolhaas and Petra Blaisse exemplifies the capacity of **textiles to enrich space** to an **aesthetic** level whilst simultaneously fulfilling a **utilitarian function**. This challenges the typical preconceptions of textiles as chiefly aesthetic in nature. The acoustic and atmospheric definition offered by the textile curtain is used to full effect in the project. The Casa da Musica illustrates the potential of exploiting the unique characteristics of textiles in place of traditional 'hard' space-defining elements.

Curtain wall

3.4.3.
TEXTILE CAFE
MUDAM CAFE AND BOUTIQUE
Ronan and Erwen Bouroullec
Luxemburg
Installation
2006-2007

The Musee d'Art Moderne Grand Duc Jean (MUDAM) restaurant, designed by Pei Cobb Freed and Partners, is located within a large interior space that carries a glass roof. Ronan and Erwin Bouroullec designed and developed a textile pavilion to provide relief from the solar radiation entering the glass roof and establish a soft space on a more human level than the surrounding architecture (The collection, 2005). The pavilion consists of a wooden structure that supports the textile cladding. The textile cladding system is composed of a series of tiles, titled "North Tile" (Kruger, 2009: 124,125). Other than relief from harsh sunlight entering the glass roof, the textile cladding enhances the space's acoustic climate and contributes to creating a soft and welcoming aesthetic.

The pavilion illustrates the capacity of textiles to perform both utilitarian and aesthetic functions. Although the textile tile emulates the form and function of a traditionally hard and cold material, the nature of textiles as a material allows it to perform beyond these restrictions. The use of the **textile adds an intangible experiential quality** to the space below the overhead plane that other traditional materials cannot provide. Further, the pavilion also illustrates how textiles can form an intimate spatial zone by means of a textile overhead plane which is not merely a tent.



Canopy

Section 3.4.1. (from top to bottom)
Figure 3.43.a. Red Bull Music Academy, section (Langarita Navarro, 2012).
Figure 3.43.b. Red Bull Music Academy, roof detail (Designboom, 2012).
Figure 3.43.c. Red Bull Music Academy, sound insulation (Designboom, 2012).
Figure 3.43.d. Red Bull Music Academy, textile ceiling plane (Designboom, 2012).
Section 3.4.2. (from top to bottom)
Figure 3.44.a. Casa da Musica, Stage curtain (Infoteli, 2010).
Figure 3.44.b. Casa da Musica, Building models (Infoteli, 2010).
Figure 3.44.c. Casa da Musica, Curtain knot detail (Infoteli, 2010).
Section 3.4.3. (from top to bottom)
Figure 3.45.a. Mudum cafe and boutique, View of temporary café structure (Mimoa, 2006).
Figure 3.45.b.Mudum cafe and boutique, North tile detail (The collection, 2005).
Figure 3.45.c. Mudum cafe and boutique, View indicating glass overhead façade (Mimoa, 2006).

3.5.
TEXTILE ASSOCIATIONS

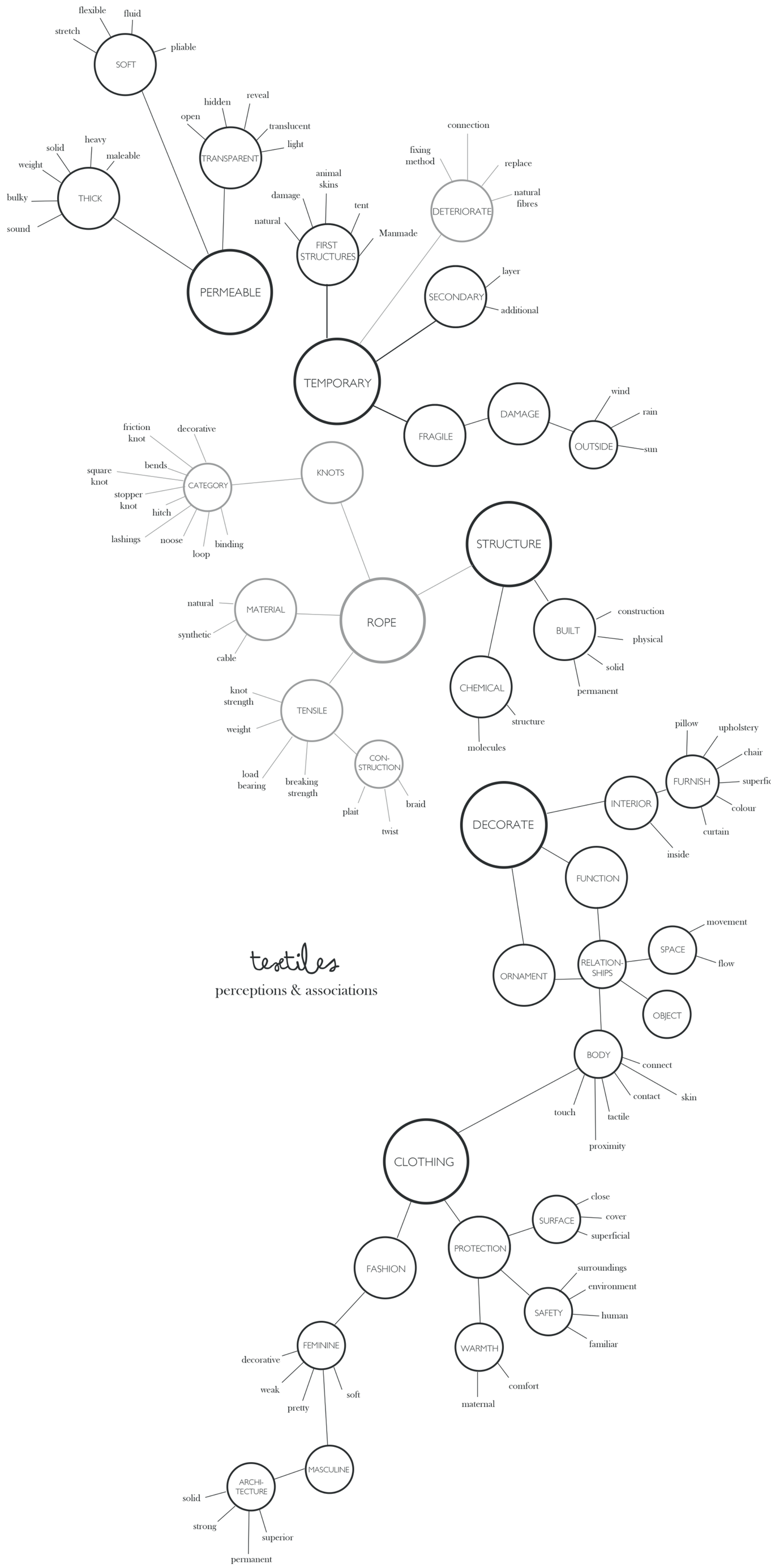
"Associations generate meaning by making connections in the mind to other objects; in this way it transmits meaning and cultural capital from other objects to the interior artefact." (Konigk 2015: 226).

Earlier on in the study it was argued that the associations or connections that existis between textiles and decorating (Hoskyns 2007: 85) contributed to the devalued status of textile within the interior as well as its current conventional application within the discipline of interior design. **The research aims to re-evaluate this position and reclaim this valuable lost territory through alternative contemporary textile applications.** New associations and perceptions can be established through these alternative applications.

Figure 3.46. Textiles, personal perceptions and associations is a heuristic exploration of the materials of textile and rope. The exploration was completed before and during section **3.3. Comparitive visual study.** The diagram is not based on empirical data but acts as an observation (See CHAPTER 2: Methodology for further discussion of the methods).

Further, personal associations with the hand-knotted textile, rope and rope-like materials can be found in the form of small bubble diagrams on specific posters throughout the presentation.

Figure 3.46. Textiles, personal perceptions and associations.



3.6
CONCLUSION

The chapter investigated various examples of traditional as well as alternative space-defining elements. These examples provide opportunity for further investigation into the potentials and restrictions that textile as an alternative material offer in terms of space-making. These potentials and restrictions will be discussed in **CHAPTER 5: Design development.** Further, the precedents investigated provided a means of discovering the unique character of textiles. The Chapter also briefly introduced certain associations and perceptions that are linked to textiles as a material. These associations and perceptions will be introduced again later in **CHAPTER 5: Design development.**

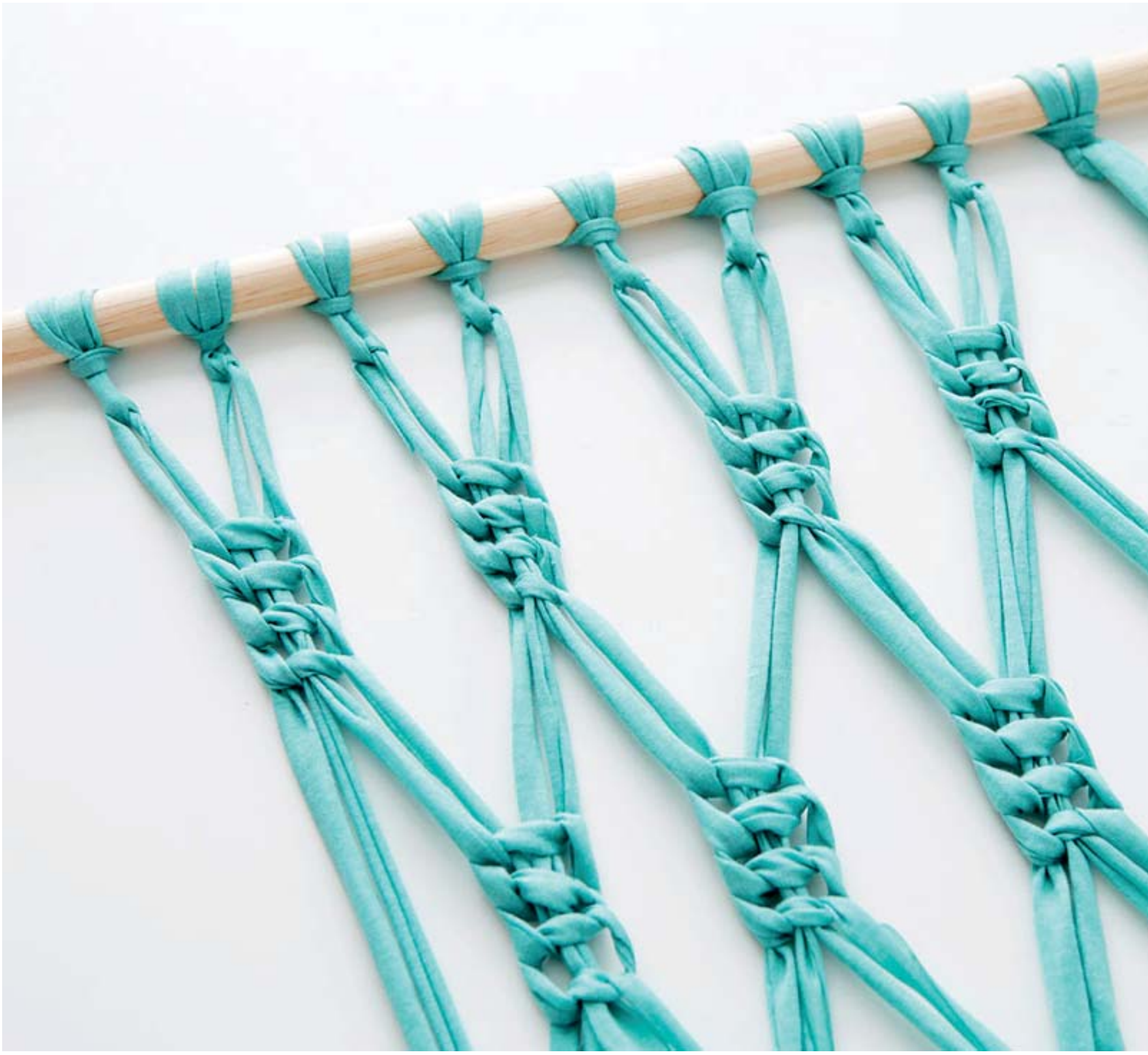


Figure 4.1. Hand knotted macramé (Taghavian, 2014).

material overview

CHAPTER 4

"Indeed, I am not sure but it would be safe to state that the real difference between civilized and savage man consists largely in the knowledge of knots and rope work. No cloth could be woven, no net or seine knitted, no bow strung and no craft sailed on lake or sea without numerous knots and proper lines or ropes; and Columbus himself would have been far more handicapped without knots than without a compass."

-Verril, 1917: 2

This chapter situates rope and rope-like materials within the realm of textiles and textile production. The discussion includes a set of precedents illustrating hand-knotted textiles as space-defining elements. Next, the chapter investigates the construction and physical structure of rope and introduces rope and knot terminology. Knots are further unpacked by introducing the various knot categories and uses of each of these main types of knots. Furthermore, rope and knot strength is discussed. Overall the chapter serves as an introduction to rope and rope-like material and knotting as fabrication method.

rope and rope-like materials

4.1.
ROPE AS TEXTILE

See section **4.1.1. Rope as textile,** on poster 8 (opposite page) for **full definition of rope as textile.** Further, refer to definition of terms in **Section 1.6, (**page 9).

...The term textile consequently refers to any filament, fibre or yarn that can be processed into cloth or fabric as well as the resultant material.

The emphasis and eventual outcome of the investigation is specifically aligned toward the application of rope and rope-like materials in the fabrication of textile space-defining elements. The use of rope allows the investigation the opportunity to apply textiles in an alternative manner within the interior. This yarn-based material is well situated within the realm of textiles. It displays the character of textiles and takes on textile functions.

See precedents **4.1.2. Hand knotted playground** and **4.1.3. Beaded curtain** on poster 8 (opposite page) as examples where rope is employed to create textile space-defining elements.

4.2.
ROPE CONSTRUCTION AND STRUCTURE

Textile manufacturing is a major industry. At present most commercial textiles are produced by industrial production methods (Peopletree, 2014). However, textiles are still produced by means of pre-industrial processes, otherwise known as traditional manual fabrication techniques. The process of manual textile production follows the same basic steps as that of the industrial process. These steps involve the manufacturing of fibres, which are then processed into yarns. Whereafter yarns are fabricated into textiles (Kadolph, 2007: iii). Industrial textile production methods include knitting, weaving, tufting and fusion bonding, braiding, twisting, combining fibres as well as extruded polymer solutions (Yeager & Teter-Justice, 2000: 97-105). Manual fabrication techniques are limited to weaving, knitting, crocheting and lace making (Peopletree, 2014). **The dissertation introduces knotting as an additional manual fabrication technique.** See Figure 4.4. Pre-industrial textile production techniques, on poster 8 (opposite page).

Knotting as manual fabrication technique is pure in its capacity to be hand-crafted, whereas other manual techniques such as knitting, crocheting and lace making require additional, albeit basic, mechanical equipment. Before taking up the matter of knot making, it is necessary to first consider rope (otherwise known as cordage) in general, as both it and the materials that it is made of, help determine its knot-making properties (Animated knots, 2012).

The structure of the cordage can also have an effect it's capacity to stretch, its flexibility, abrasion resistance, handgrip, aesthetic and more (Penn, 2015; Animated knots, 2012). The three basic types of cordage are classified according to the method of construction (How products are made, 2015). See section **4.2.1. Main rope types** on poster 8 (opposite page) for a list of the main rope types.

rope as textile

MATERIAL OVERVIEW

4.1.1.
ROPE AS TEXTILE

The term textile does not refer only to classical textile materials comprising of flat fabrics. The term textile is derived from the Latin *textilis* and the French *texere*, which means 'to weave' (Whewell, 2015). Originally the term represented only fabrics produced by means of weaving. Later however, the term also encompassed fabrics produced by additional methods. Therefore lace, embroidery, nets, threads, cords, ropes, braids and fabrics made through methods of weaving, knitting, felting, bonding and tufting are considered textiles (Whewell, 2015). The term textile consequently refers to any filament, fibre or yarn that can be processed into cloth or fabric as well as the resultant material.

Refer to section 4.1. for further discussion.

4.2.1.
MAIN ROPE TYPES

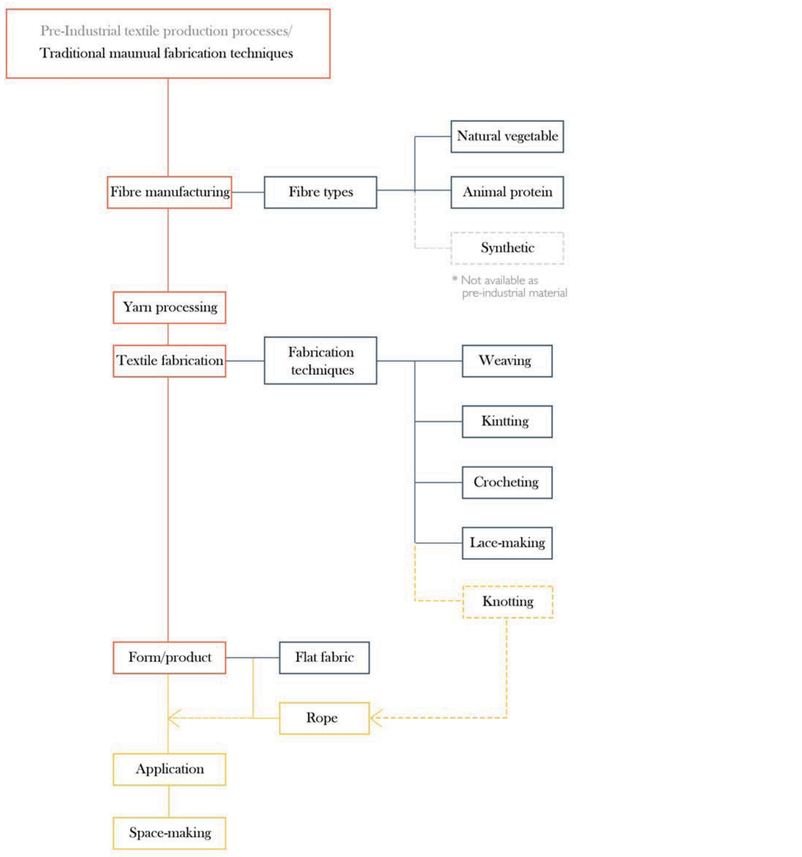
Refer to section **4.2. Rope construction and structure** (opposite page, document). Knotting as manual fabrication technique is pure in its capacity to be hand-crafted, whereas other manual techniques such as knitting, crocheting and lace making require additional, albeit basic, mechanical equipment.

The three main rope types are:

- **Twisted rope:** Yarns twisted into strands, and strands twisted into rope.
- **Braided rope:** Yarn is braided together instead of twisted.
- **Plaited rope:** Plaited rope is made by braiding twisted strands together.

See also section **4.2.1.1. Twisted rope** (following page, document) and section **4.2.1.2. Braided and plaited rope** (following page, document) for a discussion on these rope types.

Manual fabrication techniques are limited to weaving, knitting, crocheting and lace making (Peopletree, 2014). **The dissertation introduces knotting as an additional manual fabrication technique.** See Figure 4.4. Pre-industrial textile production techniques, below.



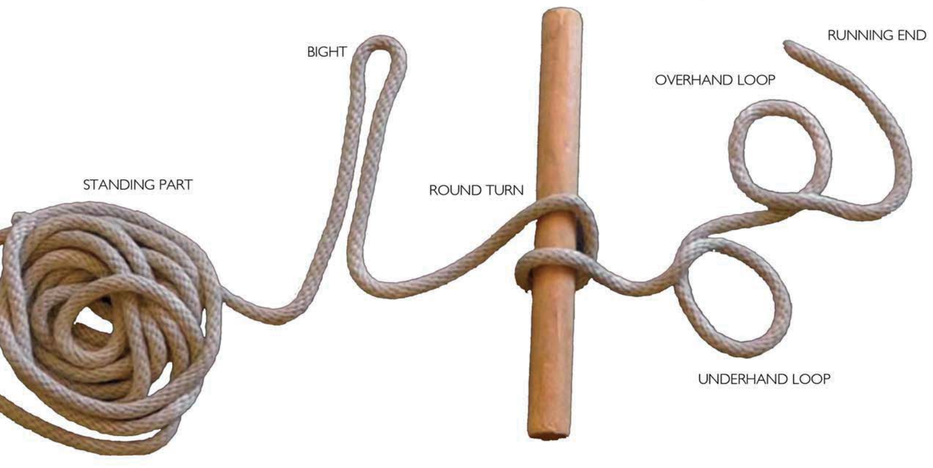
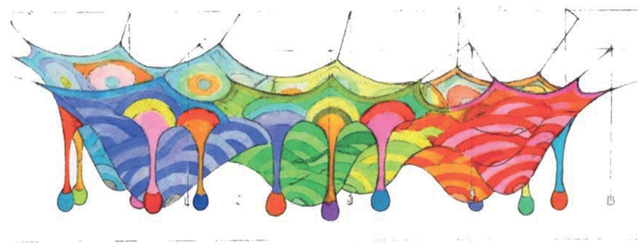
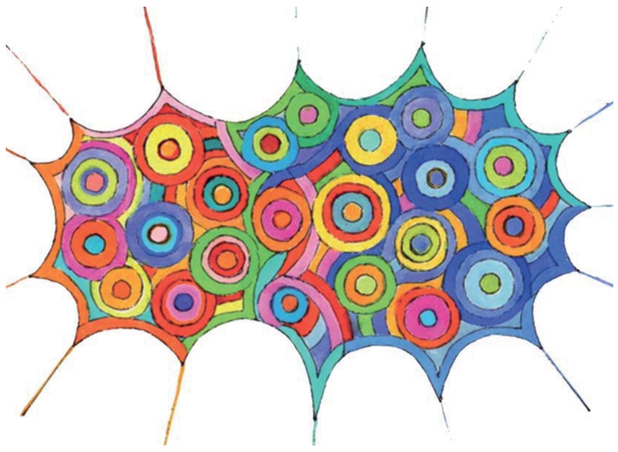


Figure 4.7. Rope terminology

4.1.2.
HAND KNITTED PLAYGROUND
'WOODS OF NET' PAVILION
Toshiko Horiuchi MacAdam
Hakone Open Air Museum, Hakone, Japan
Textile Installation
2009-2010





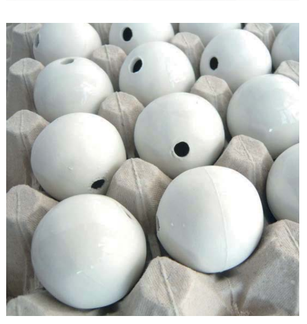
Toshiko Horiuchi creates spatial zones using fibre and textile structures. The production of the hand crafted playgrounds involve the translation of traditional architectural space-defining elements, ideas and references into alternative space-defining elements that respond to principles of tension and the forces of gravity.

The knitted playground is not only a sculptural museum piece but also an experiential area for children to touch and feel. Toshiko firstly imagines an image, draws it and calculates the area, amount of material and the rate at which she works. Then she sets a plan and works on it diligently until it is completed. The hand knitted playground is constructed of 650kg of Nylon 6 rope which Toshiko dyed in lots of 1kg within a time span of three months. The completed piece took Toshiko one year to crochet and assemble. Conceptually the project is based on the idea of an infant cradled in the womb. The crocheted form resembles the mother's womb and the fluid wave-like motion that the net makes when children play on it, mimics the rocking and floating motions inside of the womb (ArchDaily, 2012b).

The hand crafted playground is a prime example of how ideas of traditional hard, static space can be re-imagined into alternative textile space. Further, the hand crafted playground illustrates how the manual textile fabrication technique of crocheting with rope can be applied large scale to form impressive decorative and useful spaces.

Canopy

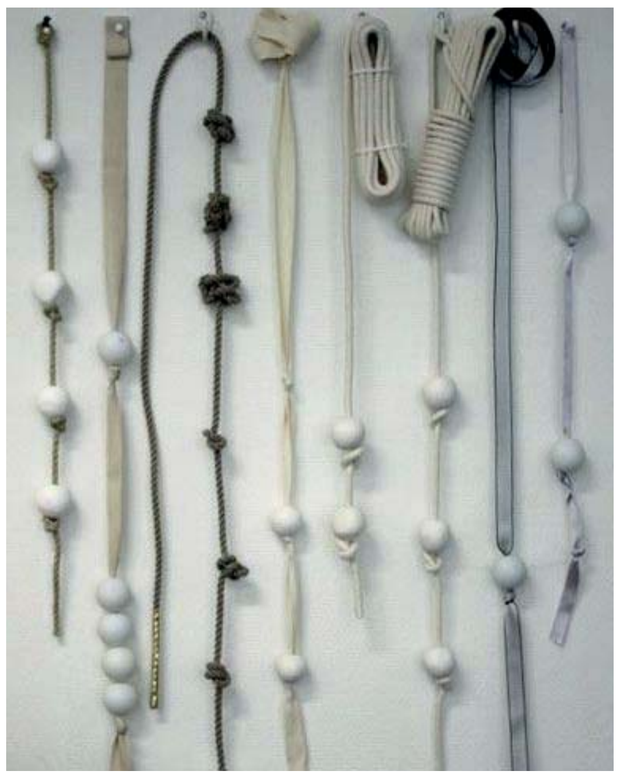
4.1.3.
BEADED CURTAIN
NORTH DELEGATES LOUNGE
Rem Koolhaas, Hella Jongerius + Irma Boom
United Nations Headquarters, New York, USA
Renovation
2009-2013



The renovation of the North Delegates' Lounge at the United Nations building in New York was completed by a team of Dutch creatives that included architect Rem Koolhaas, Designer Hella Jongerius, graphic designer Irma Boom, artist Gabriel Lester and theorist Louise Schouwneberg. The main lounge area, designed by architects Oscar Niemeyer and Le Corbusier in 1960 was spatially reconfigured and enhanced through the addition of new furniture (Bernstein, 2013; Dezeen, 2013).

The main feature of the new lounge is a beaded curtain designed and made by Hella Jongerius. It consists of hand knotted yarn and 30 000 porcelain beads. The curtain acts as a space-defining element and enhances the view through the opening towards the East River. Jongerius also designed two new furniture pieces for the lounge area, introducing a revitalised colour palette to the space (Dezeen, 2013).

The beaded curtain in the UN building demonstrates the way in which rope can be knotted to form space-defining elements. The use of porcelain beads in combination with rope illustrates how hard elements can appear soft due to the pliable and flexible nature of rope. Although the rope curtain acts as a soft textile space-defining element, it still mainly communicates the characteristics of a traditional, vertical, single plain space-defining element.



Curtain wall

Section 4.1.2. (from top to bottom)
Figure 4.2.a. Hand Knitted playground, elevation (archdaily, 2012B).
Figure 4.2.b. Hand Knitted playground, plan view (archdaily, 2012B).
Figure 4.2.c. Hand Knitted playground (archdaily, 2012B).
Figure 4.2.d. Hand Knitted playground, hand knitting procedure (archdaily, 2012B).
Section 4.1.3. (from top to bottom)
Figure 4.3.a. Beaded curtain, North delegates lounge (Dezeen, 2013).
Figure 4.3.b. Beaded curtain, image 1-4 process of making (Jongeriuslab, 2013).
Figure 4.3.c. Beaded curtain, Material selection (Jongeriuslab, 2013).

4.2.1.1.
TWISTED ROPE

The rope making process is very similar to the process of textile construction.

The making of rope involves the twisting of fibres (Figure 4.5: A) to form what is known as a yarn (Figure 4.5: B). The combined twisting of two or more yarns, form a strand (Figure 4.5: C). Three or more strands twisted together form a rope (Figure 4.5: D), and finally when three ropes are combined, a cable is formed (Figure 4.5: E) (Verril, 1917: 3). See also Figure 4.6. Types of rope, (1) for an example of twisted rope (opposite page).

In order to form a strand, the yarns are twisted together in the opposite bearing from that in which the initial fibres were twisted. Similarly, in order to form a rope, the strands are twisted in the opposite direction from the yarns of the strands. This ensures that the natural tendency for each yarn, strand, rope or cable to untwist, instead serves as a manner of binding it (Verril, 1917: 3). **Twisted ropes are mainly constructed using natural fibres. The following terms are commonly used within the category of twisted rope:**

- **Three-strand twisted rope** (also four-strand twisted).
- **Lay:** The lay or direction of slant, is the direction in which the strands of a rope twists
- **Right hand lay or Z-twist:** Strand progresses away from the viewer, and rotates clockwise like right hand thread. Right hand lay is typically used for most three-strand or four-strand rope.
- **Left hand lay or S-twist:** Left hand lay or cable laid, is typically used for steel cables.

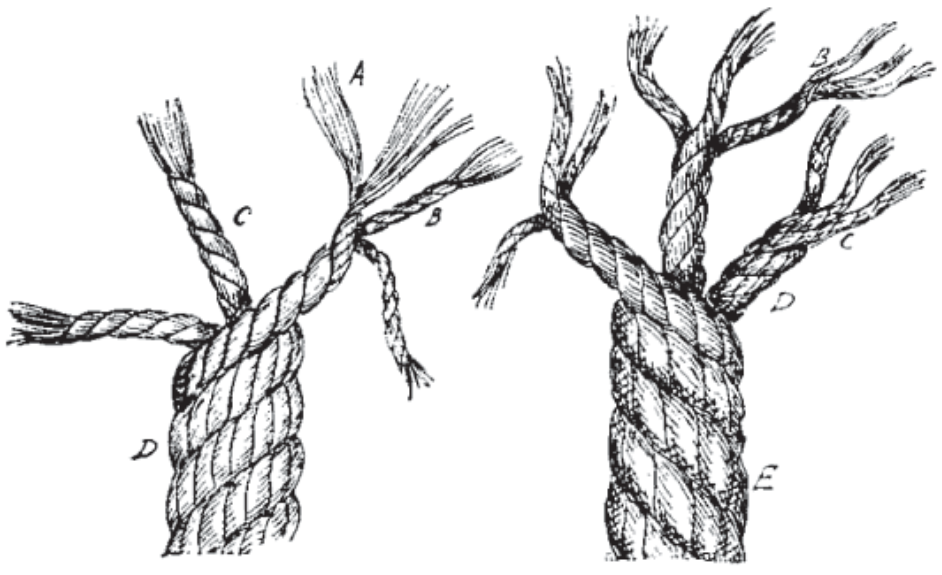


Figure 4.5. Composition sketch of twisted rope (Verrill, 1917: 8).

4.2.1.2.
BRAIDED AND PLAITED ROPE

The use of modern machinery and the advent of synthetic fibres allow for additional rope construction beyond that of twisted rope. Plaited and braided ropes, woven on machines are available in a range of decorative patterns, are tightly woven and don't untwist as easily as twisted rope (Penn, 2015; Animated knots, 2012). See Figure 4.6. Types of rope (2) for an example of plaited rope and (3-6) as examples of braided rope (opposite page). The following rope structures for braided and plaited ropes are described by Randy Penn (2004) in his book The everything knots book:

Single braid ropes include various braids which have no second layer. These include:

- **Hollow braid:** The construction consists of two sets of fibres that progress around in opposite directions and weave into each other. Hollowbraid refers to the behaviour of the rope as it readily opens up to become 'hollow'. This allows the tail or standing end of the rope to be passed through the rope to form a knotless loop.
- **Solid braid (simple weave):** The construction of the rope consists of two sets of fibres that rotate in opposite directions but with a tighter weave than that of the Hollow braid structure. This structure is mainly applied to smaller diameter general-use lines.
- **Solid braid (solid weave):** The structure of a solid braid, solid weave rope contain fibres that do not progress around the rope. Instead the fibres spirals from the exterior of the rope toward the interior. The solid weave structure is commonly found in general-purpose rope but is not applied to high performance or specialty purpose rope.

Double braid (braid-on-braid) rope consists of a braided interior core surrounded by a braided outer sheath. The load is thus shared between the sheath and the core. The protection offered to the core by the braided sheath is desired but can make it difficult to detect any possible damage to the inner core. Some core and sheath ropes contain cores that are not braided, such as a three-strand rope. The core can also be a composed of different material than the outer sheath attributing the rope with different properties.

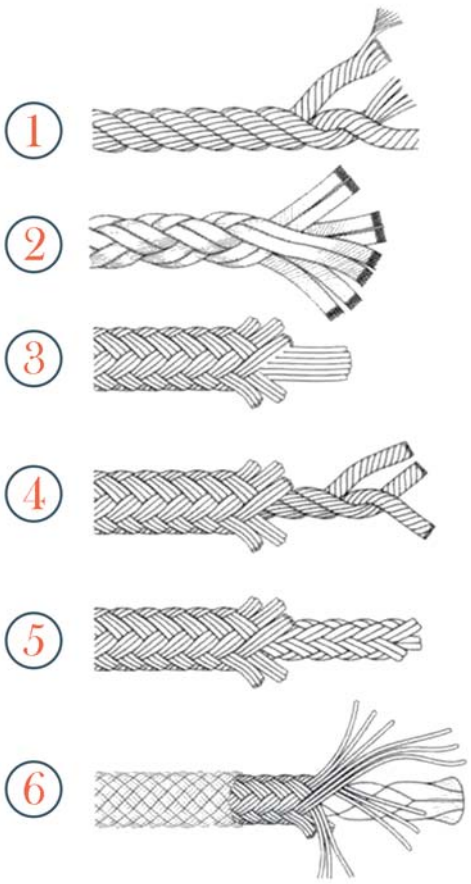


Figure 4.6. Types of rope (adapted from Knotsguide, 2008).

4.3.
ROPE TERMINOLOGY

NOTE: The following terminology pertaining to rope and the tying of knots, is a direct selection from the American army field manual section FM 3-05. 70 (Mongabay.com, 2015). The selected terms will be applied continuously throughout the document.

STANDING PART: The static part of the rope or rest of the rope besides the running end.

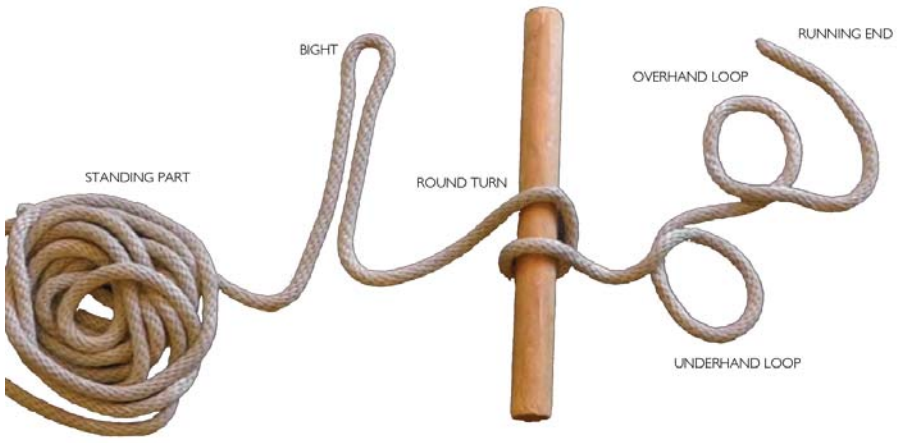
BIGHT: A simple bend in a rope in which the rope does not cross itself.

TURN: A loop around an object such as a post, rail or ring, with the running end continuing in the opposite direction to the standing end. A round turn continues to circle and exits in the same general direction as the standing end.

LOOP: A loop is formed by crossing the running end over or under the standing end to form a ring or circle in the rope.

RUNNING END: The free or working end of the rope. This is the part you are actually using to tie the knot.

DRESSING' THE KNOT: The orientation of all knots parts so that they are properly aligned, straightened, or bundled. Neglecting this can result in an additional 50% reduction in knot strength. This term is sometimes used for setting the knot which involves tightening all parts of the knot so they bind on one another and make the knot operational. A loosely tied knot can easily deform under strain and change, becoming a slipknot or worse, untying.



Duplicate of Figure 4.7. Rope terminology (poster 8)

4.4.
KNOT CATEGORIES

According to Pettigrew (2013) in A few good knots & hitches and bends, knots can be divided into various categories. These basic categories are: Hitches, Loops, Noose, Bends, Binders, Stopper knots, Friction knots, and Lashings (Pettigrew, 2013). Pettigrew (2013: 4) refers frequently to ABoK when describing knots.

The acronym, ABoK refers to Ashley's Book of Knots (AcronymFinder; Pettigrew, 2013: 4). This book was first published in 1944 and later reprinted in 1993 with amendments. The book contains 7000 drawings representing more than 3800 different knots. It is the principal reference work for knotting as each knot illustration is identified by a number (Pettigrew, 2013: 4). According to Pettigrew (2013:4)

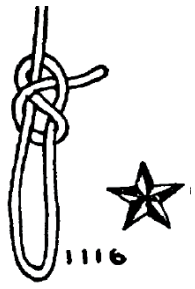
> "With many knots having more than a single name in any one language, the reference number from ABoK has become the equivalent of the Binomial or Latin name in Zoology and Botany."

However, new knots and some that do not appear in Ashley's Book of Knots lack an ABoK number.

With reference to both Pettigrew (2013) and Ashley (1993) knots are categorised as:

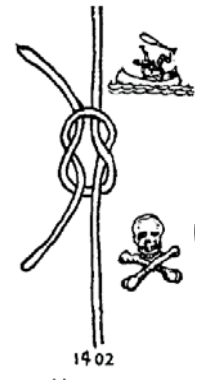
- Noose
- Loops
- Friction knots
- Lashings
- Binders
- Hitches
- Bends
- Stopper knots

These knot categories are described in more depth on the opposite page. All illustrations from Ashley's Book of Knots (Ashley, 1993).

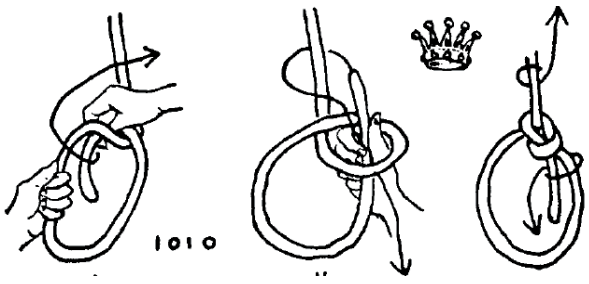


NOOSE: A Noose or snare, sometimes called a Running Knot is a variety of Loop Knot that is tied in hand, and, when placed around an object, renders and constricts when the rope is pulled on. It serves a purpose similar to a hitch, but a hitch is tied directly to its object (Ashley, 1993: 203). Figure 4.8. The Figure-Eight Noose, ABoK #1116 (Ashley, 1993: 203).

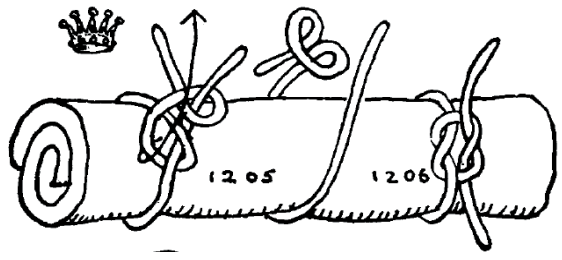
LASHINGS: Lashings is a broad term that covers several somewhat different practices. A lashing may wrap and bind, or else bind only with a multiplicity of turns, a bale, parcel, box, chest, or other container, either for transportation of for storage. It may secure something movable to something that is fixed, with various turns and hitches, so that it cannot shift from its position (Ashley, 1993: 335). Figure 4.11. The Loop Knot, ABoK #2068 (Ashley, 1993: 335).



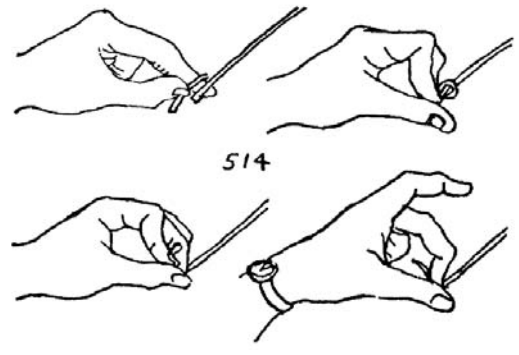
BENDS: A bend unites two ropes, or two parts of the same rope, generally at the ends. Its purpose is to lengthen the rope (Ashley, 1993: 257). Figure 4.14. The Reef or Square Knot, ABoK #1402 (Ashley, 1993: 257).



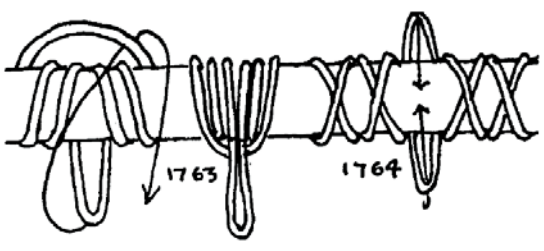
LOOPS: A Loop Knot is a closed bight that is tied either in the end or in the central part of a rope. It serves much the same purpose as a hitch. However, a Loop Knot is a rigid knot that is tied in hand and placed over an object such as a peg, post, pile, hook, or the lug of an archer's bow, while a hitch is made fast directly around an object (Ashley, 1993: 185). Figure 4.9. The Bowline, ABoK #1010 (Ashley, 1993: 185).



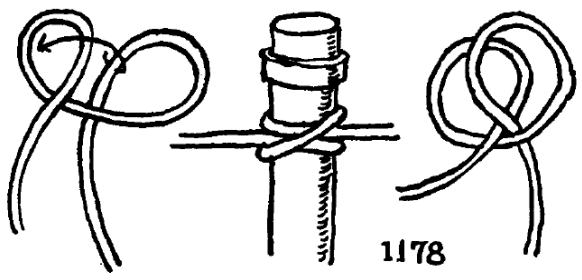
BINDERS: Binders or Binding Knots are of two sorts. The first sort passes around an object or objects two or more times and the tow ends are snugly tied together; the second passes around an object or objects two or more times and the ends are stuck under the turns. The knots serve two purposes. Either they confine and constrict a single object, or else they hold two or more objects snugly together (Ashley, 1993: 219). Figure 4.12. The Granny Knot, ABoK #1206 (Ashley, 1993: 219).



STOPPER KNOTS: Stopper Knots or Knob Knots are divided into various sub-categories, each with their own purpose. Stopper Knots are used for a variety of tasks, from holding up a shelf or attaching a swing, to preventing the rope from unreeving from a block, slipping through a Cam Cleat or running out of a belay/abseil device. They can also provide security to a knot by preventing the tail form pulling through. They are equally useful in providing handholds on a rope that is being pulled or climbed (Pettigrew, 2013: 32). Figure 4.15. The Overhand Knot, ABoK #514 (Ashley, 1993: 84).



FRICTION KNOTS: The Ashley book of knots classifies friction knots as '*right angle and lengthwise pull hitches'* (Ashley, 1993: 289, 297). Pettigrew (2013: 34) describes Friction Knots or Slide and Grip Knots as specialised knots. They are mainly tied using slings made of webbing or cord. The cord used is usually between 60% and 70% of the diameter of the rope it is to be tied around (Pettigrew, 2013: 34). Figure 4.10. The Prusik Knot, ABoK #1763 (Ashley, 1993: 289, 297).



HITCHES: The general purpose of a Hitch or Crossing Knot is to hold together the bights of two ropes, or two parts of the same rope that cross each other, or else to secure the bight of a single rope to another cylindrical object (Ashley, 1993: 213). Figure 4.13. The Clove Hitch, ABoK #1178 (Ashley, 1993: 213).

4.5.
ROPE AND KNOT STRENGTH

Every rope has a specific Breaking Strength. See definition of terms, **Section 1.6**, (page 9). This means that when a rope is placed under enough strain, it will break (Root, 2005). The safe working capacity or safe working load of a rope is generally considered to be one-fifth of the rope's breaking strength, or 15-25% of the tensile strength (BoatSafe, 2009). In other words, the breaking strength should be five times the weight of the object that the line will be holding. Even though a rope might have a safe working capacity when brand new aspects such as age, wear and tear, dynamic loading, excessive use, elevated temperatures or extended periods under load will critically affect the strength and safety of the rope (Root, 2005; JB Rope supply, 2015). The strength of a rope as stated by the manufacturer is for new or unused rope (Pettigrew, 2013: 6).

It is understood that all knots reduce the strength of a rope but some knots are stronger than others. However, considering how important ropes and knots are to a variety of people, sufficient research on the strength of knots within ropes is scarce. The available sources of data often do not indicate how tests were conducted, nor do they indicate the type of rope tested or the age and condition of the rope. As a baseline for this dissertation, The study of knot performance: Exploring the secrets of knotted cordage to understand how knots work by *All about knots* (2010), was consulted.

The paper examines knot strength and structures that may weaken natural-fibre knots. The author compares the relative strength of a selection of commonly used knots. A straight or un-knotted rope is assumed to have 100% strength (All about knots, 2010). The values listed in the table below refer to the remaining breaking strength of a rope after the specified knot has been tied (Root, 2005). See Table 4.1. Knot strenght comparison, below (The figure indicated does not represent an exact percentage but the general range of strength is accepted as an indication).

For the purpose of this dissertation the following is assumed:
According to *All about knots* (2010) the strength of a knot is determined by two characteristics of the first curve within the knot:

1. The relative proportion of the full load that falls on the first curve
2. The severity of the first curve, that is, how far it deviates from a straight line.

Further, it is also important to note that all components and rigging hardware used with rope or cordage should be suitable to the size and strength of the rope itself. The attachments should be properly installed and fixed and must have a safe working load capacity at least equal to the product with which they are used (Toolee, 2007). Rigging and hardware is covered in greater depth in **CHAPTER 5: Design application.**

KNOT STRENGHT		
Strong knots	Blood knot	85-90% (Barnes, 1947); 80% (Day, 1947)
	Flemish bend	81% (Frank & Smith, 1987)
	Figure eight loop	80% (Frank & Smith, 1987)
	Double fisherman's knot	79% (Frank & Smith, 1987)
Moderate knots	Butterfly knot	75% (Frank & Smith, 1987)
	Bowline knot	60% (Day, 1947)
	Overhand knot	60-65% (Leubben, 1995)
Weak knots	Overhand bend	50% (Allaboutknots, 2010)

Table 4.1. Knot strenght comparison (Various sources)

4.6.
CONCLUSION

Rope and rope-like materials stem from the same yarn based fabrication methods as textiles, and so can be classified as a subcategory of textiles. The formation of textile space-defining elements by means of hand knotting rope and rope-like materials imply a certain knowledge of the material. The chapter therefore introduced terminology specific to rope and knotting and discussed the main categories of knots and each of their applications. Further, the chapter illustrated examples of the use of hand knotted rope as textile space-defining elements.

The specific material selection and selected colour palette is discussed in **CHAPTER 5: Design application.**

Figure 5.1. Hand-crafted, knotted textile sample

design application

CHAPTER 5

"Always design a thing by considering it in its next larger context-a chair in a room, a room in a house, a house in an environment, an environment in a city plan."

-Eliel Saarinen

This chapter investigates, documents and conveys the design process and development. The chapter firstly introduces the conceptual thinking behind the design. This is followed by a description of the design process followed during the production of the hand knotted textiles. Whereafter an overview of the test sites, the site for intervention and the programme is presented. The design process is documented in cycles and each cycle includes a variety of sketches, photo studies, diagrams and textual documentation. All documentation of the design process and development can be found in APPENDIX B and C.

conceptual approach

TRADITIONAL & ALTERNATIVE

5.1.
CONCEPTUAL THINKING

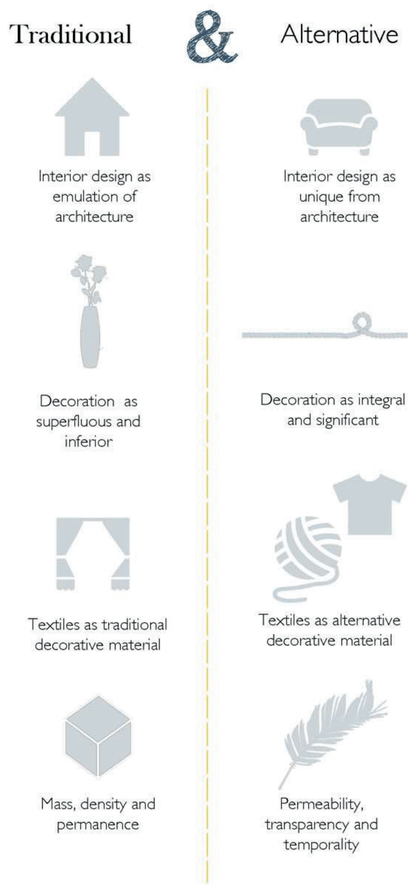
Throughout the dissertation, the terms traditional and alternative are visible. These concepts are posed against each other and the resulting paradox contributes to the decision making process. In this way the dissertation investigates how traditional ideas, methods, material use and applications can be translated alternatively. The conceptual thinking is illustrated through the following illustrations:

Figure 5.2. Traditional versus alternative, diagram (Various sources) (below)
Figure 5.3. Conceptual image board, (Various sources) (right)

The conceptual approach diagram represents various manual construction methods that exist within the realm of textile craft. For each method of construction there are various examples. The examples are also split into the two categories 'traditional' and 'alternative'. Traditional examples are found left of the cut line, while alternative examples are right of the cut line. The conceptual diagram also serves as a 'pasteboard' for a range of small precedents. Textile construction methods explored in the diagram include:

-Fabric (Material)
-Sewing (Post-production)
-Cross stitch (Post-production)
-Macramé (Post-production)
-Knitting * (Pre-production)
-Weaving * (Pre-production)
-Crochet * (Pre-production)

*Represents pre-industrial textile production techniques where lace-making is the fourth manual fabrication technique.



alternative

traditional

textiles

sewing

cross stitch

macrame

crochet

weaving

5.2.
DESIGN PROCESS

The principles of Action Research - planning, acting, and critically analysing - form the basis of the iterative design process within this study.

The Action Research method is responsive to the design situation in a way that many other research methods can't be (Dick, 2000) – rendering it appropriate to the investigation of the process of knowing through making.

Figure 5.4. Design process diagram (below), indicates the way in which the Action Research method is applied in this dissertation. Each rectangle firstly represents one of the steps typically present in the process of manual textile fabrication. See Figure 5.19. Typical steps in manual textile fabrication, poster 12 (page 58). In addition to representing the Action Research method within the rectangles, the test sites and intervention site are also indicated within the rectangles as an integrated part of the process.

The process of planning, acting and critically analysing always takes place in the same order, but, the process is not always initiated in the same rectangle (as indicated by the arrows above and below the rectangles). Each design cycle is recorded and the observations made at the end of each cycle forms the basis for the plan of action set out for the ensuing cycle. Refer to Table 5.5. Test matrix on poster 12 (page 58).

The design process takes place within the various sites, which respond to various scales of design investigation. The first two sites are the test sites. The first of the two test sites is focused on detail design (the fabrication of a textile through the method of knotting) and the second test site is focussed more on the spatial manipulation of the textile space-definer. The site for intervention is the final physical manifestation of the textile space-definer. This spatial manifestation realises the theory discussed on spatial definition in CHAPTER 3. The cycles of design incorporate a response to all three of these sites, with planning, acting and critical reflection as part of each of the cycles. (It is however important to note that the iteration process is not necessarily a linear process. The design response might move two boxes to the right on the diagram and then one step to the left. It does not mean that the next design steps would be back to the right.

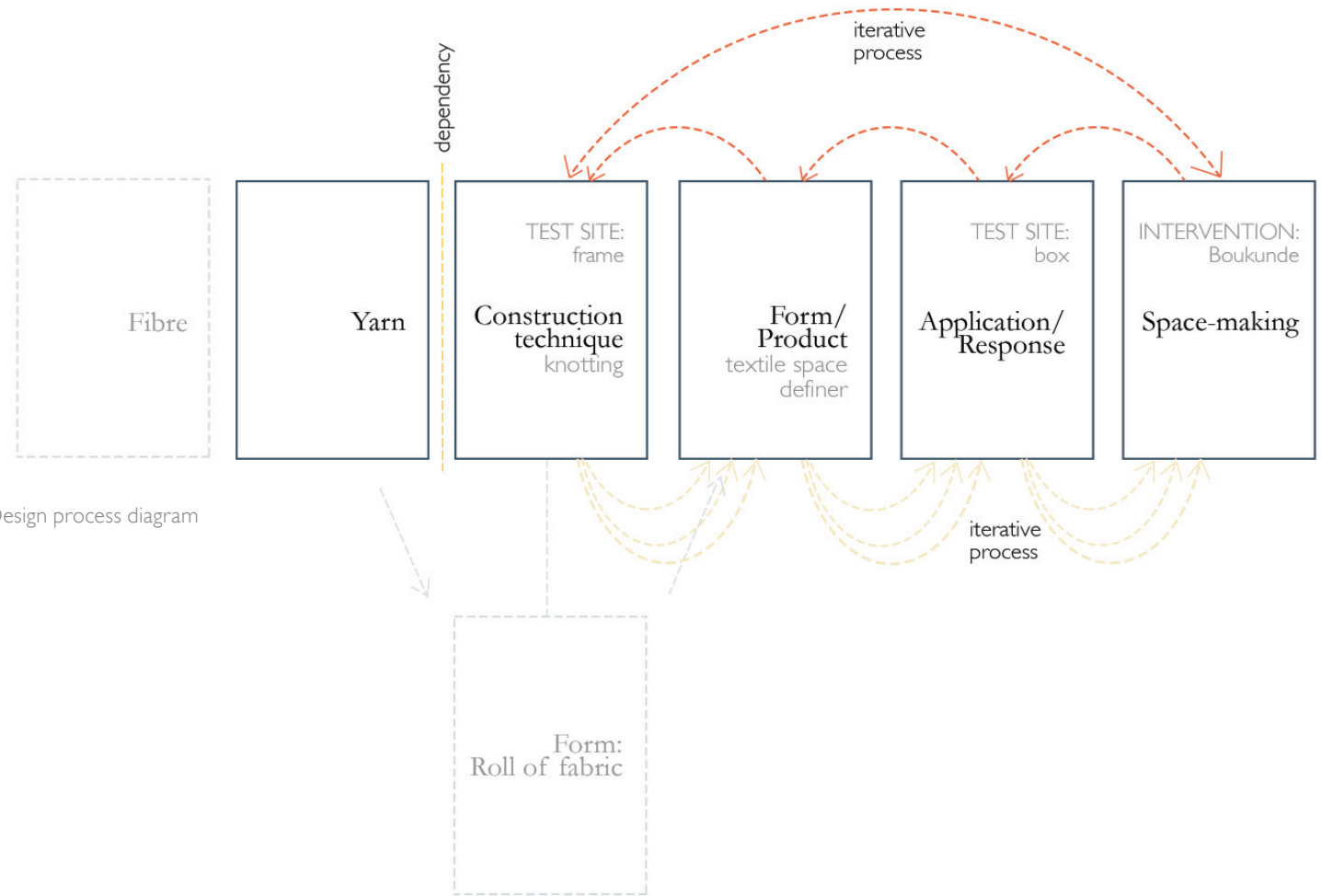


Figure 5.4. Design process diagram

5.3.
SITES FOR MAKING AND TESTING

Section 5.2. Design process offers a visual representation of the iterative design process. This process is represented by means of a **process icon** at the top of pages where appropriate. The process icon is based on Figure 5.4. The design process diagram.

The iterative cycles, employing various sites, ensure that design is considered on a larger intervention scale as well as on a more detailed and focussed scale.

The iterative cycles therefore allows for the comprehensive development of the eventual textile space-definer. The three test sites act as neutral 'areas' for the making and testing of the knotted textile. Each of the test sites have their own parameters and characteristics. The test site for intervention allows the textile to be tested on human scale, as a spatial manifestation. See APPENDIX A for the process of construction for the Testing frame and Testing box.

See section **5.3.1. Testing frame, 5.3.2. Testing Box and 5.3.3. Testing site for intervention** on poster 10 (following page) for a discussion on each of the sites. Tables 5.1. - 5.3. provide feedback in terms of observations made during the design process and the specific response to each of the observations. These observations and responses are findings related specifically to construction of the site, its parameters and issues that surfaced while working and designing within the sites.

making and testing

TEST SITE PARAMETERS

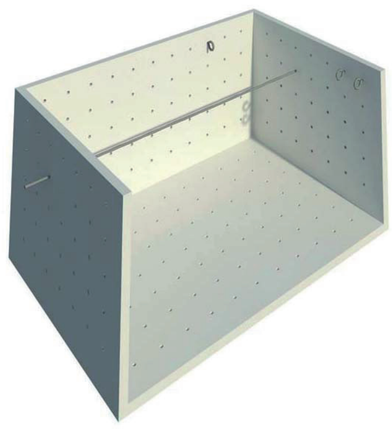
5.3.2.
TESTING BOX

form

The testing box is not designed according to a specific scale but allows for the testing of space-definers in a three dimensional setting. One could imagine the horizontal surface of the box as a floor or ceiling of an interior space and the vertical panels of the box as the walls. Therefore testing is done to discover spatial response and not the solving of construction details on a scale of 1:1 as with the testing frame.

Construction parameters of the testing box was derived from knowledge gathered throughout the iterative process. See Table 2.1. Plan of Action, part 1, poster 3 (page 16). This includes responses as seen in Table 5.1.-5.3. (below). Figure 5.17. Test type diagram, poster 11 (page 57) indicates that test completed within the framework of the box would fall under category A and B, rigid and semi-flexible testing. See APPENDIX A for construction process of the testing box. See Figure 5.8. View of test box (directly below) and Figure 5.9. Test box, scale 1:10, and Figure 5.10. Test box exploded view.

Figure 5.8. View of test box



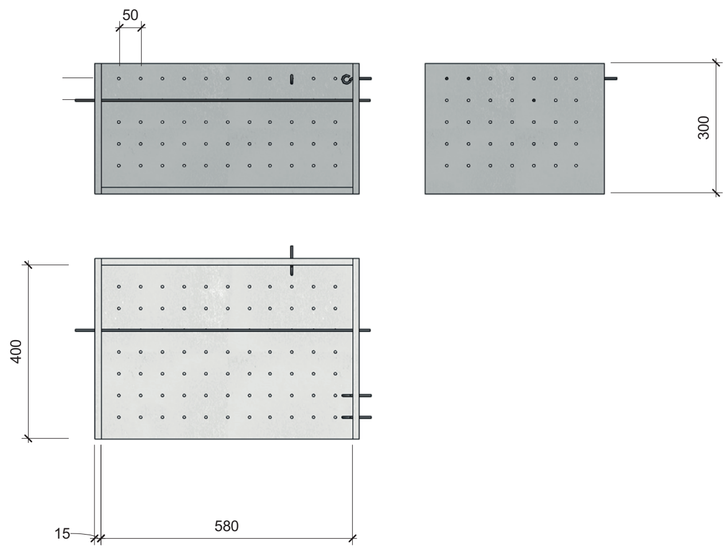


Figure 5.9.
TEST BOX
SCALE 1:10

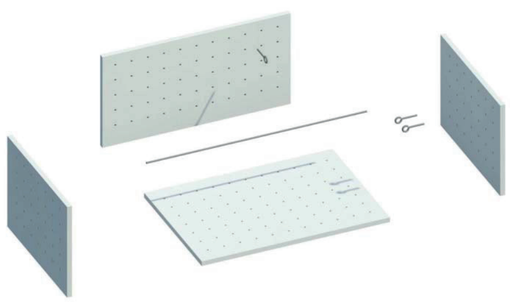


Figure 5.10. Test box exploded view.

Observation	Response
Initially the purpose of the testing box was aimed towards a scaled down testing site for samples developed on the test frame. During the first stages of testing within the box it became clear that this type of testing would be time consuming and inaccurate as the knotting process (and samples) could not be reproduced on the smaller scale.	The physical parameters of the box was not altered but rather way that the box was used when designing inside of it. Textile samples were cut to fit (from traditional textile) instead of creating scaled down versions of the knotted units.
The placement of the holes on the sides of the box, remain as rigid as with the testing frame.	A threaded rod was added to compensate. The threaded rod allows for more flexible fixing points than the eye bolts.
The neutrality of the box makes it unclear where in 'Boukunde' fixing points or anchor points would be placed. (The form of the box is not based on the parameters of the test site for intervention. It is simply a rectangle)	Cardboard cut-outs resembling the main structural columns within the studio was placed into the box. Labels were fixed to anchor points within the box to indicate related anchor points within the testing site for intervention.
The flat pieces of textile do not accurately replicate the character of the knotted textile sample.	Strings were used to indicate bending lines of textile units instead of the composition of the knotted textile. Whereafter the purpose of the testing box was re-evaluated. Instead of focussing on testing in the box during this part of the process, design would rather be done by sketching on plan.

Table 5.2. Test box, observation and response.

5.3.2.
TESTING BOX

form

The testing box is not designed according to a specific scale but allows for the testing of space-definers in a three dimensional setting. One could imagine the horizontal surface of the box as a floor or ceiling of an interior space and the vertical panels of the box as the walls. Therefore testing is done to discover spatial response and not the solving of construction details on a scale of 1:1 as with the testing frame.

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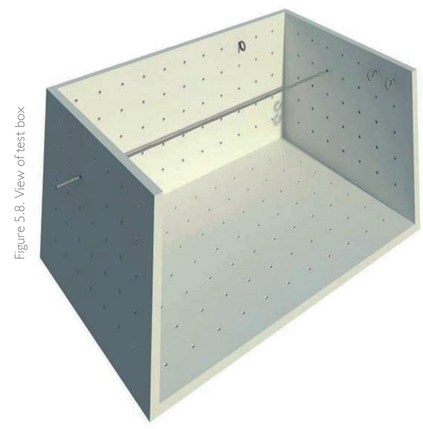
Figure 5.8. View of test box



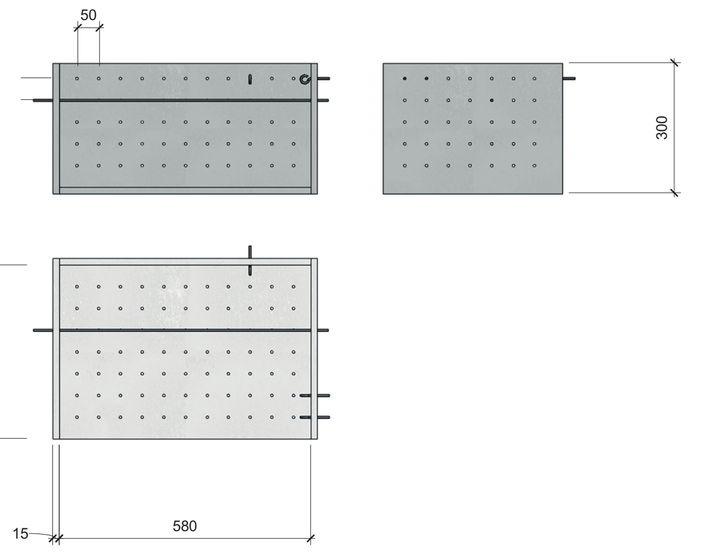


Figure 5.9.
TEST BOX
SCALE 1:10

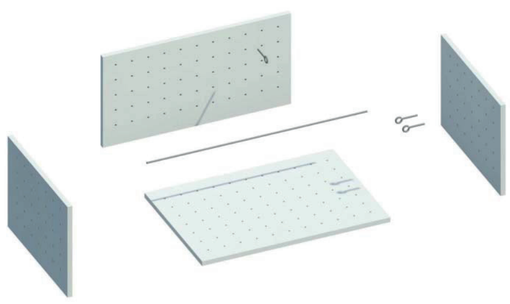


Figure 5.10. Test box exploded view.

Observation	Response
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The placement of the holes on the sides of the box, remain as rigid as with the testing frame.	A threaded rod was added to compensate. The threaded rod allows for more flexible fixing points than the eye bolts.
The neutrality of the box makes it unclear where in 'Boukunde' fixing points or anchor points would be placed. (The form of the box is not based on the parameters of the test site for intervention. It is simply a rectangle)	Cardboard cut-outs resembling the main structural columns within the studio was placed into the box. Labels were fixed to anchor points within the box to indicate related anchor points within the testing site for intervention.
The flat pieces of textile do not accurately replicate the character of the knotted textile sample.	Strings were used to indicate bending lines of textile units instead of the composition of the knotted textile. Whereafter the purpose of the testing box was re-evaluated. Instead of focussing on testing in the box during this part of the process, design would rather be done by sketching on plan.

Table 5.2. Test box, observation and response.

5.3.3.
TESTING SITE FOR INTERVENTION

The site for intervention forms part of the process of iteration and acts as a spatial informant. Within the structure of the dissertation, the site for intervention acts as a site within which to investigate and display the spatial manifestation of the hand knotted textile. The focus of the study remains primarily on the design process, with the product of the process as the primary research contribution.

The selected site is the first year studio in the Building Sciences Building (Boukunde) on the Main Campus of the University of Pretoria. The building houses the Department of Architecture, with programmes in Architecture, Interior Design and Landscape Architecture. See Figure 5.11. View of test site for intervention (directly below) and Figure 5.12. Test site for intervention, not to scale, and Figure 5.13. Existing traditional space-defining elements.

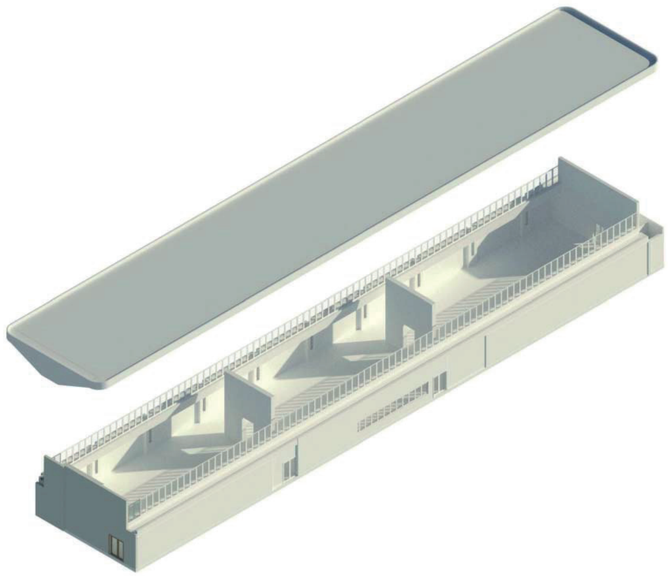


Figure 5.11. View of test site for intervention

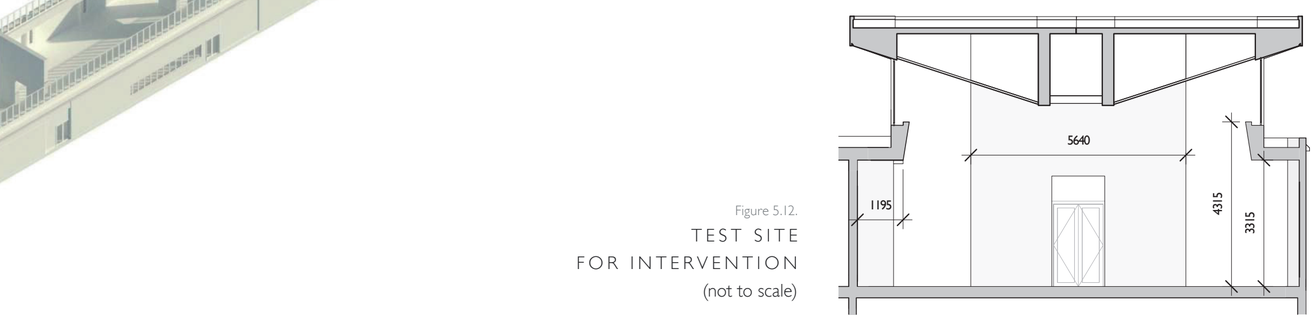


Figure 5.12.
TEST SITE
FOR INTERVENTION
(not to scale)

Figure 5.13. Existing traditional space-defining elements.

Observation	Response
Working on plan too early in the design process resulted in a very traditional first design response in terms of material choices, form and spatial thinking.	Instead of continuing on plan, design was moved back to the test frame and an exploration of material uses. Inspiration was also taken from various images and resulted in the formulation of image boards. Afterward the design process returned to the site for intervention.
Due to a fairly limited understanding of the potentials and limitations that the material offers, it was hard to determine an alternative spatial response.	A design charrette was done using existing knowledge and skills. This traditional response and understanding would then be 'translated' into an alternative response.
Design on plan reached a certain level of development when new textile ideas or input was needed. Design response was spatially appropriate in terms of movement through space, but form and aesthetic did not speak the same language as the use.	Various images were found online to create an Image board. These images indicate ideas of textiles in tension, textiles as suspensions system and cable-stayed structures and designs. Design process returned to section, plan and detailing.

Table 5.3. Test site for intervention, observation and response.

5.3.4.
TESTING MATERIALS

The tests were completed by making use of found materials – textile strips and rope in particular. It is however **important to note that the dissertation is not an exercise in the reuse, recycling or upcycling of found rope or rope-like materials.** The test materials are representative of the final materials but not identical nor indicative of the final material or aesthetic palette.

ROPE: Initially string, rope and various other cordage was purchased in small sections. See Table 5.4. Rope types on poster 11 (opposite page). Initial rope choices were limited by price and availability of the material in one metre increments (instead of an entire roll of rope). Testing involved knotting, flexing, pulling and bending the rope to obtain a sense of the character of the rope. Finally 5mm and 7mm cotton rope was selected as the main material to use for sample testing. See Figure 5.15.Selected testing cordage on poster 11, (opposite page).

ROPE-LIKE MATERIALS: See definition for rope-like materials in **CHAPTER 1**, page 9. Due to availability, cotton fabric in 15mm wide strips were selected for sample testing. These strips were off-cuts from Design team fabric. See Figure 5.14. below for an image of Design team fabric and more information on Design Team. The process involved knotting strips together, documenting the results (textual, sketches, diagrams and photos) and then taking these apart to construct new samples. See section **5.6. Design cycles** for an example of documentation, also see **APPENDIX B and C**. Samples that illustrate pertinent design process of construction were kept aside for final exhibition.

ASSISTIVE TESTING HARDWARE: The primary hardware items used can be seen in Figure 5.18. Main assistive testing hardware, (opposite page).

5.3.5.
REFLECTION (ONE)

During the planning phases of the test sites, certain design and construction assumptions were made. These assumptions were based on knowledge accumulated from precedent studies and literature reviews. **See Chapter 3: Literature study.** This was used as the starting point for decisions made in terms of the parameters that would be used for construction of the test sites. After designing using the textiles within each of the individual sites, it became clear that some of the initial assumptions were incorrect. A number of changes and refinements could then be made based on the new knowledge collected during the making and testing phase. These observations and responses are discussed within Table 5.1. -5.3. on poster 10 (page 55).

Research through making implies gaining knowledge through the process of making. The process of designing and testing the test sites clearly illustrated this to me. This was an important step for me as it demonstrates the importance of the process of plan, act, observe and reflect. It also demonstrates the importance of action plans based on knowledge that was gained during the actual making part of the process. Instead of knowledge collected through the typical research style, this type of knowledge could potentially gain a more accurate design response the first time around.

Through reflection certain deductions were made concerning the nature of the test sites. See Figure 5.17. Textile systems in section **5.3.5.1. Analysis** on poster 11 (opposite page).

design team
creating inspiration print by print

"DT Designs cc trading as Design Team is a textile design business focusing on the design, print and conversion of South African inspired textiles. Contemporary, topical designs form the basis of our fabric collections, rather than the already well represented ethnic approach."
(Designteam, 2011).

Figure .5.14. Photo of Design team fabric (right).

testing materials

5.3.4.1.
MATERIAL USE

NOTE that the dissertation is not an exercise in the reuse, recycling or upcycling of found rope or rope-like materials. The test materials are representative of the final materials but not identical nor indicative of the final aesthetic of material palette. Refer to section **5.3.4. Testing materials** (page 56, document) for more information of the various testing materials and images. Find below the definitions for rope and rope-like materials.

rope: A length of thick strong cord made by twisting [braiding or plaiting] together the strands of hemp, sisal, nylon, or similar material.

TEST ROPE

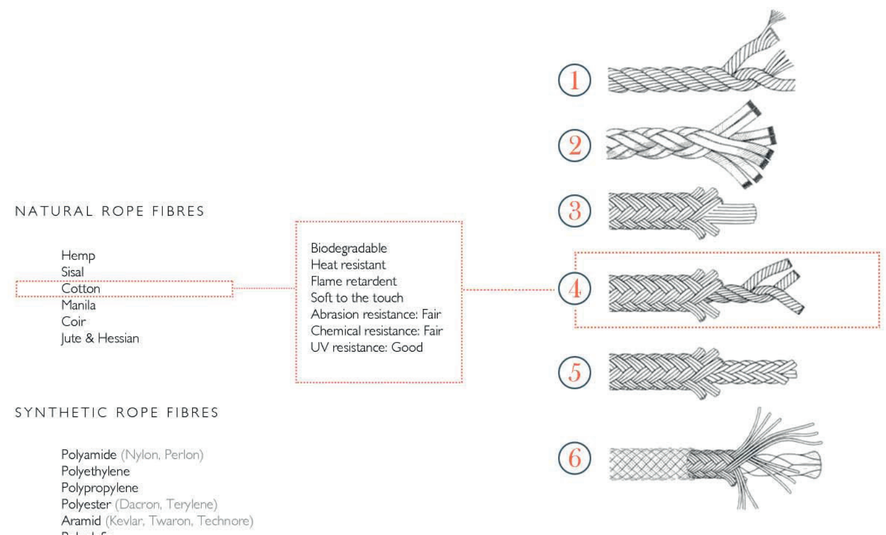


Figure 5.15. Selected testing cordage

Table 5.4.

ROPE TYPES

Type	Name	Material	Structure	Attribute
1	Sash cord	Cotton	Double braid	Shared load
2	Sash cord	Cotton	Double braid	Shared load
3	T-Shirt rope	Viscose	Knit	Stretch
4	Ski-rope			
5	Lacing cord	Polyethylene	Three strand twisted	Rotational force
6	Fabric strip	Cotton	Weave	Increased surface area

Eye bolt
8mm

Carabiner
6mm

Quick link
4mm

Figure 5.18. Main assistive testing hardware.

Figure 5.16. Rope-like materials.

rope-like: Any textile that exhibits similar characteristics to those of rope (as defined above) or that can be knotted and handled in a similar manner to rope.

5.3.5.1.
ANALYSIS

Three kinds or systems of textile interaction manifest. These systems are illustrated on the diagram to the right.

- test frame performs as rigid grid system, TYPE A on Figure 5.17.
- test box performs as semi rigid system, TYPE B on Figure 5.17.
- test site performs as most flexible system, TYPE C on Figure 5.17.

This information could not be gained by means of traditional research methods at the beginning of the study. These facts were gained purely by means of making.

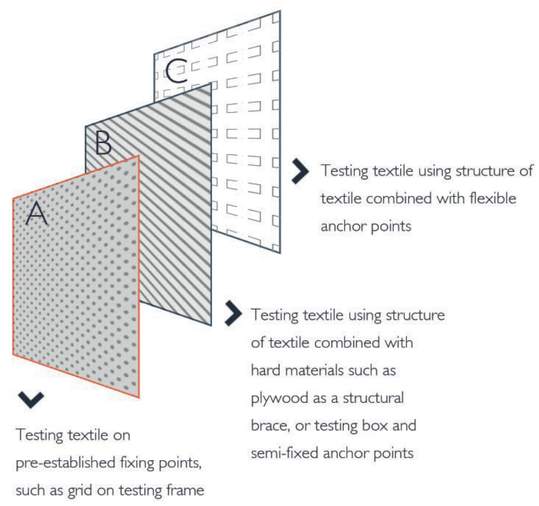


Figure 5.17. Test type diagram.

test matrix for design cydes

ACTION AND OBSERVATION

5.4.
TEST MATRIX

The test matrix is a table with a summary of the results of the Design cycles. Each sample test was made and recorded within the test matrix. See table 5.5. Test matrix, below. Further, each step of each sample test was recorded in more detail within another table, see APPENDIX B: Data collection and synthesis and APPENDIX C: Raw data. This collected data potentially allows the design process to be simulated by another person in future. It also relays the steps taken to produce the final hand knotted textile.

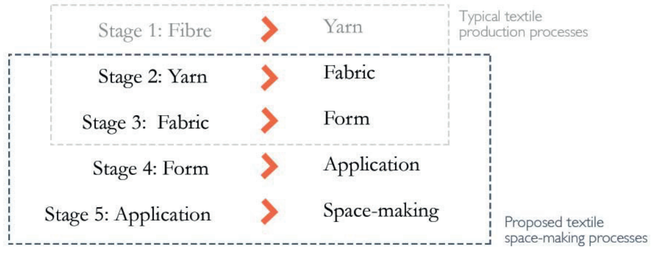


Figure 5.19. Typical steps in manual textile fabrication

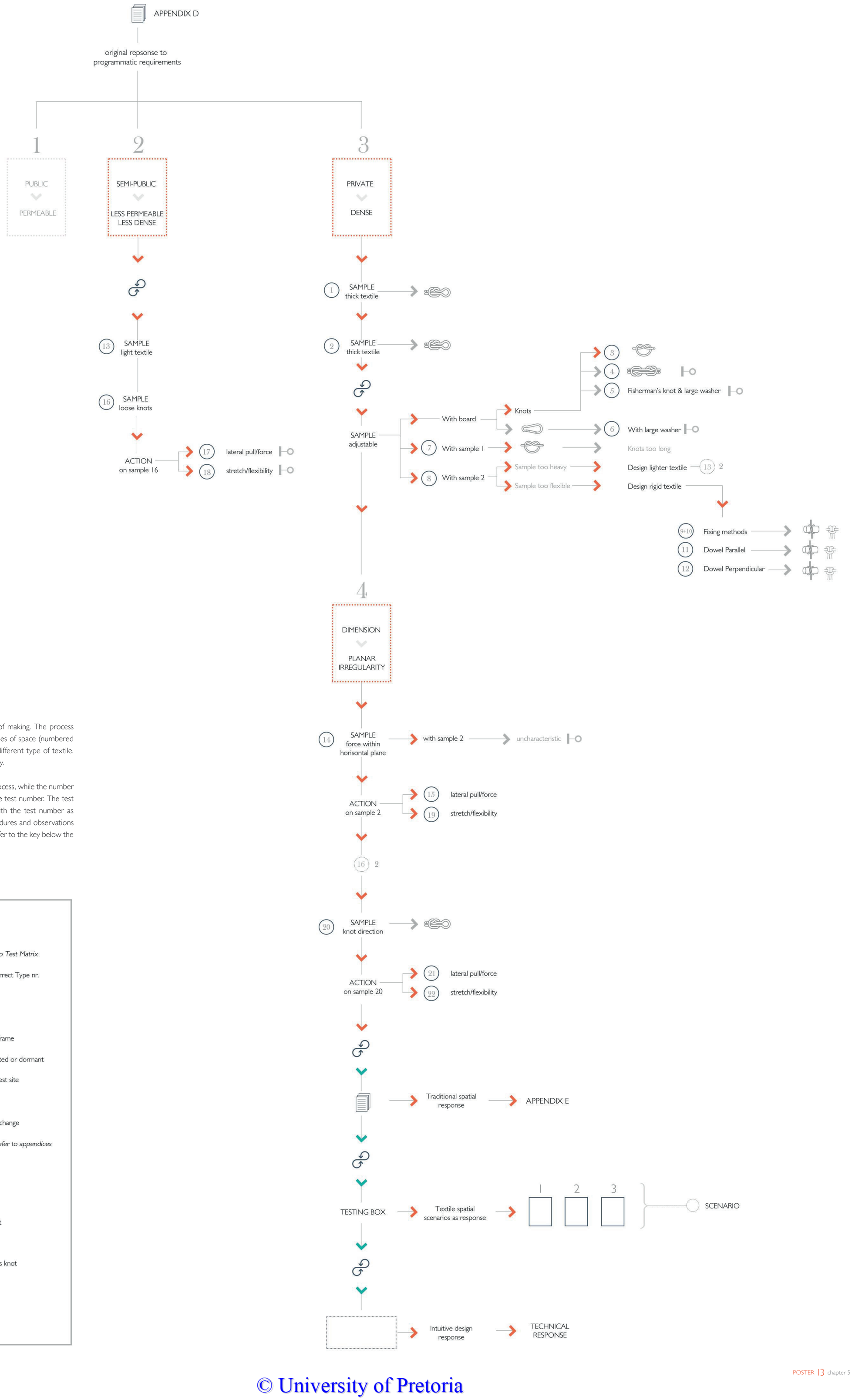
table 5.5. test matrix

DATE	Test Nr	Desired result	Knot category	Knot name	ABOK	Additional material	Notes	Observations	Response and questioning
									Initial scale
06_05	1	Thick textile 1	Noose	Simple Noose Knot	#1114	Eye bolts and carabiners	First sample test based on programmatic requirements	Sample area is quite small for the amount of material used, sample stretches easily because of the T-shirt rope, Colour and knot type is aesthetically pleasing, Textile is still very two dimensional and represents traditional material use, and therefore could just as well be replaced with any kind of board product	Investigate how sample can be constructed to appear less 'flat' or two dimensional
10_05	2	Thick textile 2	Noose	Simple Noose Knot	#1114	Eye bolts and carabiners	Sample 2 based on sample 1, 2x FC stapled together to increase length of cord	Sample depth appears thicker but knots are less compact forming larger holes, sample 2 appears more bulky than sample 1 which is good, The off white colour of the filler cord used is well suited to the cotton primary cord, Textile is more bulky but still a very two dimensional,	Ivenstigate whether textile could potentially be more dynamic or have more dimension. Does the knot itself not represent the three-dimensionality of the textile sample?
									* Scale change
22_05	3	Adjustable vertical space-definer (a)	Stopper knot	Overhand Knot	#46	Cardboard, representing plywood or similar board material	Board product to be secured with all 4 ropes through all 4 holes	Sample depth dependent on hole spacing within the board material, Insufficient knot usage, Difficult to ensure exact knot spacing with Overhand Knot used, Sample still very empty and very 'traditional' in the sense that it is simply a rope with a hard board material as spacing and fins.	Sample does not exploit unique character of textiles but simply emulates traditional uses, Can the board product be replaced by a textile? Can Overhand Knot be replaced with a knot that can be moved accurately into position?
25_05	4	Adjustable vertical space-definer (b)	Bend	Double Fisherman's Knot	#1415	Cardboard, representing plywood or similar board material	Position board with knots securely fixed against board	The Double Fisherman's Knot slides to fit snuggly against the board within the first tier, At the second tier the knots do not fit snuggly against the board, The main rope which forms both knots buckles in-between the two tiers, add another piece of rope to counteract buckle but this prohibits the last knot from being secured, another piece of rope is needed, Type of knot cannot be placed in series using the same primary cord throughout, TEST ABANDONED	
25_05	5	Adjustable vertical space-definer (c)	Bend	Double Fisherman's Knot	#1415	Knot and large washer	Looping rope A through rope B and inserting a large washer as bottom stopper and Double Fisherman's Knot as top stopper	The Knot pushes securely against the top side of the board, The second tier fixing point is problematic, Number of running ends become problematic, TEST ABANDONED	
25_05	6	Adjustable vertical space-definer (d)	Bend, Stopper knot	Double Fisherman's Knot and Overhand Knot	#1415 #46	Large washer	Loop 2 rope ends firstly through washer and secondly through holes within the board	No tension in ropes, not a secure connection, not a balanced or even connection, not a strong connection, Severely negative test results due to lack of tension, strength and cohesion, TEST ABANDONED	
25_05	7	Adjustable vertical space-definer (d) with thick textile sample 1				Knotted textile sample 1	Fix textile sample 1 in place of board product	The type of knot used to fix the sample to the rope structure creates an overly elongated connection point that is not aesthetically pleasing, Loose or running ends of the sample pieces hanging loose, Textile simply replaces board product as flat component and does not exploit the character of the textile to the full.	Ideally the fixing knot type should be changed to get a more effective binding, however this will not be tested at present.
27_05	8	Adjustable vertical space-definer (d) with thick textile sample 2				Knotted textile sample 2	Fix textile sample 2 in place of textile sample 1	Rope structure not enough tension causing the sample to 'sag' or hang low, moving the fixing points does not fix the issue (primary cord of sample 2 runs lengthwise), Textile sample is too heavy, Textile sample is too flexible	Design lighter textile, Design more rigid textile
29_05	9	More rigid textile, Fixing method	Square Hitch Loop	Larks head Clove Hitch knot, Side by side Clove Hitch and loop,	#2485 #1776	19 x 910 mm timber dowel	The test investigates methods of fixing rope or primary cord to a dowel, dowel could represent another material within structure	Primary cord is fixed to the main frame with eye bolt and carabiner by means of Larks head knot, Connection is very secure and very neat, One dowel is suspended and fixed firstly by means of Double stranded Clove Hitch knot, knot seems secure when pulling on dowel, Two strands are split and two separate Clove Hitch knots are tied, knots are very neat and very strong, Fixing methods work well for when the running end of the rope needs to continue past the fixing point, if the running end of the rope needs to be secure without loose ends, then another knot needs to be tested	Test investigates a single fixing point or line of fixing points, perhaps multiple fixing point can be investigated.
29_05	10	Rigid textile, Fixing method with multiple anchor points	Square Hitch Loop	Larks head Clove Hitch knot, Side by side Clove Hitch and loop,	#2485 #1776	19 x 910 mm timber dowel	Test investigate how to fix timber dowel with multiple anchor points	Timber dowel suspended from main frame with knots as tested in test nr 9, additional anchor points secured to back board, dowel suspended and at rest with four anchor points, Structure very secure and strong	Could textile sample be suspended from this structure?
29_05	11	Rigid textile sample 2, parallel	Square Hitch Loop	Larks head Clove Hitch knot, Side by side Clove Hitch and loop,	#2485 #1776	19 x 910 mm timber dowel knotted textile sample 2	Primary cord parallel to dowel	When pulling the dowels apart the textile flattens out into a horisontal plane, the initial sagging as in the test 8 is reduced, the sample is less sturdy than in test 11, when pulling on the dowel sticks the sample stretches out, if the running ends are not secured there is the danger that the textile could completely unravel	If it is so that the textile unravels when the dowels are parallel to the Primary Cords, can the dowels be turned to be positioned perpendicularly to the Primary Cord? What would the effect be?
29_05	12	Rigid textile sample 2, perpendicular	Square Hitch	Larks head Clove Hitch knot, Side by side Clove Hitch and loop,	#2485 #1776	19 x 910 mm timber dowel knotted textile sample 2	Primary cord perpendicular to dowel	Specific sample is too long for the frame, when pulling the dowels apart the textile flattens out into a horisontal plane, the initial sagging as in the test 8 is reduced, the sample is sturdy due to the force being excerted on the primary cord, Fixing knot is not the most appropriate choice, Employing the loops available from the sample itselfs should not be the final solution, excess running ends untidy	How can the loose ends or running ends be fixed up or tied back to be neatened? Is the weight of the sample still a hindrance to the effectiveness of the horisontal textile? Design a lighter textile sample.
31_05	13	Lightweight textile	Noose	Simple Noose Knot Overhand Knot	#1114	Eye bolts and carabiners	Original thick textile as in sample 2 contains double layer of filler cord. This will be adjusted to a single layer to reduce weight	At start of knotting process it is clear that the pattern changes because of the loop of a single layer filler cord instead of using a double layer filler cord, the sample is much more permeable than sample 2, The weight of the sample is reduced but aesthetic quality is compromised, Due to the textile being fixed at one point but seperated into two layers the pattern is slightly different than for test 2, Pattern includes line crossover, textile seems lighter, visual quality of the sample is very different than that of sample 2, construction of knots must occur in order from left to right otherwise pattern is not repeated and knotting is tedious	Is the visual quality of the sample acceptable? Can the textile be composed with alternative patterns? How will this textile perform under the testing applied to sample 2 and sample 20?
									* Scale change
04_06	14	Planar irregularity (a), Textile beyond one dimension,LATERAL PC FIXED TO VERTICAL PC					Currently textile manifests within a singel vertical plane, rope to be added for extra horisontal plane	When exerting a force on the vertical primary cord structural integrity of the pc is decreased, Without additional rigid reinforcement the unit will not be structurally adequate, Additional rigidity could be added in order to force the manipulation of the textile but this is not the true character of textiles	What is the true character of the textile, how does the textile naturally manifest? Can the unit of sample 2 be distorted in order for the textile to manifest in more than one plane? Can the filler cord be manipulated instead of the Primary cord?
05_06	15	Planar irregularity (b), Textile beyond one dimension, plane, axis, LATERAL PULL ON PC				Added weight, horisontal pulling force on sample 2	Sample 2: Filler cord and Primary cord run parallel, what is the effect of lateral forces?	When pulling on PC 3, the center cord, the sample forms a rounded hollow shape, The filler cords slide on the PC and compress toward each other causing a more dense sample, At the point at where the PC is pulled a larger opening is formed, The PC slide easily through the loops in the FC, Once the PC is released it has to be pulled downwards to adjust the pattern on the FC, The PC that assists with planar irregularity has to be longer than other PC's and needs a stopper knot at the end, It also has to be weighted or anchored,	Can the knots be tied more loosely in order to assist with knot sliding of the Filler Cord on the Primary Cord? Tie a sample with looser knots.
08_06	16	Planar irregularity (c), Textile beyond one dimension, plane, axis, LOOSE KNOTS	Noose	Simple Noose Knot	#1114	Eye bolts and carabiners	Loose/elongated Simple Noose Knot	The effect of the loose is untidy and is not visually appealing, The knots are also not strong, the unit is weak and flimsy, Textile appears very fragile, Sample not durable. TEST ABANDONED	
08_06	17	Planar irregularity (d), Textile beyond one dimension, plane, axis, LATERAL PULL ON PC					Testing lateral stretch on Sample 16	When pulling on PC center a large opening is formed at the point at which the force is applied, Loose knots (FC) slide easily allong PC. TEST ABANDONED	
08_06	18	Planar irregularity (e), Stretching LOOSE textile					Testing strength and amount of flex/stretch of Sample 16	Sample composed of parallel PC and FC, When pulling at the four corners of the textile (outwards) the textile expands and deteriorates, The openings within the textile enlarge and distort completely, The primary cord pulls out of the Filler Cord completely causing the sample to fall apart, , TEST ABANDONED	
08_06	19	Planar irregularity (f), Stretching textile					Testing strength and amount of flex/stretch of Sample 2	Sample composed of parallel PC and FC, When pulling at the four corners of the textile (outwards) the textile expands but does not deteriorate, The openings within the textile are enlarged, The primary cord distorts into an s-shape, The top fixing loops stretch out of proportion causing a wider top end,	Top loops need to be fixed to slide but not move downward, Fixing points need to be considered,
10_06	20	Textile sample change direction of PC and FC	Noose	Simple Noose Knot	#1114	Eye bolts, carabiners and frame	PC and FC 'woven' using same knotting technique as sample 2	Completely different aesthetic than seen in sample two, Sample 18 appears much more structured and neat, Knot rows easily slide up and down the PC, Therefore density can be adjusted by hand, unless FC fixed at each end, Pulling down on PC's has no effect on the FC as these do not run parallel	What would the effect of various pulling forces be on the 'woven' format of the knots?
10_06	21	Planar irregularity (g), Textile beyond one dimension, plane, axis, LATERAL PULL ON PC				Added weight, lateral pulling force on sample 20	Sample 20: Filler cord and Primary cord run parallel,	When pulling on PC center the sample forms a rounded hollow shape, the sample distortion appears more evenly than distoritionfound in sample 2 (test 15), The filler cords mainly remain static except for point of force, The PC slides more easily through the loops of FC than in sample 2, After releasing PC downward force needs to be applied for PC to settle back, Stopper knot and weight needed	How long would the FC need to be to allow for sufficient deformation? What type of Stopper Knot would be most succesful?
10_06	22	Planar irregularity (h), Stretching textile				Added weight, horisontal pulling force on sample 20	Testing strength and amount of flex/stretch of Sample 20	Textile does not stretch in the same manner as sample 2, The Filler Cord keeps the sample rigid, Therefore sample 20 more rigid vertically and horisontally than sample 2	What are the possibilities for spatial application of this textile sample as oposed to textile sample 2? How can each of these samples be used to exploit the unique characteristics of a knotted rope textile?
									* Scale change

* Scale change occurs when design moves from one test site to another. Often this would be a time where design charettes are done. Scale changes are indicated on the flow diagram on the opposite page (poster 13).

design cycle overview

A FLOW DIAGRAM



5.5.
FLOW DIAGRAM

The diagram represents the process of making. The process starts at the identification of three types of space (numbered 1,2,3). Each type of space requires a different type of textile. This is divided into categories of density.

The arrows indicate the path of the process, while the number within the dark blue circle indicates the test number. The test number on the diagram correlates with the test number as found in the TEST MATRIX. All procedures and observations are documented in the Test Matrix. Refer to the key below the diagram for further instruction.

Figure 5.20. Flow diagram.

KEY:

- 1 — active test, *refer to Test Matrix*
- 1 — find test under correct Type nr.
- test terminated
- Grey text — test observation
- test path, testing frame
- test path deactivated or dormant
- test path, spatial test site
- 2 — type number
- scale change, site change
- design charette, *refer to appendices*

- simple noose knot
- overhand knot
- double fisherman's knot
- clove hitch knot
- larks head knot

design cycles

REFLECTIONS

5.4.1. thick textile 1

From the onset of the first test, the framework for the creation of the first test sample was based on the proposed programme. The programme requires three basic types of interior spaces. Private space, semi-public space and public space. The design response investigates three types of textiles that would fulfil the requirements for each of these interior spaces. The first cycle focusses on a material that is thick and dense.
Conclusions were reached in terms of:

Possible spatial functionality: The sample is quite thick and can act as a strong visual barrier. The sample could potentially be used to create a space-definer for a private interior spatial zone. The textile can be stretched easily due to material selection.
Aesthetic and tactile quality: The completed knotted textile has a defined and organised knot pattern on one side and a less structured, pattern on the other side. The textile feels soft to the touch and has a very pliable and malleable quality to it.
Knot and material selection: The initial knots were done instinctively as a way of fixing two pieces of rope together. The T-Shirt rope allows for ease of knotting. Due to the width and stretch of the rope-like material, a substantial length of rope results in a small sample surface area. Research on the knot type and category took place after the completion of this first test sample.

Potential: The textile sample allows for stretchability, flexibility, coverage, density, It can also act as a visual barrier, influence the acoustic quality of a room and be visually appealing.

Figure 5.21. Sample 1 knot texture, Backing side.

Figure 5.22. Sample 1 knot texture, Facing side.

Figure 5.23. Sample 1, sketch.

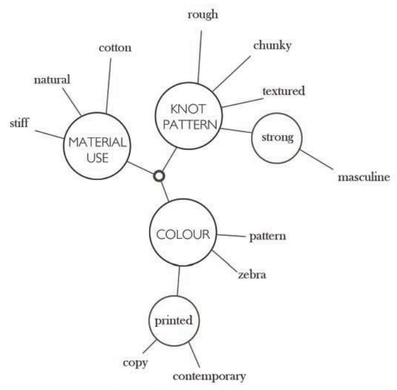


Figure 5.24. Sample 1, associations.

5.4.1.1. CONSTRUCTION PROCESS — 1

1 Fix three ropes to upper frame (loop through eye bolt)
One primary cord centred (10)
Two filler cords (A and B) either side of the primary cord (9,11)

2 Select FC-A and make an overhand loop knot towards the PC
Place PC through the eye of loop FC-A. Pull the running end of FC-A to dress the knot

3 Repeat step 2 using FC-B. Push knot from FC-B up against FC-A to ensure a snug fit

4 Hang one AC over left V and one AC over right V. Ensure that ends meet

5 Select FC-A and make an overhand loop knot towards the AC
Place AC through the eye of loop FC-A. Dress knot

6 Repeat step 5 using FC-B

7 Repeat steps 2-5 until end of rope is reached

5.4.2. thick textile 2

Thick textile 2 is a response to the observations made after the construction of thick textile sample 1.
Conclusions were reached in terms of:

Possible spatial functionality: The sample is quite thick and can act as a strong visual barrier. The sample could potentially be used to create a vertical space-definer for a private interior spatial zone.
Aesthetic and tactile quality: The completed knotted textile has a defined and organised knot pattern on one side and a more unruly, pattern on the other side. The textile gives way when pushing onto it. The textile is slightly more rigid than thick textile sample 1. The openings between the knots are larger than in thick textile sample 1.
Knot and material selection: The wider textile strip allows for larger more bulky knots to be formed and therefore causes larger openings in the finished sample.

Potential: The textile sample is visually appealing and could be employed as a vertical space-definer yet still allowing for visual connection between spatial zones. The softness of the textile sample could potentially 'soften' the feel of an interior zone. The nature of construction allows for various configurations of colour and pattern which need to be explored further.

Figure 5.25. Sample 2 knot texture, Backing side.

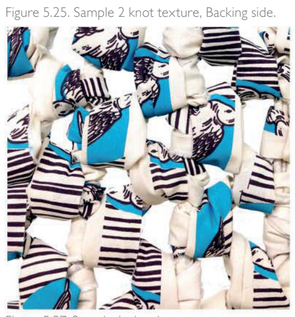
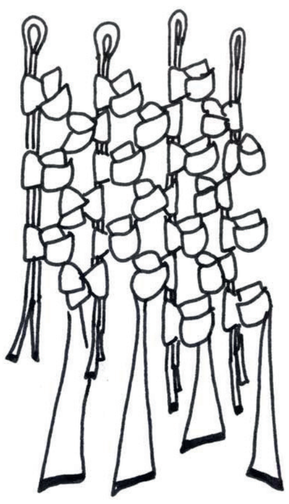


Figure 5.26. Sample 2 knot texture, Facing side.

Figure 5.27. Sample 1, sketch.



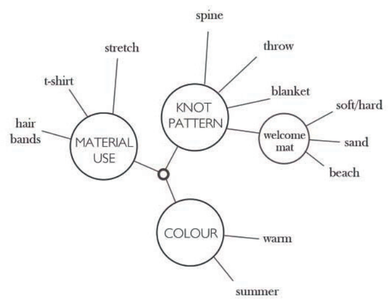


Figure 5.28. Sample 2, associations.

5.4.2.1. CONSTRUCTION PROCESS — 2

1 Fix five Primary Cords (14,16) to the upper frame
Fix four Filler Cords (13,15,15,17) to the upper frame

2 Select the first FC and make a simple noose not toward the second PC (angling the FC-A toward the right to reach the second PC). Place running end of first PC through the eye of loop FC-A. Pull the running end of FC-A to dress the knot

3 Repeat step 2 using the second FC and the second PC . Push knot from FC-B up against FC-A to ensure a snug fit

4 Select the FC-C and make a simple noose not toward the fourth PC (angling the FC-A toward the left to reach the fourth PC). Place running end of first PC through the eye of loop FC-C. Pull the running end of FC-C to dress the knot

5 Repeat step 4 using the fourth FC and the fourth PC . Push knot from FC-D up against FC-C to ensure a snug fit. One row of knots are now completed

6 Repeat steps 2-4, angling each of the FC to the PC opposite the existing knot criss crossing down the PC one row at a time. Repeat the steps until the remaining PC is covered completely with FC.

design cydes

REFELCTIONS

5.4.3. adjustable space-definer 1

The spacing of the Primary Cord's by means of a board product, is a response to the initial observation that the thick textile sample appeared 'flat'. Secondly the form and functionality is a response to the spatial quality of the proposed site of intervention. The sample aims to offer the user the opportunity to adjust the conditions of the interior space as a response to light, sound and visual influences.
Conclusions reached in terms of:

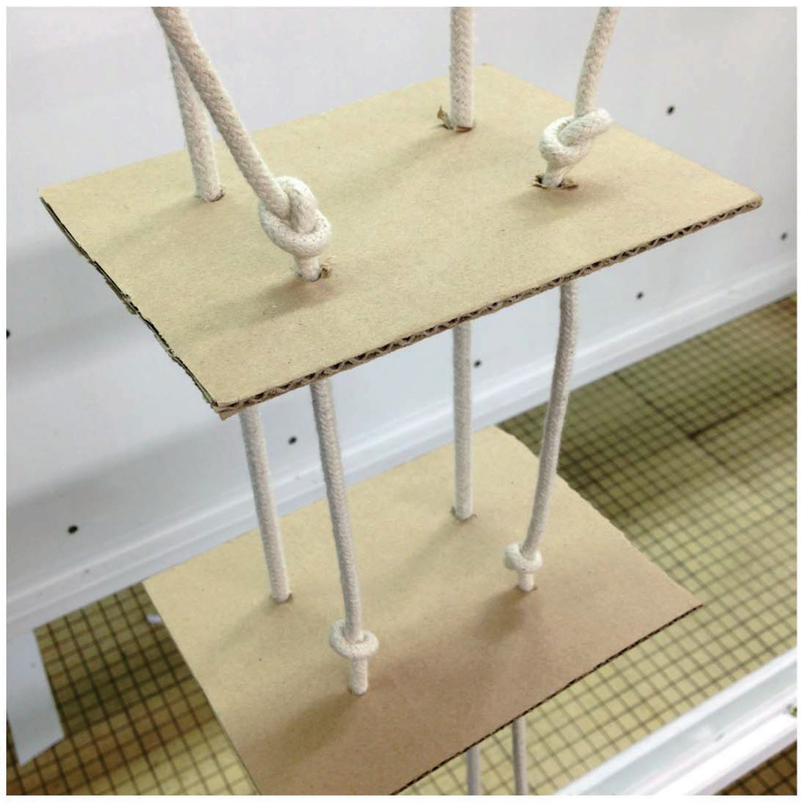
Possible spatial funcionality: The adjustable panels within the sample allows for customizable spatial zones. The textile sample is noticibly deeper than samples 1 and 2, allowing for the creation of a more articulated spatial definer.
Aesthetic and tactile quality: The sample is reminicent of a blind, evoking ideas of interior furnishings and decoration yet remaining quite traditional due to the board.
Knot and material selection: The use of a board product as horizontal definition gives the sample a hard, more traditional quality and appearance. The material choice should be reconsidered.

Possible potential: The adjustable nature of the sample allows for adaptable spatial zones.

Figure 5.31. Adjustable space-definer, concept sketches.

Figure 5.29. Knot positions a,b,c. (top to bottom)

Figure 5.30. Adjustable space-definer with cardboard spacers.



5.4.3.1. CONSTRUCTION PROCESS

1. Fix two rope loops through four eye bolts so that each of the four running ends of the rope hang towards the floor
2. Insert four evenly spaced holes in two rectangular sections of board material
3. Tie an overhand knot about 400mm down the front two rope ends and feed the rope ends through the two front holes of the board. Tie two more overhand knots below the board to secure the board between the two sets of knots
4. Repeat this step using the two back ropes
5. There should now be two boards secured horisontally between hanging rope ends
6. When pulling on the front top rope loop (Between the two widely spaced eye-bolts) the horisontal boards should tip to a diagonal position

5.4.4. adjustable space-definer iterations

The first adjustable space-definer employes hard board materials. The iterations of this adjustable space-definer makes use of the thick textile samples from test one and two. The sample aims to offer the user the opportunity to adjust the conditions of the interior space as a response to light, sound and visual influences. The use of the softer infil transforms the traditional hard blind into a softer alternative.
Conclusions were reached in terms of:

Possible spatial funcionality: The adjustable panels within the sample allows for customizable spatial zones. The textile sample is noticibly deeper than samples 1 and 2, allowing for the creation of 'thicker' spatial definition. The softer, more permeable nature of the textile infill would potentially respond better to environmental factors than the solid hard board. These factors could include sunlight, auditory and visual noise.
Aesthetic and tactile quality: The sample is reminicent of a window blind evoking ideas of interior furnishings and decoration. The textile infil accentuates these ideas of decoration, softness and femininity.
Knot and material selection: The fixing knots employed are not ideal and should be reconsidered. Main knot and material selection discussed on page one.

Possible potential: The adjustable nature of the sample allows for adaptable spatial zones. The soft textile infil allows for design opportunity in terms of 'soft' space.

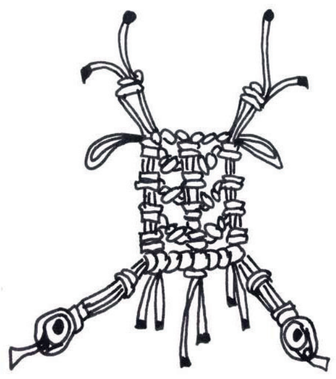


Figure 5.32. Sample 1, Sketch of adjustable textile space-definer

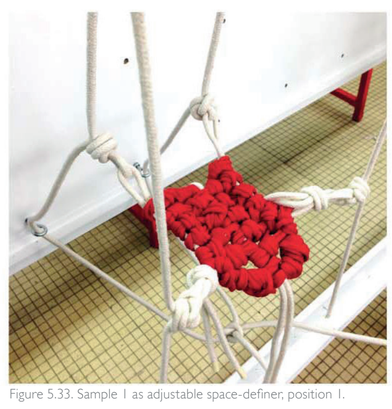


Figure 5.33. Sample 1 as adjustable space-definer, position 1.

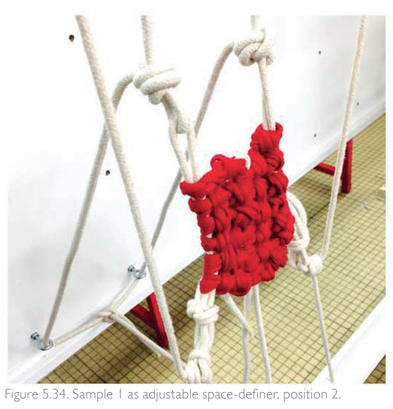


Figure 5.34. Sample 1 as adjustable space-definer, position 2.

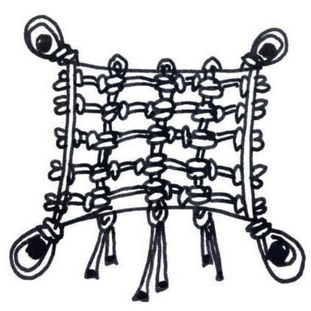


Figure 5.35. Sample 2, Sketch of adjustable textile space-definer

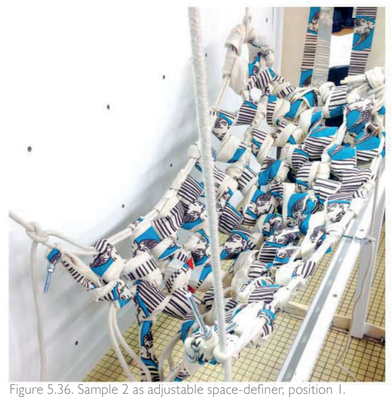


Figure 5.36. Sample 2 as adjustable space-definer, position 1.

Figure 5.37. Sample 2 as adjustable space-definer, position 2.

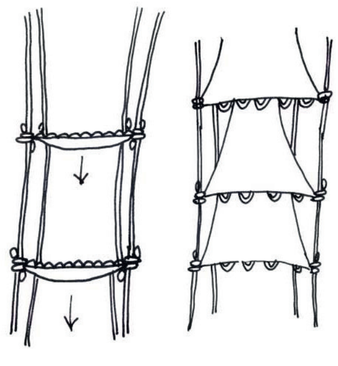


Figure 5.38. Sketch of adjustable textile space-definer as a whole

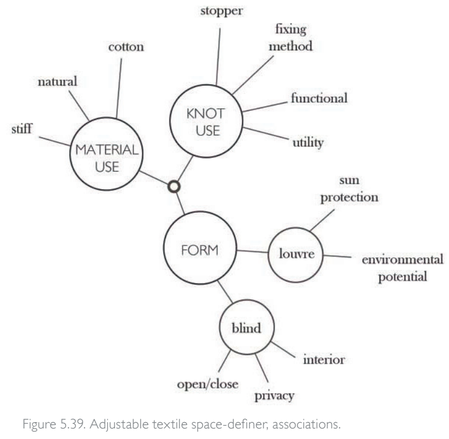
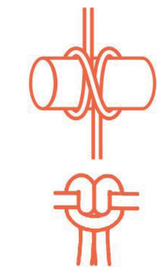


Figure 5.39. Adjustable textile space-definer, associations.

design cycles

REFLECTIONS



5.4.5. rigidity

The board as horizontal element is naturally rigid. When replacing the board with a textile sample the rigidity is reduced. Knot choices in terms of fixing as well as other 'hard' materials need to be added to the textile to provide adequate rigidity. Conclusions were reached in terms of:

Possible spatial functionality: The fastening methods and insertion of stiff materials (such as a dowel) allow for rigidity within the textile sample. This rigidity is employed to ensure structural stability of textile-space defining elements.
Aesthetic and tactile quality: The use of the dowel as rigid material within the textile does not detract from the soft and fluid quality of the textile sample. Knots for fixing feel strong and rigid and provide a finished and rounded look to the product.
Knot and material selection: The knots used for fixing provide ample structure. The insertion of a dowel stick into the fabric provides rigidity to the textile sample. However it is not in the nature of a textile to behave in a rigid fashion unless it is in terms of tensile forces.

Possible potential: The textile sample can span further and with more ease than without added rigidity. This would allow for larger sections of vertical or horizontal space-defining elements to be covered or divided. The knotting techniques investigated can be employed at various stages throughout the construction process.

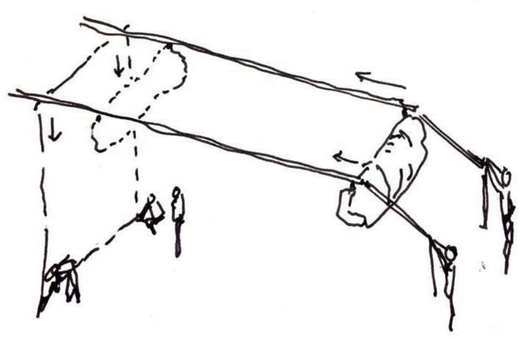


Figure 5.42. Concept sketch of rigid system with textile infil

Figure 5.40. Sketches of fixing methods

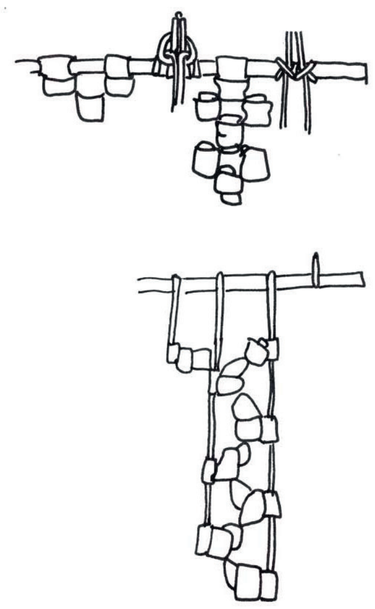


Figure 5.41. Collection of photos of various rigid fixing methods.

Left to right, top to bottom

1 Clove Hitch, side by side
2 Single Clove Hitch
3 Dowel perpendicular to Primary Cords
4 Clove Hitch with double cord
5 Clove Hitch with fold over loop
6 Dowel Parallel to Primary Cord
7 Larks Head Knot looped through carabiner
8 Clove Hitch with fold over loop
9 Larks Head Knot looped over frame

5.4.6. spatial exploration

When certain points within the sequence of the design process is reached, a jump in scale occurs. Between test 12 and 13 the spatial intervention was investigated on plan and various quick perspective sketches.
The following conclusions were reached:

When assessing the sketches and plans drawn it is apparent that conventional design methods result in conventional design proposals. This is especially noticable in the form that the plans take on as well in the representation of solid volumes inserted into the existing space.

Knowing through making focusses on the creation of data instead of the collection of data. The importance of this process is clear in the design that resulted when the focus of the research was shifted to more conventional methods.

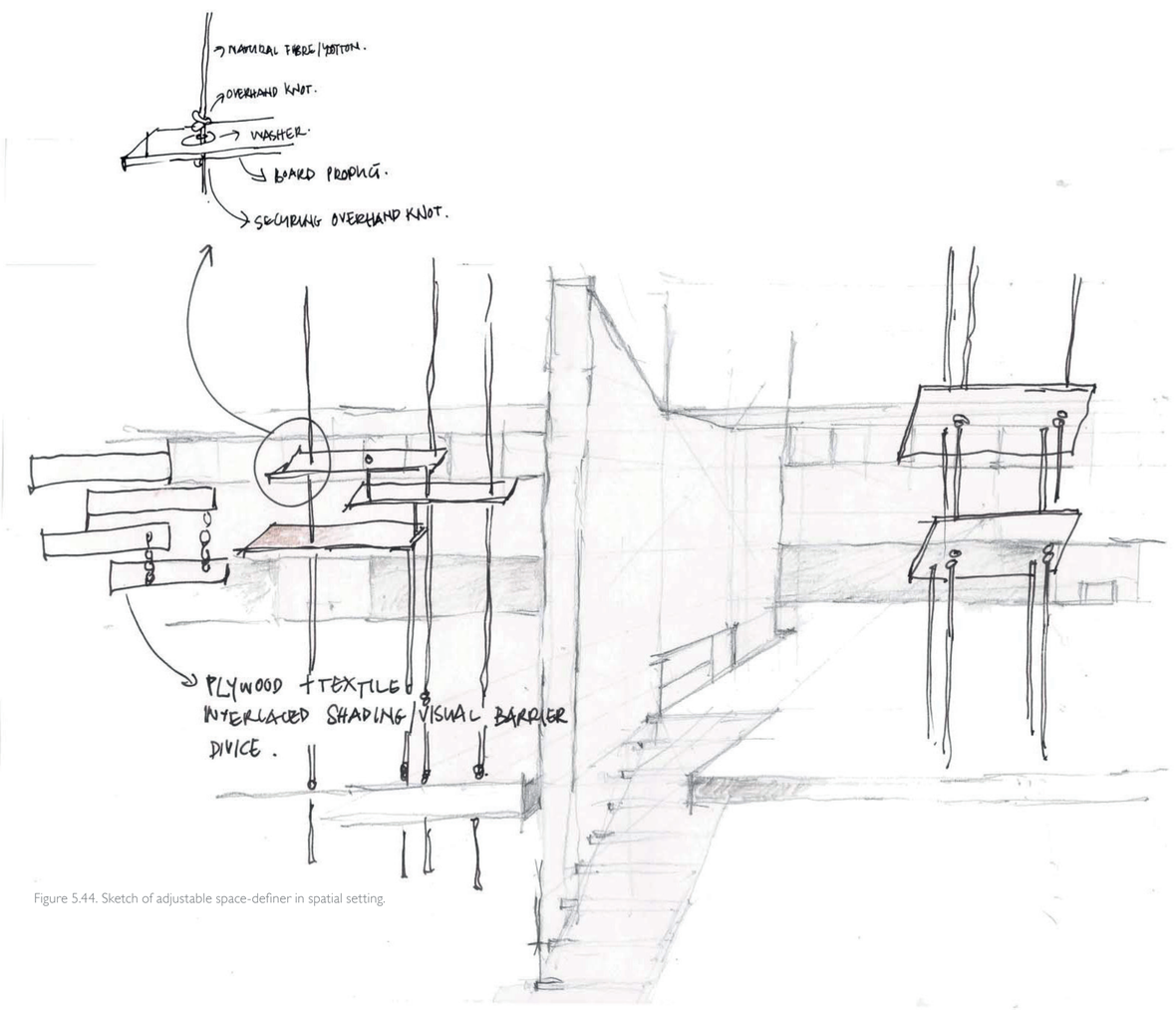
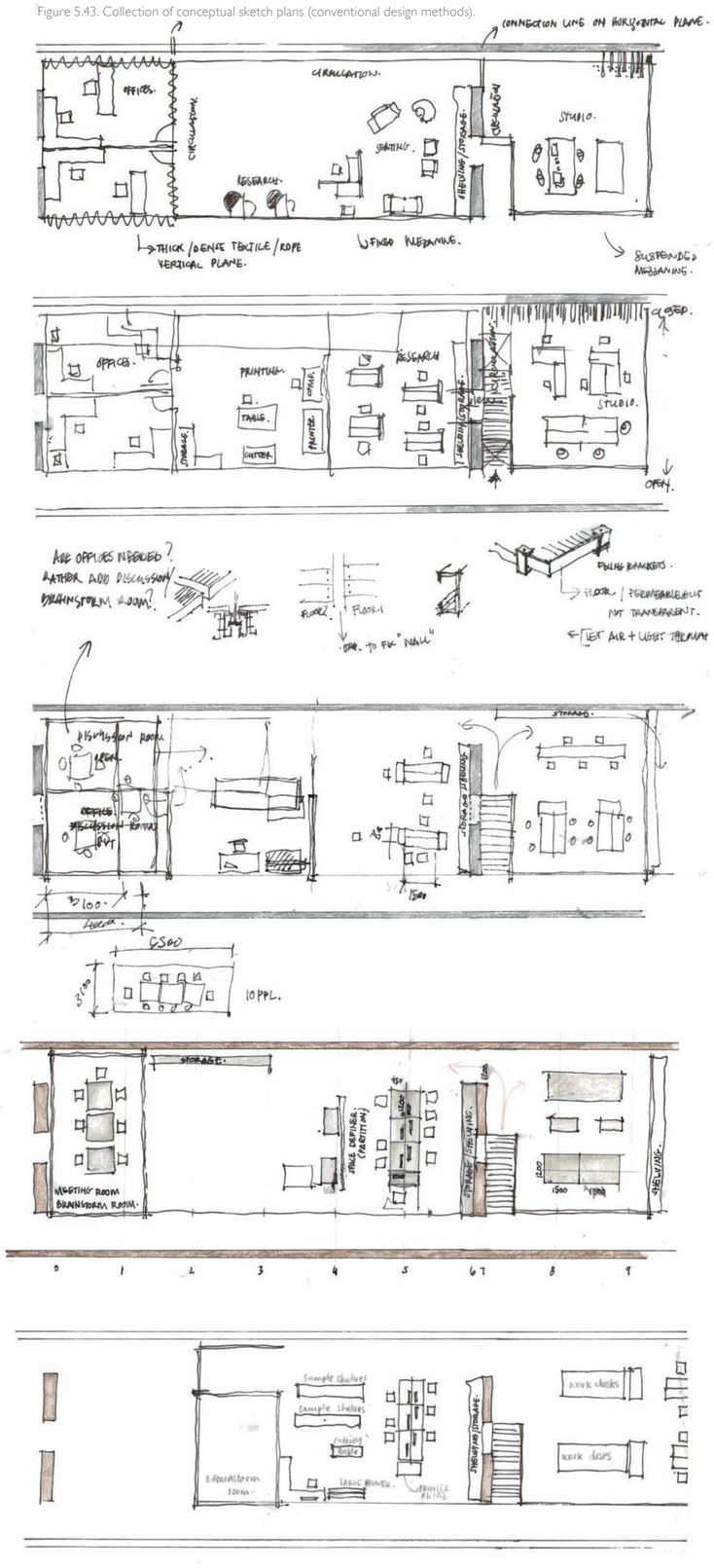


Figure 5.44. Sketch of adjustable space-definer in spatial setting.

Figure 5.43. Collection of conceptual sketch plans (conventional design methods).



design cycles

REFLECTIONS

5.4.7. lighter textile

The light textile sample is a response to the conclusions reached during the rigidity cycle. The lighter textile sample is also the second type of textile that can be applied in the formation of semi-private spatial zones. (See process diagram).
Conclusions were reached in terms of:

Possible spatial functionality: The textile is considerably lighter than thick textile sample 2. The textile could sufficiently define semi-private spatial zones.
Aesthetic and tactile quality: The openings between knots are larger and provide less visual obstruction than the thick textile samples. The knot sequence creates an organised and recognizable pattern. The sample is looser than sample 1 and 2.
Knot and material selection: The selected rope-like fabric provides sufficient bulk for the construction of a textile that remains thick but is lighter and less dense. The selected knot type remains as is and provides opportunity for the adjustment of the overall textile pattern and look.

Possible potential: Similar to previous textile samples the nature and composition of the textile allows for variations in colour and pattern. The reduced weight of the textile is beneficial overall as it influences issues that arise such as structure, fixing points and methods of insertion.

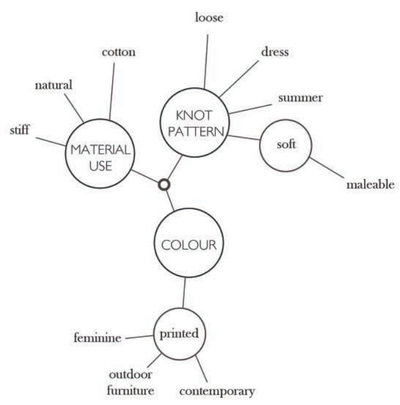


Figure 5.48. White and blue patterend fabric, associations.

Figure 5.45. Light textile, open knot end.

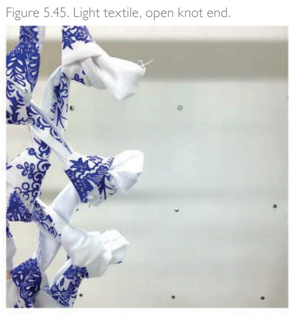


Figure 5.47. Sketch of light textile sample.

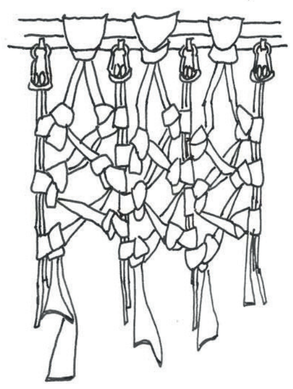


Figure 5.46. Light textile, Facing side.

5.4.7.1. CONSTRUCTION PROCESS

1. Fix five Primary Cord's to the upper frame
2. Fix three Filler Cords consecutively inbetween each of the PC's
3. Select FC-A and make a Simple noose knot towards the first PC. Place the running end of the second PC through the eye of loop FC-A. Pull the running end of FC-A to dress the knot
4. Repeat step 3 using FC-B and the second PC. Ensure that FC-B is ontop of FC-A in the diagonal cross formed by the two filler cords.
5. Repeat steps 3 and 4 with the remaining FC's and PC's. Ensure that the FC joining from the left always crosses over the FC joining from the right.
6. Repeat steps 3-5 until end of rope is reached

5.4.8. planar irregularity

The planar irregularity cycle returns to the original textile samples created. The cycle employs the same knot as applied to the first sample tests, but introduces subtle changes in procedure.
Conclusions were reached in terms of:

Possible spatial functionality: The sample is quite thick and can be used to create a strong visual barrier. The sample can be a space-definer for a private interior spatial zone.
Aesthetic and tactile quality: The knotted textile has a defined knot pattern on one side and a more irregular pattern on the other side. See section 1.6. Definition of terms: Developed terms on page 9. The distinctive visual quality of the textile sample is very different from that achieved during the first sample tests. The textile feels soft to the touch and has a very pliable and malleable quality to it.
Knot and material selection: By simply changing the direction of knotting the result is changed completely. The structural behaviour of the textile responds in a significantly different manner than that of textile sample one and two.

Figure 5.49. Sample 20, Backing side

Figure 5.51. Sample 20, sketch.

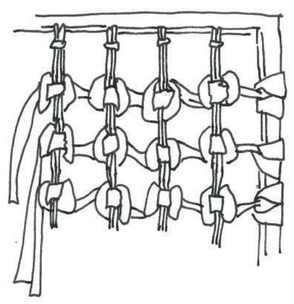


Figure 5.50. Sample 20, Facing side.

5.4.8.1. CONSTRUCTION PROCESS

1. Fix five Primary Cords to carabiner within upper frame. Fix to carabiner using Cow hitch knot.
2. Fix five Filler Cords to side of frame. Select the uppermost FC and make a Simple noose knot towards the firts PC. Feed the PC through the eye of the loop of the FC. Pull the running end of FC to dress the knot
3. Repeat step 2 with the same FC and remaining PC's
4. Repeat step 2 and 3 with the remaining FC's and PC's

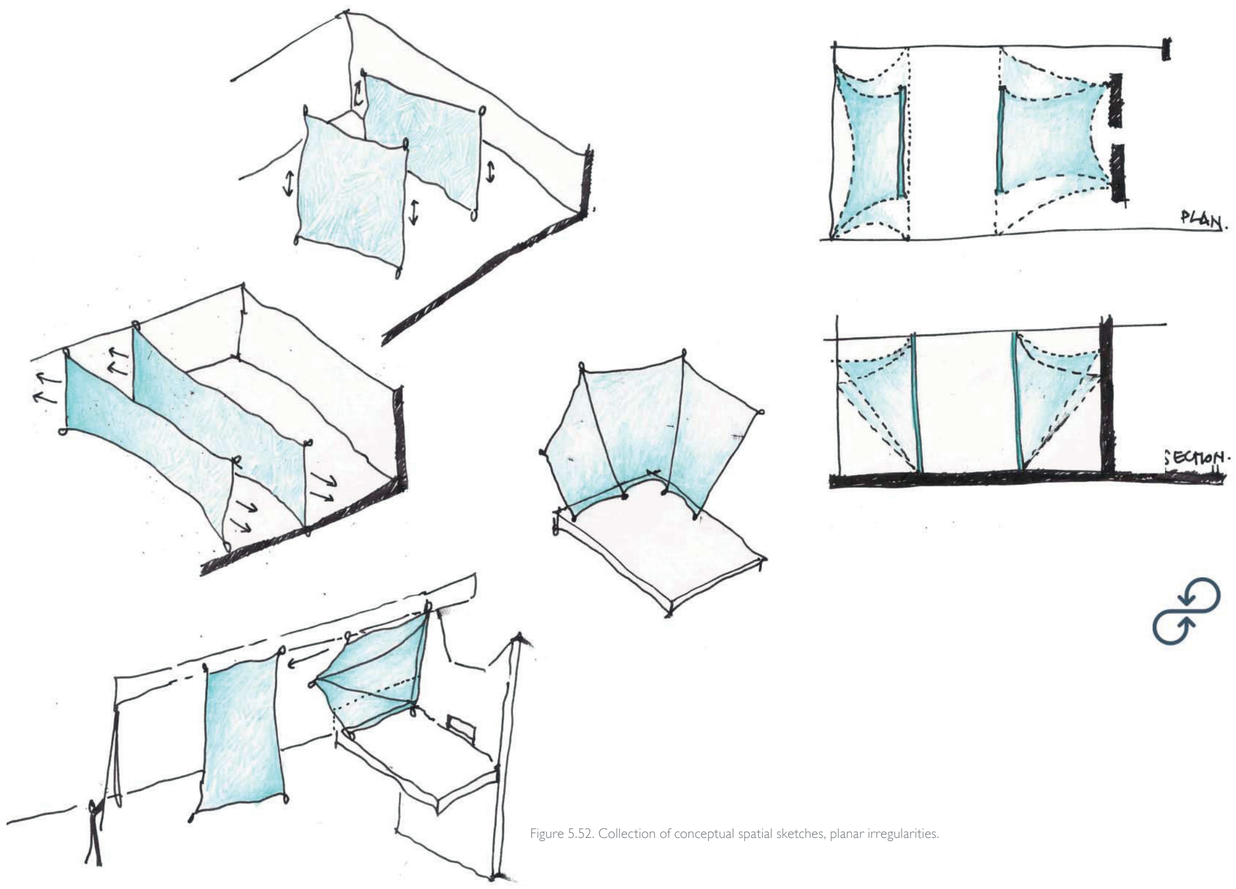


Figure 5.52. Collection of conceptual spatial sketches, planar irregularities.

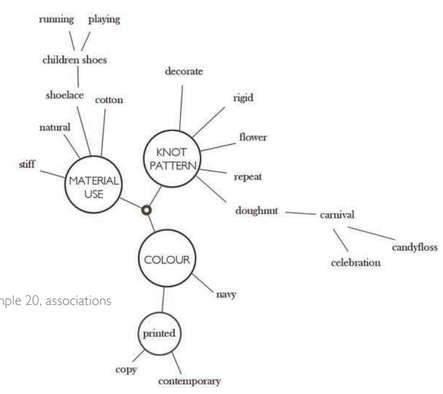


Figure 5.53. Sample 20, associations

image board 1

AESTHETIC, TEXTURE AND DETAIL

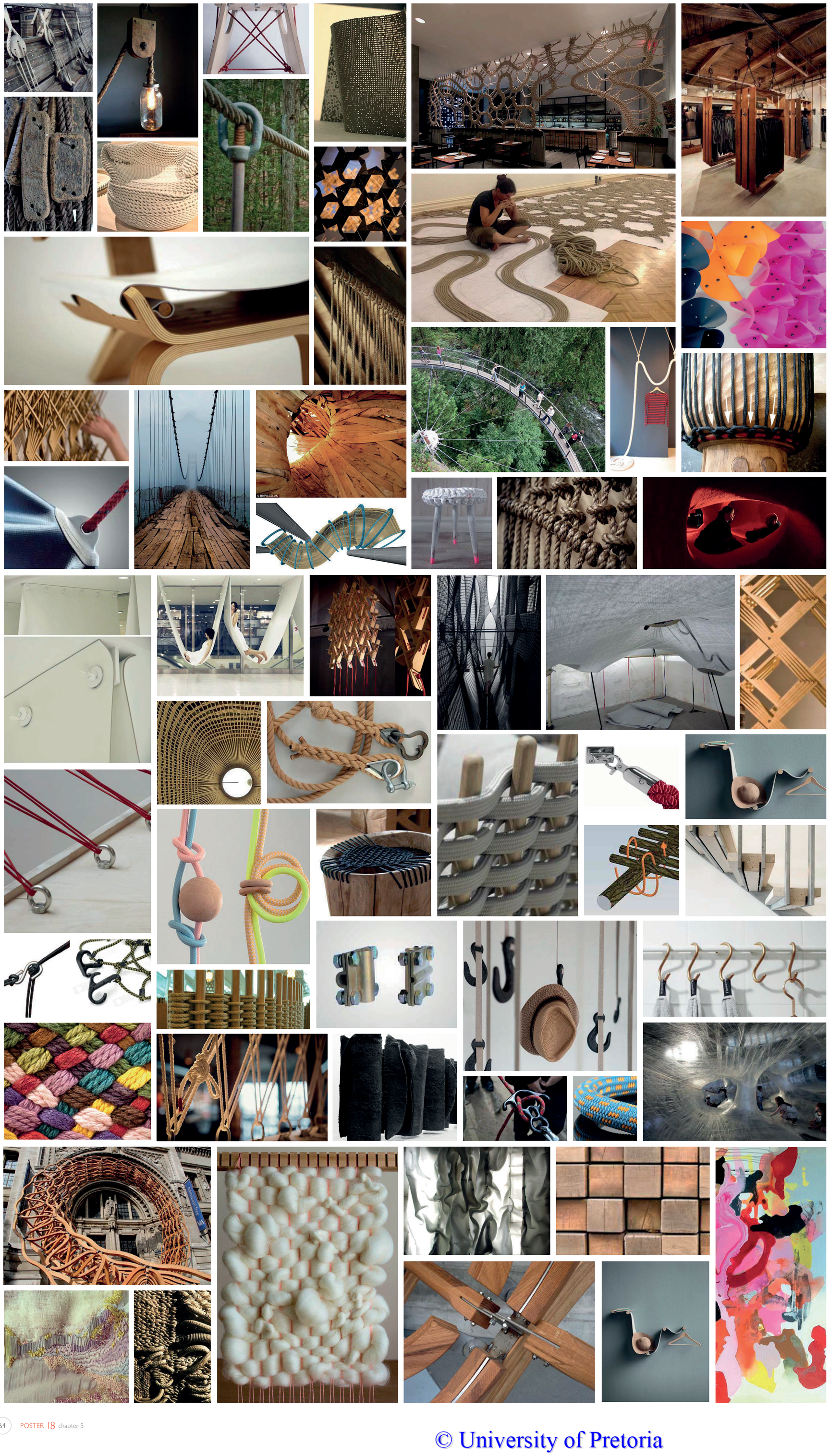


Figure 5.54: Image board (Various sources).

knot selection

STEP BY STEP

5.6.
FINAL KNOT SELECTION

Figure 5.55. Collection of selected knots (Right), illustrate the specific knots that were selected after the Design cycles (See section **5.4.1-5.4.8.**) Each illustration includes the name of the selected knot, its ABOK number, a short description and the selected icon to represent the knot. The tying process of the knot is also illustrated directly below each knot icon. Each knot icon can also be found at the top right hand corner of certain pages to indicate its use.

knot:

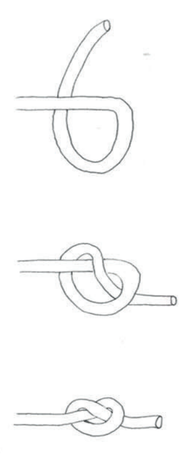
An interlacing of the parts of one or more flexible bodies forming a lump or knob (as for fastening or tying together) (Meriam-Webster: knot). An intertwined loop of rope, used to fasten two such ropes to one another or to another object. A knot even when not in use, will hold its shape or form.

Figure 5.55. Collection of selected knots (right).

OVERHAND KNOT

ABOK #46

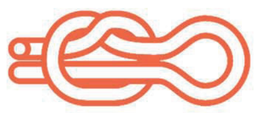
The overhand knot is the simplest of the single-strand stopper knots, and is tied with one end around its own standing part, its purpose being to prevent unreeving.

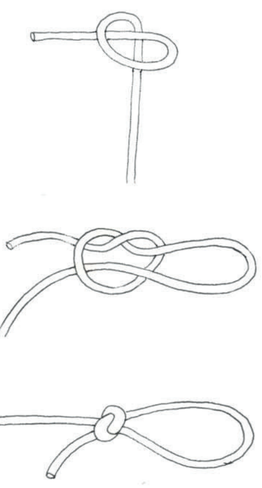


SIMPLE NOOSE KNOT

ABOK #1114

The simple noose knot is closely related to the Overhand Knot, the final tuck of the Noose being made with a bight instead of a single end, as in the Overhand. It is often employed ashore, seldom at sea, its simplicity being its greatest recommendation. It may be tied in the bight as well as in the end of a rope.

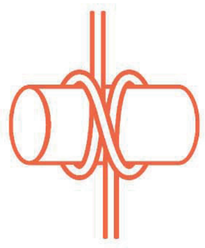


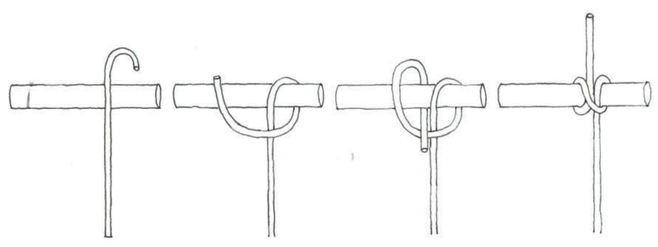


CLOVE HITCH KNOT

ABOK #1176-1180, 1773-1777

The Clove Hitch is a simple yet useful hitch. It is used to secure more complex hitches, in lashings, to make rope fencing, to temporarily moor small boats, in climbing, where it is tied around a Carabiner and as a general utility knot. The Clove Hitch can be tied in the Bight or with the Working End.

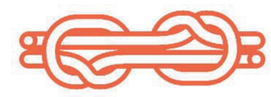


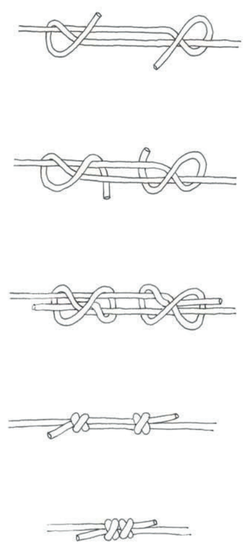


DOUBLE FISHERMAN'S KNOT

ABOK #1415

The Double Fisherman's Knot is also known as the Grapevine knot or Double English Knot. This variation of the Fisherman's knot is a very secure bend widely used in climbing and in search and rescue operations. All variations of this knot tend to jam under strain, and in situations when the knot needs to be easily united other bends are preferable.

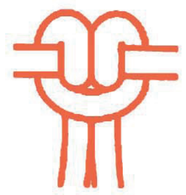


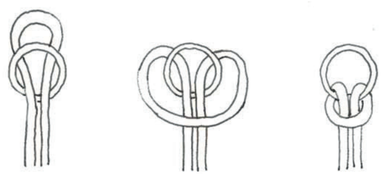


LARKS HEAD KNOT

ABOK #2485, 56

The Larks Head is also known as the Cow Hitch. It is most commonly used in square knotting or Macrame. Square knotting is started with a series of cords made fast to a foundation cord, by means of a Larks Head Knot.





working plan 2

ACTION PLAN & TIME FRAME

5.7.
PLANNING PART TWO

After the design cycles as documented in the test matrix, a second Plan of Action was set out. As with the plan of action part one, the table includes a number indicating the **phase**, a description of the **action** performed within that specific phase, the **research technique** applied and the **purpose** for the action. Further information such as the primary source used as basis for the action, the time frame to perform the action, as well as the **physical manifestation** of the action performed is included.

PHASE	ACTION	RESEARCH TECHNIQUE	SOURCE	MATERIAL	PURPOSE	TIME FRAME	PHYSICAL MANIFESTATION	Notes
11	Investigate spatial intervention and characteristics	**Observation** **Design response**	PHASE 6-10	N/A	Determine spatial intervention	Incremental process	Sketches, plans, sections, perspectives and spatial interpretations	Iterative process, refer back and forth between PHASE 6,7,12. Spatial intervention will be mainly determined on testing sites and translated on paper by means of sketches
12	Set up documentation procedures for testing		PHASE 6,9	N/A	To allow for rigorous documentation of the process	1 DAY	Outline and steps for data collection and documentation process	The documentation procedure is revised once or twice after the first phases of design has occurred
13	Test rope and rope-like materials on a spatial level within testing model 2	**Making** **Iteration** **Observation**	Preceding phases Intuition	Rope and rope-like materials, hardware	Determine size, shape, characteristics and scope of spatial intervention	Continuous process	Photographs, sketches and process documentation as well as possible models and maquettes	Iterative process involving design on various scales, moving back and forth between the construction level and the spatial level
14	Document conclusions	**Analysis** **Synthesis**	PHASE 12	N/A	Synthesis of data in order to reach appropriate conclusion and well planned responses	Continuous process	Synthesised data in excel spreadsheets	Observations and conclusions are of the utmost importance
15	Investigate type of 'hard' or rigid elements	**Making** **Iteration**	PHASE 12,14	N/A	Investigating types of hard or rigid insertions will inform form	1 WEEK	Lasercut board elements and other hardware items as needed	Determine type A,B,C of space-defining element
16	Determine spatial intervention according to intervention site	**Design response**	PHASE 6-16	N/A	Formulating application type will assist with the design of space-defining-element	2 WEEKS	Plans, Sections, Perspectives	Iterative process
17	Material and colour selection	**Design response**	Association bubbles and intervention site	Rope and rope-like materials	Formulate design response as a whole	1 WEEK	Samples and diagrammatic colour studies and pattern layouts	
18	Investigate and determine fixing methods	**Making** **Iteration** **Response**	PHASE 12,14,16	Rope and rope-like materials, hardware	Fixing methods will inform spatial response	1 WEEK	Selection of hardware with knots and method of fixing	Test various methods of fixing rope and what types of hardware responds best to the characteristics of the materials
19	Technification	**Analyse** **Literature**	PHASE 4 and literature sources	N/A	Determining technical specification for construction and fabrication purposes	TO BE DETERMINED	Sketches, detail sections	
20	Documentation		PHASE 17-20	N/A	Documentation to relay fabrication methods	TO BE DETERMINED	Technical sketches, revit drawings and specification	
21	Presenting fabrication methods		PHASE 19,20	N/A	Production purposes	TO BE DETERMINED	Technical sketches, revit drawings and specification	

Table 5.6. Plan of Action, part 2. (above).

	JUNE										JULY																							AUGUST								
	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
	20	21	22	23	24	25	26	27	28	29	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9
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COMPLETED
TO COMPLETE
CRIT DAY

Table 5.7. Plan of Action schedule, part 2. (above)

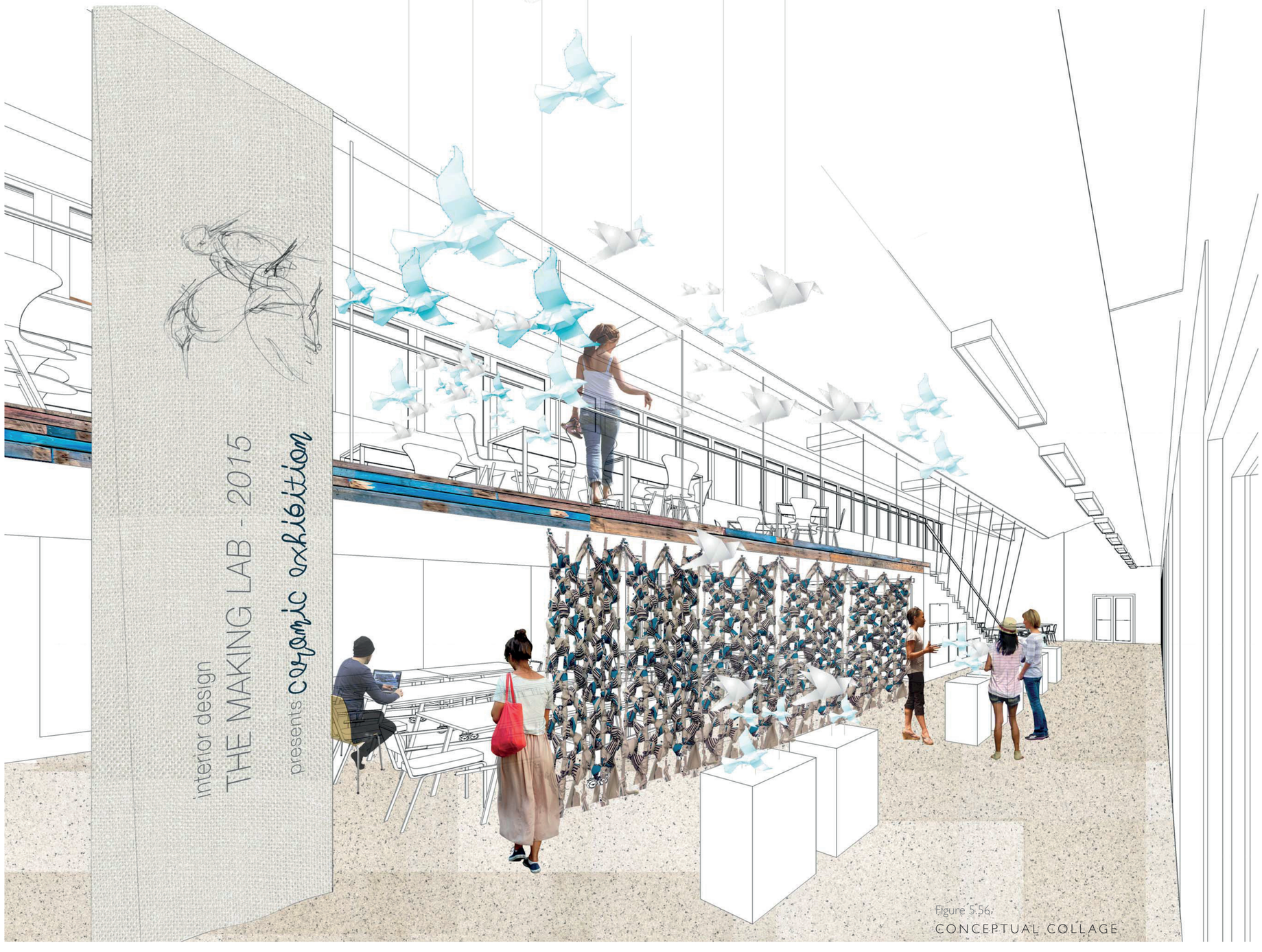
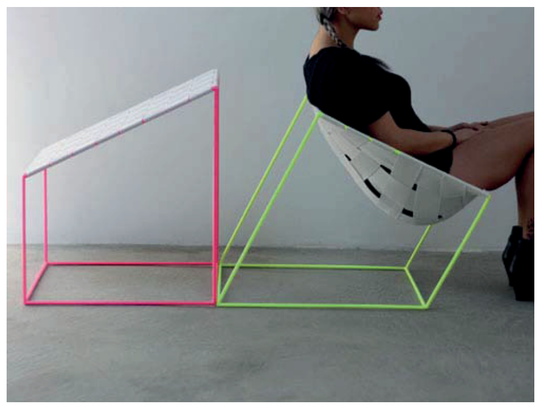
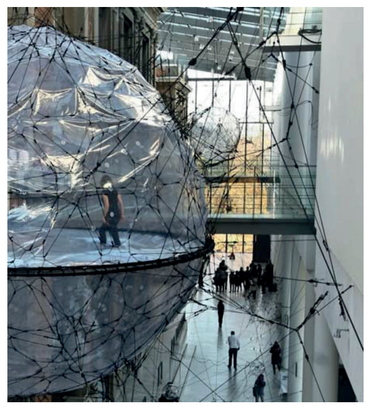


Figure 5.56.
CONCEPTUAL COLLAGE

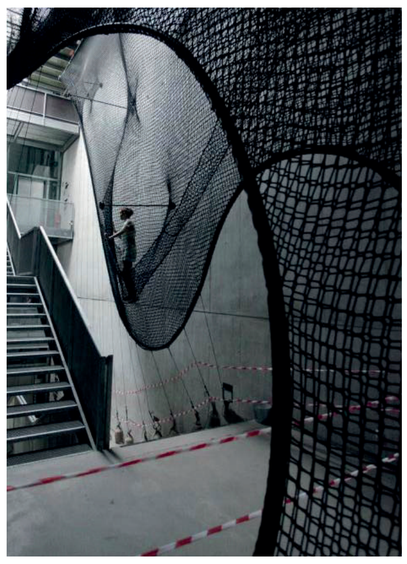
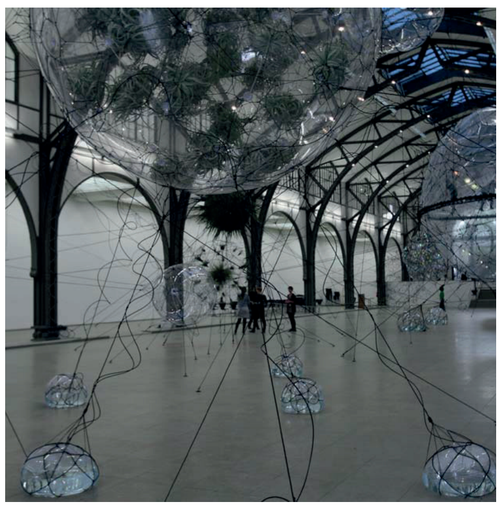
image board 2

SUSPEND AND STRETCH

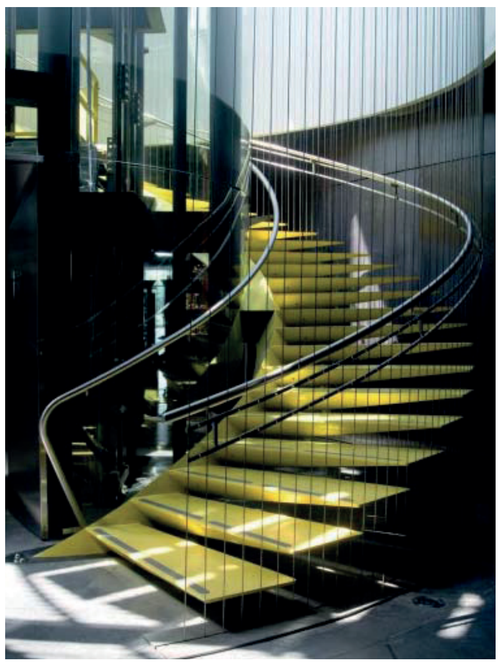


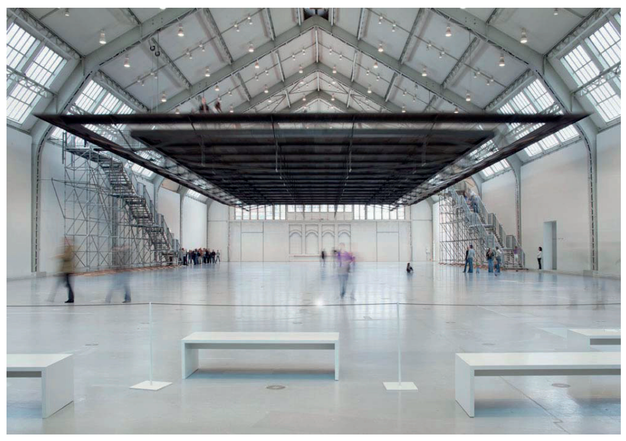
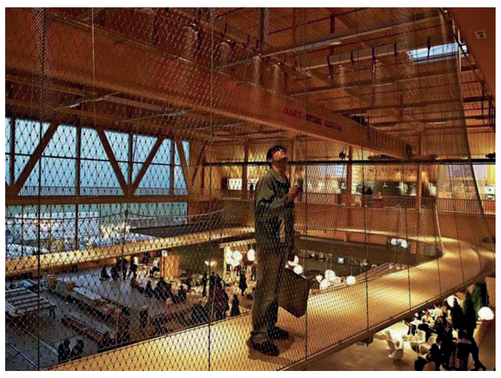
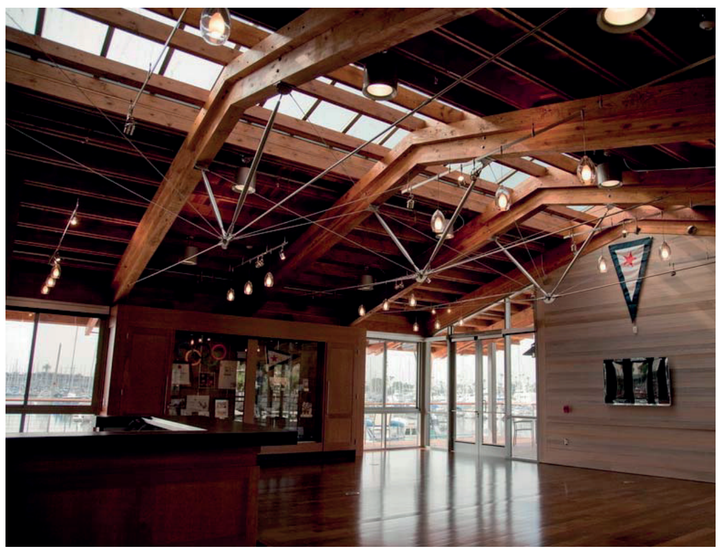



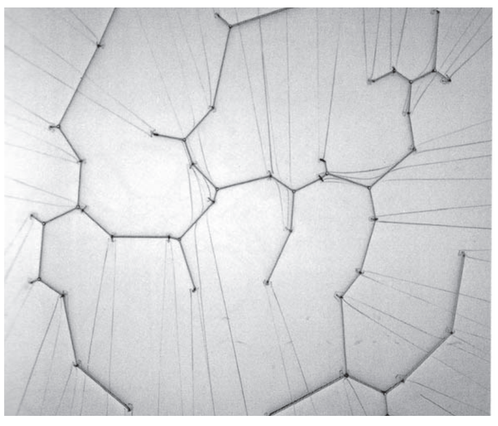








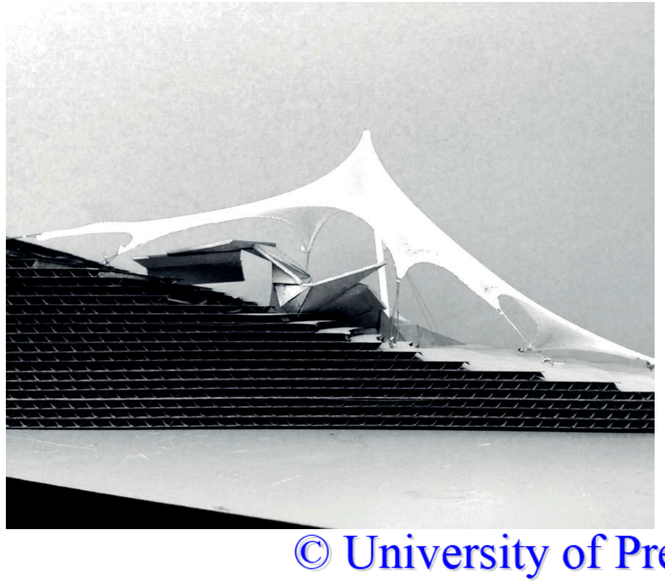
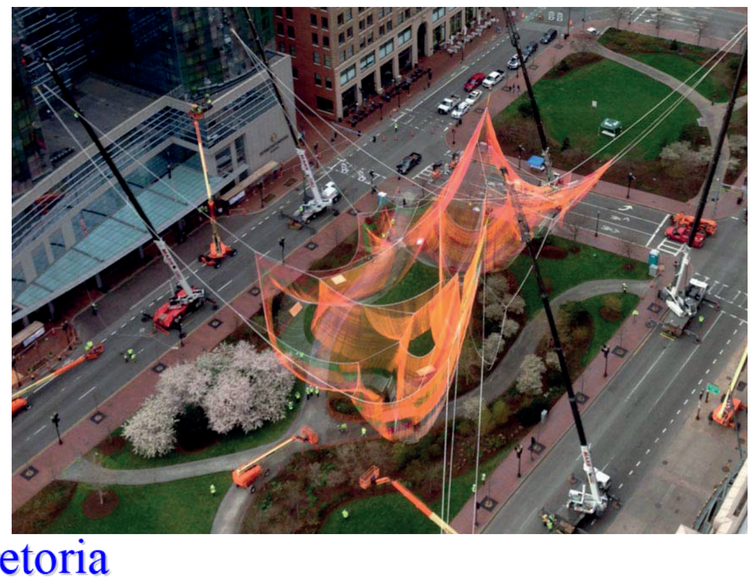



Figure 5.57. Image board 2 (Various sources).

testing box results

DEVELOPMENT OF SCENARIOS

5.8.
DEVELOPMENT OF SCENARIOS

During the testing and making phases (using the testing box), the textile scenario's were developed. The following images illustrate the initial development of the scenario's as well as the form and use of the textile space-definers on a spatial level.

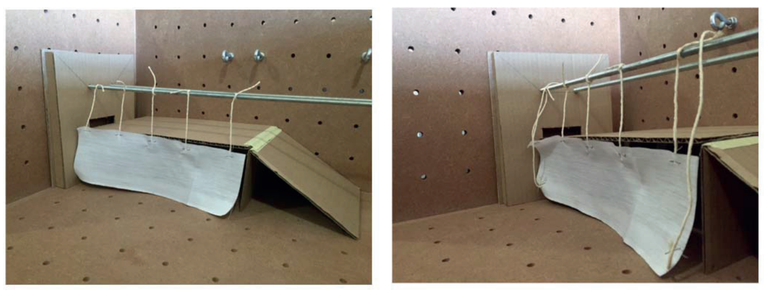


Figure 5.58.
TEXTILE PLANE ONE,
POSITION 1 (above left and right).

The textile plane is adjustable by means of a pulley system, Position one defines a spatial zone below the mezzanine as either digital classroom or a informal seating space. North of the textile plane is a formal studio space and exhibition space.

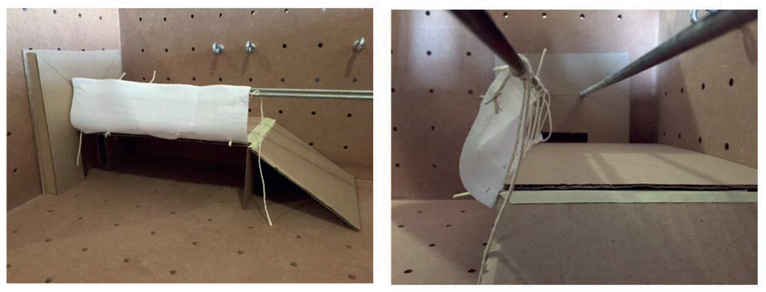


Figure 5.59.
TEXTILE PLANE ONE,
POSITION 2 (above left and right).

Position two defines spatial zone three and four. Zone three combines the space underneath the mezzanine with the existing formal studio space. Spatial zone four is now an enclosed area on top of the mezzanine with access from the west using the stairs.

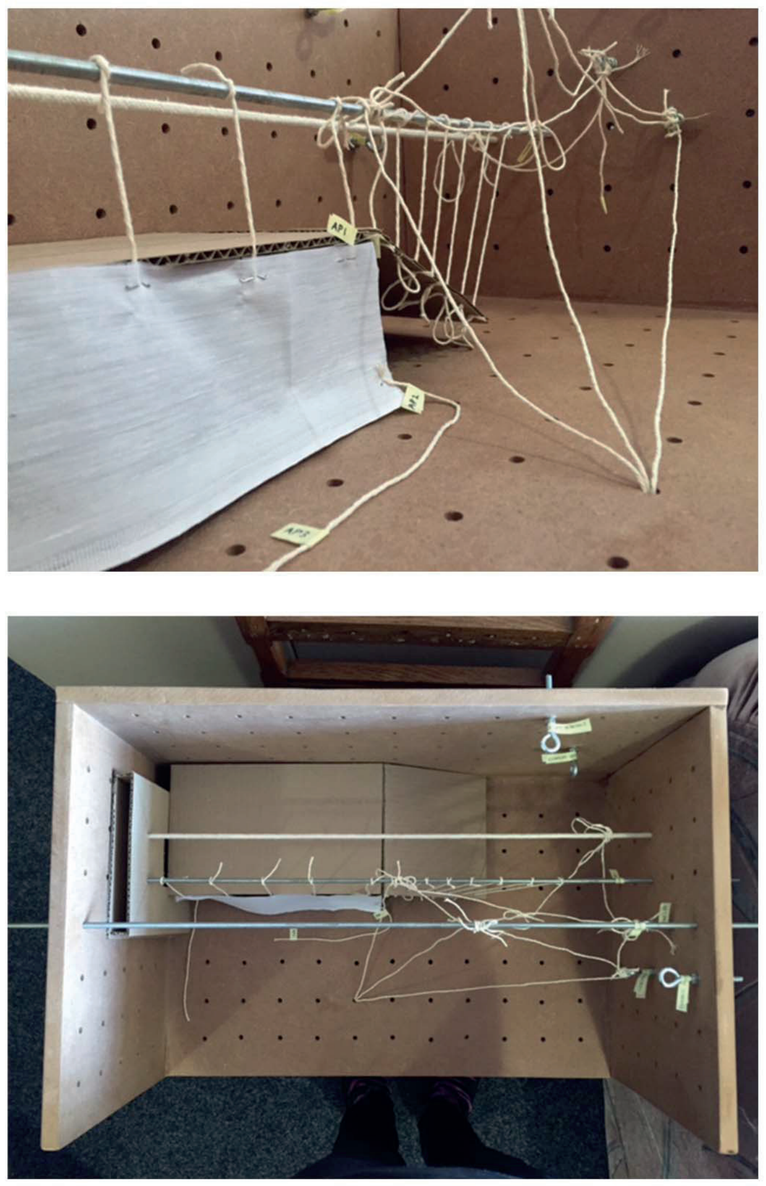


Figure 5.60.
LARGE SUSPENDED TEXTILE,
POSITION 1 (above).

The large suspended textile plane is considered a combination of horizontal and vertical planes. The structure is suspended by two static, permanent anchor points.

The exhibition and digital presentation sees the textile suspended from the existing overhead pane and fixed in position to define a more secluded or enclosed area at the south west corner of the existing studio space. This area can be used in various formations for digital projection and exhibition or presentations. Here the staircase incorporated within the proposed mezzanine act as amphitheatre seating.

spatial scenarios

TEXTILE MANIFESTATION

5.9.
DESIGN RESPONSE

The Boukunde site for intervention acts as a shell for the textile intervention. Firstly a hard element is inserted into the space - a cable-stayed mezzanine. This structure is not a textile space-defining element itself, but assists in the formation of space. See Figure 5.61. Design intervention diagram (bottom). With textile space-making in mind, the mezzanine structure is designed to be as lightweight as possible, conceptually alluding to permeability and lightness. See **section 5.1. Conceptual thinking** on poster 9 (page 50).

Fixing and connection details between hard and soft - mezzanine and textile space-defining elements - are accentuated and exposed to respond to the conceptual approach. These textile space-defining elements are designed according to the identified scenarios. See Figure 5.62. Scenario sketches 1,2 &3 (boxed below).

5.9.1.
PROGRAMME

The commitment of the Department of Architecture to innovate, combined with the desire of the interior design disciplines to define and differentiate themselves from the discipline of architecture, creates the unique opportunity for the design of an INTERIOR DESIGN MAKING STUDIO for the department. See Figure 5.63. Diagram of proposed programme (right) for a bubblediagram indicating the different functions of the proposed programme.

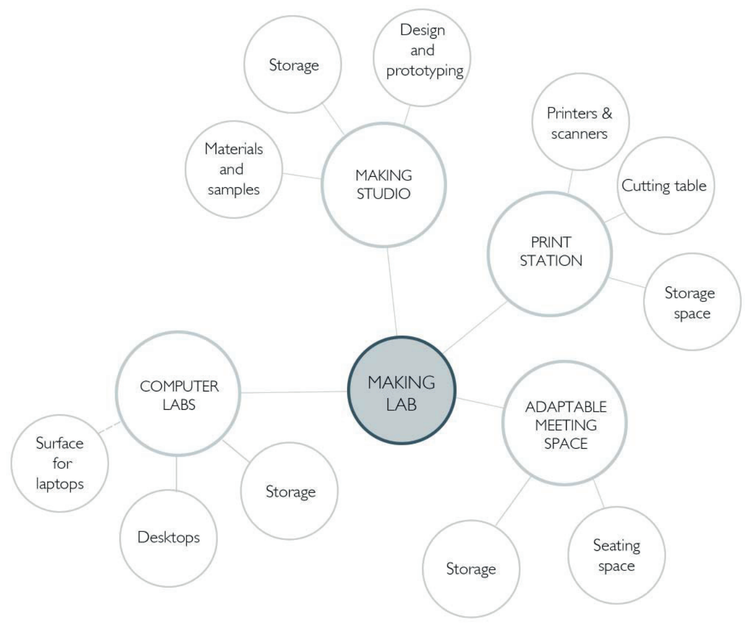
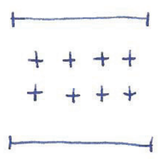


Figure 5.63. Diagram of proposed programme.

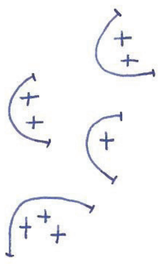
5.9.2.
SCENARIO ONE - DIVISION OF GROUP WORKSPACES

The textile unit for scenario one is a semi-fixed unit (One point of the textile always remains fixed to the structure). Scenario one allows the user to create a visual barrier between group working spaces. Each textile unit can be manoeuvred individually to suit the needs of the user, both at the bottom of the mezzanine and at the top. All of the units can also be rolled up for easy storage. Even though the large workspaces above and below the mezzanine can be divided by the user, the textile is restricted to two vertical planes.



5.9.3.
SCENARIO TWO - DIVISION OF INDIVIDUAL WORKSPACES

Scenario two offers the user more flexibility than scenario one. Each textile unit can be completely detached from the structure, allowing the user to relocate the sample to a different location. This allows the user to create a more private or enclosed space. The individual unit is equipped with colour-coded carabiners allowing various configurations of space.



5.9.4.
SCENARIO THREE - DIVISION OF ROOM FUNCTIONS

Scenario three offers the potential of subdividing larger interior spaces. This allows for the creation of temporary 'rooms' within an interior setting which could potentially house different functions. Within the design studio scenario three includes the creation of a temporary digital projection space within an exhibition area.

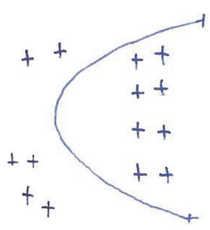


Figure 5.62. Scenario sketches 1,2 &3 (top to bottom).

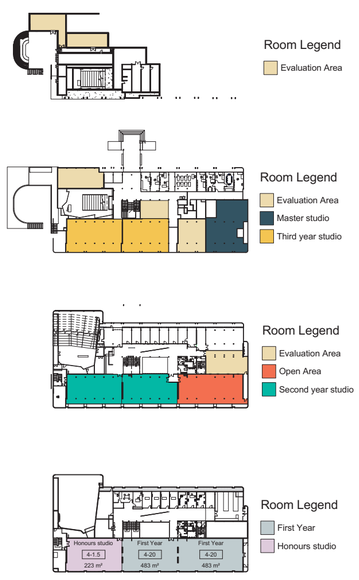


Figure 5.64. Student allocation diagram (above).

5.9.5.
EXISTING CONDITION

Figure 5.64. (left) indicate the areas where students currently have their design studios. Table 5.8. (below) indicate the number of students for each discipline in each of the years. The Honours student occupying the Western wing of the test site for intervention (first year studio) will be relocated to the OPEN AREA indicated in red on the plan. Figure 5.65. (bottom) illustrate with a collection of images, the current condition of the test site for intervention.

Table 5.8. (below)
ALLOCATION OF STUDENTS

Year	Interior	Architecture	Landscape	TOTAL
First year	~	~	~	**88**
Second year	14	60	16	**90**
Third year	28	50	20	**98**
Honours	12	10	43	**65**
Masters	7	23	15	**45**

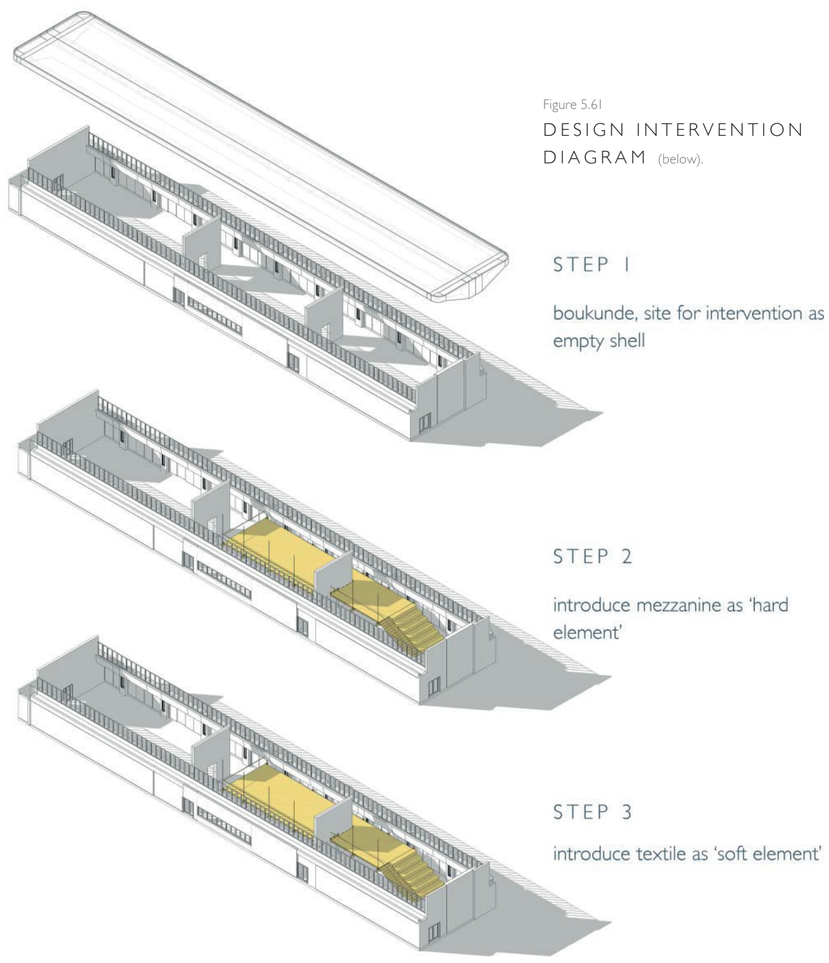


Figure 5.61
DESIGN INTERVENTION DIAGRAM (below).

STEP 1

boukunde, site for intervention as empty shell

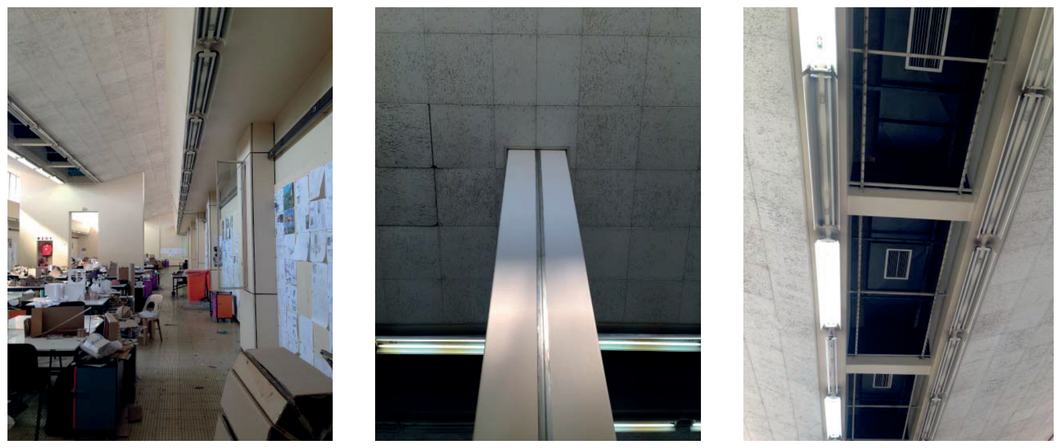
STEP 2

introduce mezzanine as 'hard element'

STEP 3

introduce textile as 'soft element'

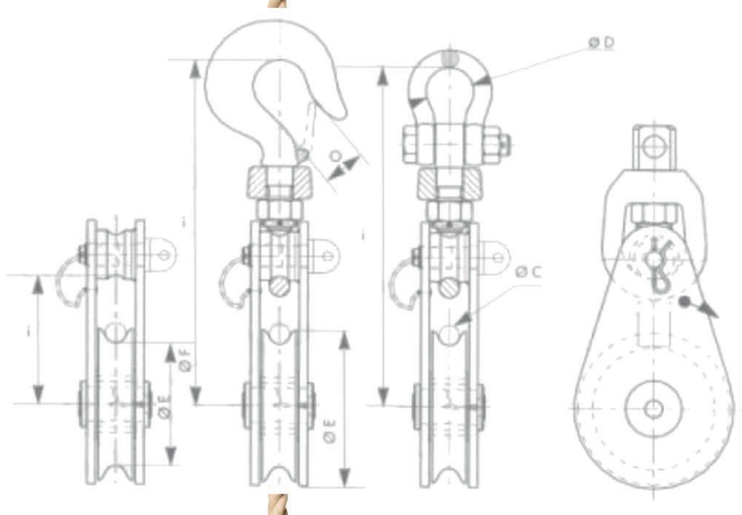
Figure 5.65. Collection of images of first year studio in Boukunde building (below).



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

look and feel

THE MAKING STUDIO



POWDER COATING SAMPLES

IVORY
RAL 1015

PURPLE
RAL 4008

MINT GREEN
RAL 6019

TEAL
RAL 5018

DUSTY PINK
RAL 3017

SAND
RAL 7044

WHITE

UMBER GREY
RAL 7010

GALE WINDS
RAL 7040

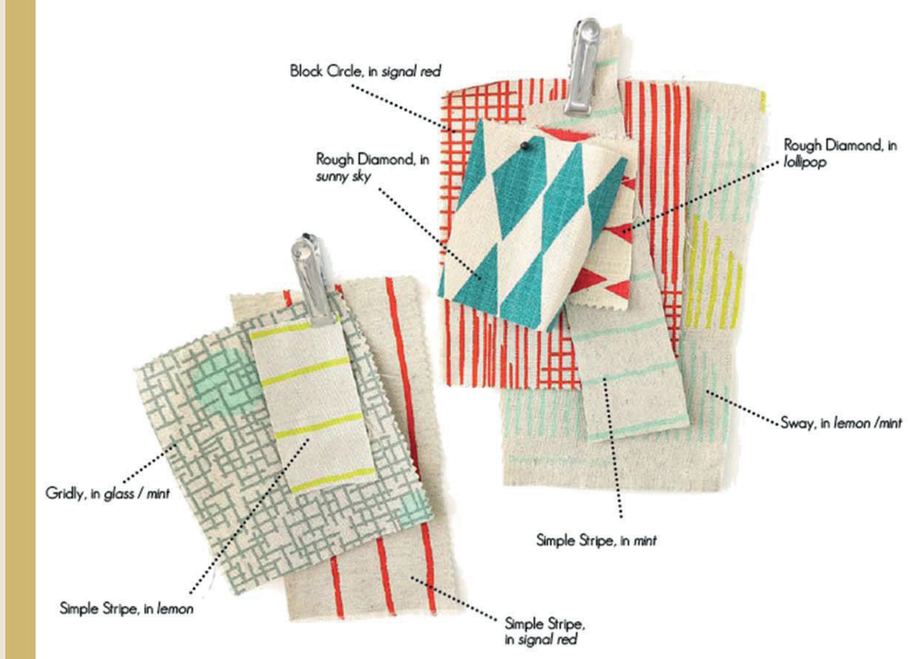


Figure 5.66. Look and feel (moodboard).

INTERIOR DESIGN RESEARCH STUDIO

test site for intervention

5.10.
SPATIAL DESIGN RESPONSE

The basis for the design of the textile space-defining element is presented in the first part of this chapter in the form of design cycles, reflections and observation and response tables. The information and ideas discovered throughout the making process fully informs the spatial design response that follows.

The making process continues throughout the design development in order to enrich and contribute towards the more conventional spatial design process.

The textile samples and knowledge collected from the making process directly informs the basic textile unit. The basic textile unit is then altered to create the various spatial responses that follow. These space-defining elements are presented as part of the three scenarios as discussed earlier on poster 23, page 69. This is indicated when appropriate at the top right corner of the poster pages.

Sections 5.4.1. - 5.4.8. on posters 14-17, illustrate the initial design detailing cycles. Differently than with conventional research methods, research through making, introduces a process where smaller focussed detailing takes place before detailing on a larger scale. This section however looks at design detailing as part of the spatial manifestation. The design detailing takes place on the test site for intervention.

This section covers the following detail areas:

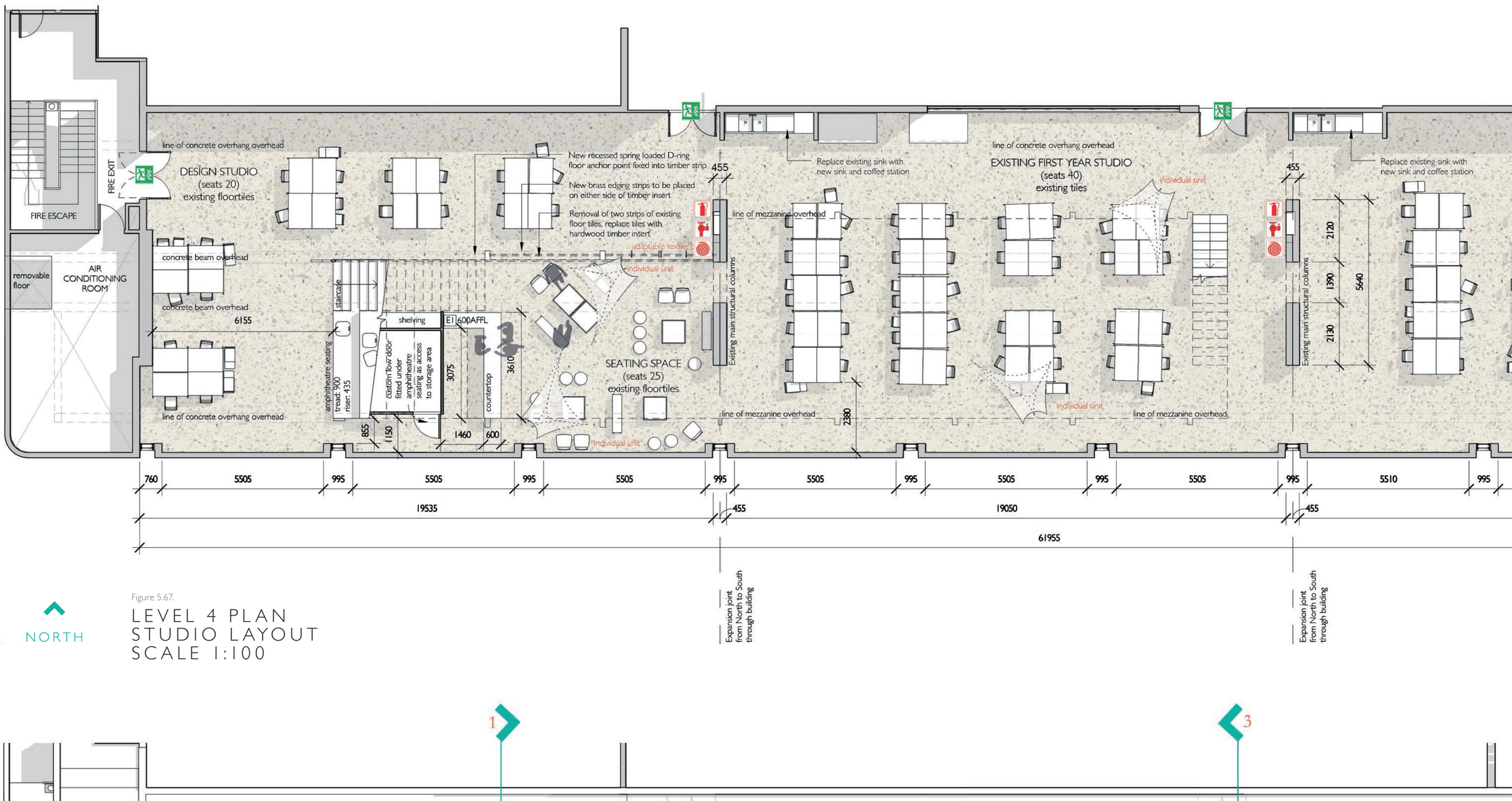
- the cable-stayed mezzanine
- the balustrade
- textile unit one & two
- rigging details
- the conceptual development of textile unit three

The location of each of these details are indicated on Figure 5.78. Section 1 - scenario one and two with detailing, poster 29 (page). A small development sketch is added as reference.

NOTE:
All scales indicated on drawings (plans, sections and details) apply only to full scale poster prints. AI drawings indicated within the book are 'not to scale'.

plans scale 1:100

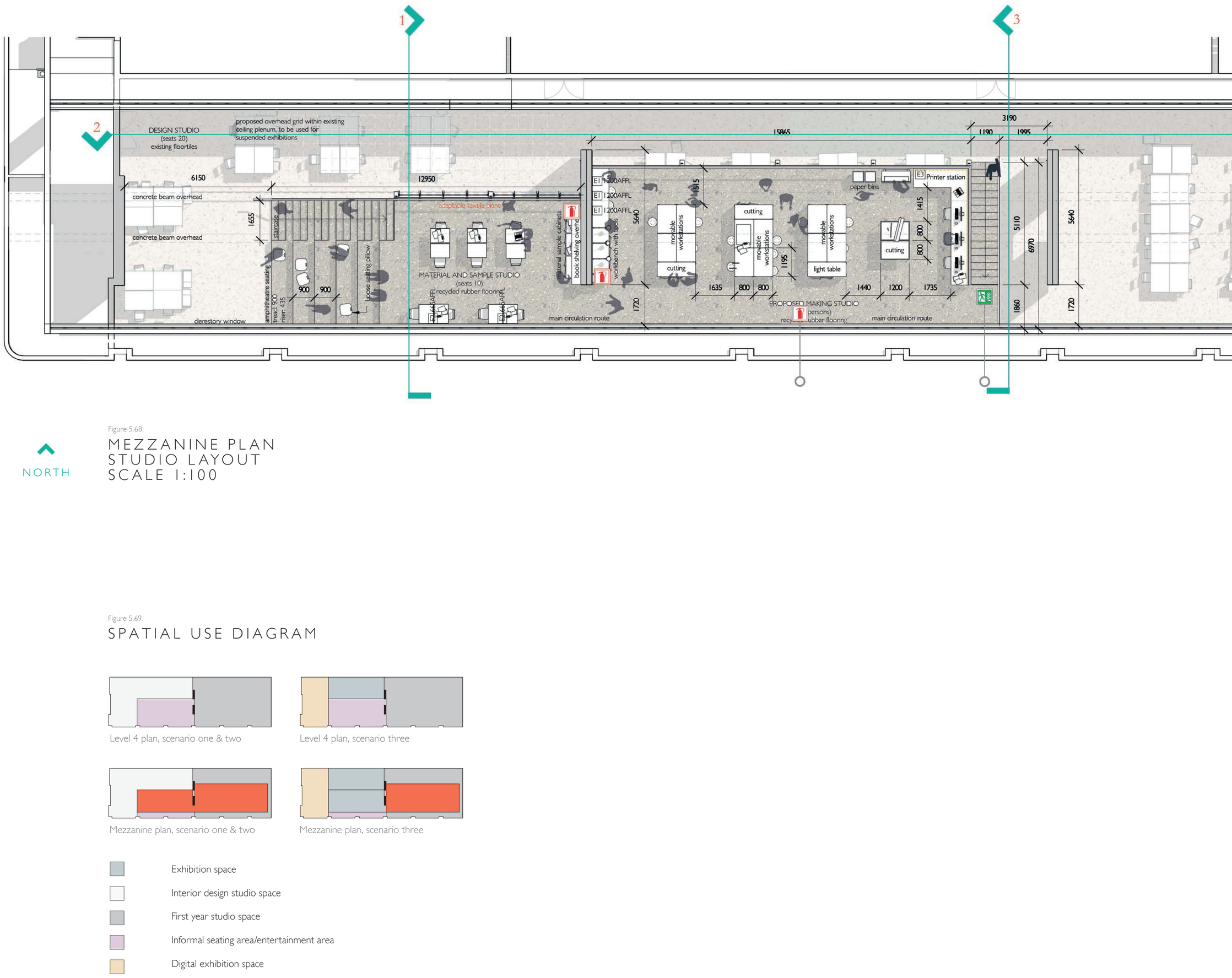
SCENARIO ONE & TWO



NORTH

Figure 5.67.

LEVEL 4 PLAN
STUDIO LAYOUT
SCALE 1:100



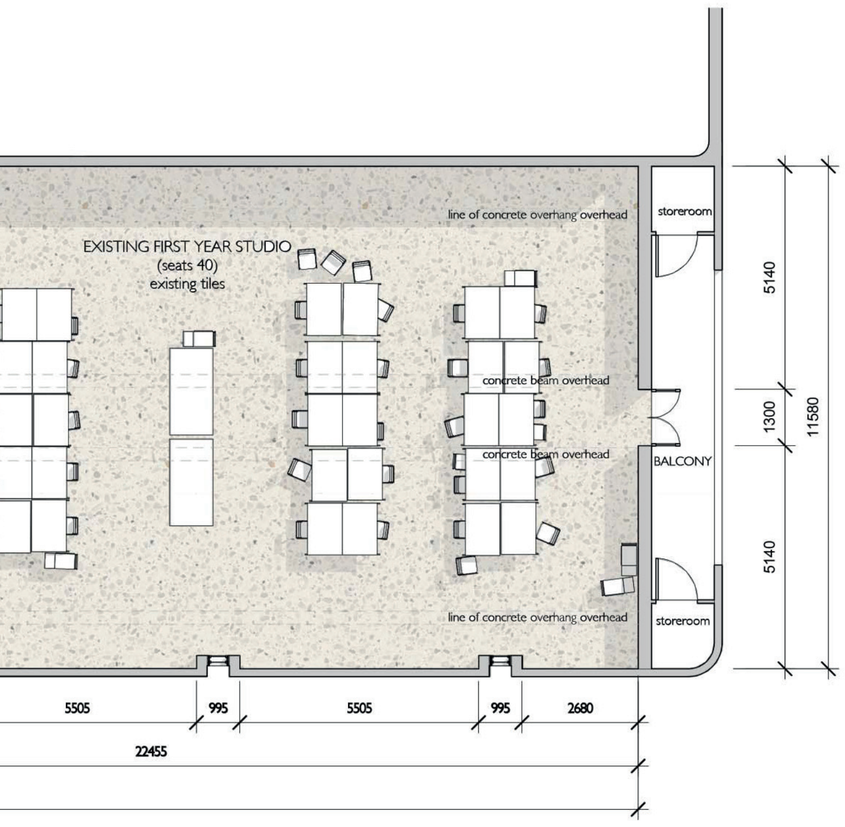
NORTH

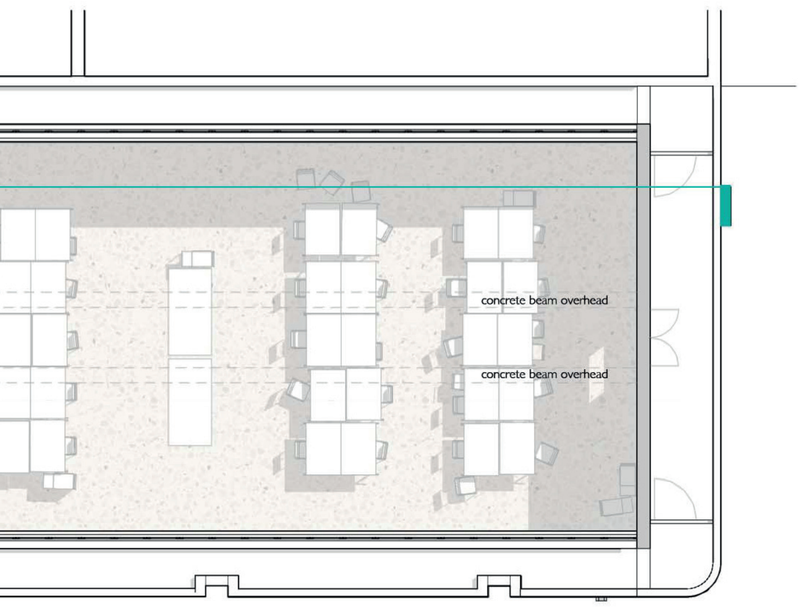
Figure 5.68.

MEZZANINE PLAN
STUDIO LAYOUT
SCALE 1:100

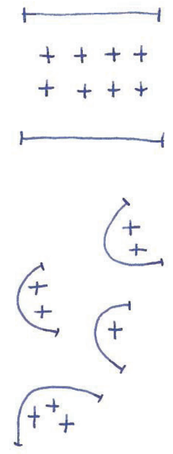
Figure 5.69.

SPATIAL USE DIAGRAM





space-making

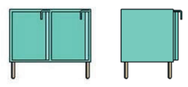


FURNITURE LEGEND:

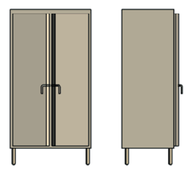
F1 Existing studio chair

F2 Existing studio desk
DOKTER & MISSES

F3 Existing light tracing table



F4 Two door storage unit
DOKTER & MISSES
Colour: Mint green
RAL 6019



F5 Two door storage unit, tall
DOKTER & MISSES
Colour: Sand
RAL 7044

F6 Four door storage unit, tall
DOKTER & MISSES
Colour: Dusty Pink
RAL 3017

F7 300x500 mm Crochet pouffe
MR PRICE HOME
Colour: Burnt orange
Code: 6102016343001

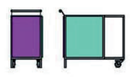
F8 300x500 mm Cable knit pouffe
MR PRICE HOME
Colour: Natural
Code: 6102016343001

F9 Standard OH!Two chair
RAW STUDIOS
Colour: Brown and blue

F10 Low OH!Two chair
RAW STUDIOS
Colour: Brown and green

F11 1300x320x430 mm powder coated mild steel and ash timber easy bench
DOKTER AND MISSES
Colour: White, Code: ST001
With additional: magnetic upholstered cushion
Colour: Grey, Code: CS001

F12 400x800x800 mm custom stackable plinth as coffee table



F13 Existing credenza
DOKTER & MISSES
Assorted colours

F14 760x800x800 steel frame and MDF top work table

ELECTRICAL LEGEND:

E1 Double wall socket at height indicated above finished floor level
16A Slimline compact standard combined socket outlets 100x100mm
Combo socket switch on yoke as per CRABTREE
Colour: Black
Part number 6859/008
with Stainless steel coverplate
Part number: 6529/8

E2 Double wall socket surface mounted to underside of concrete overhang at height indicated above finished floor level
16A surface mounted combined socket outlets 100x100mm
Combo socket switch on yoke with surface mount box as per CRABTREE
Colour: White
Part number: 6859/008

E3 55x90 mm Single compilation galvanised mild steel powerskirting to be mounted to underside of workdesk,
Powerskirting as per STRUTFAST
Finish: Matt
Colour: Umber grey, RAL 7010
Code: F802
with service outlet cover with gripclips as per CRABTREE

FIRE RETICULATION:

9kg Dry powder fire extinguisher 1/200 sq/m

Fire Hydrant 1/1000 sq/m

Fire Hose reel 1/500 sq/m

Fire Escape

callout plan scale 1:50

SCENARIO ONE & TWO

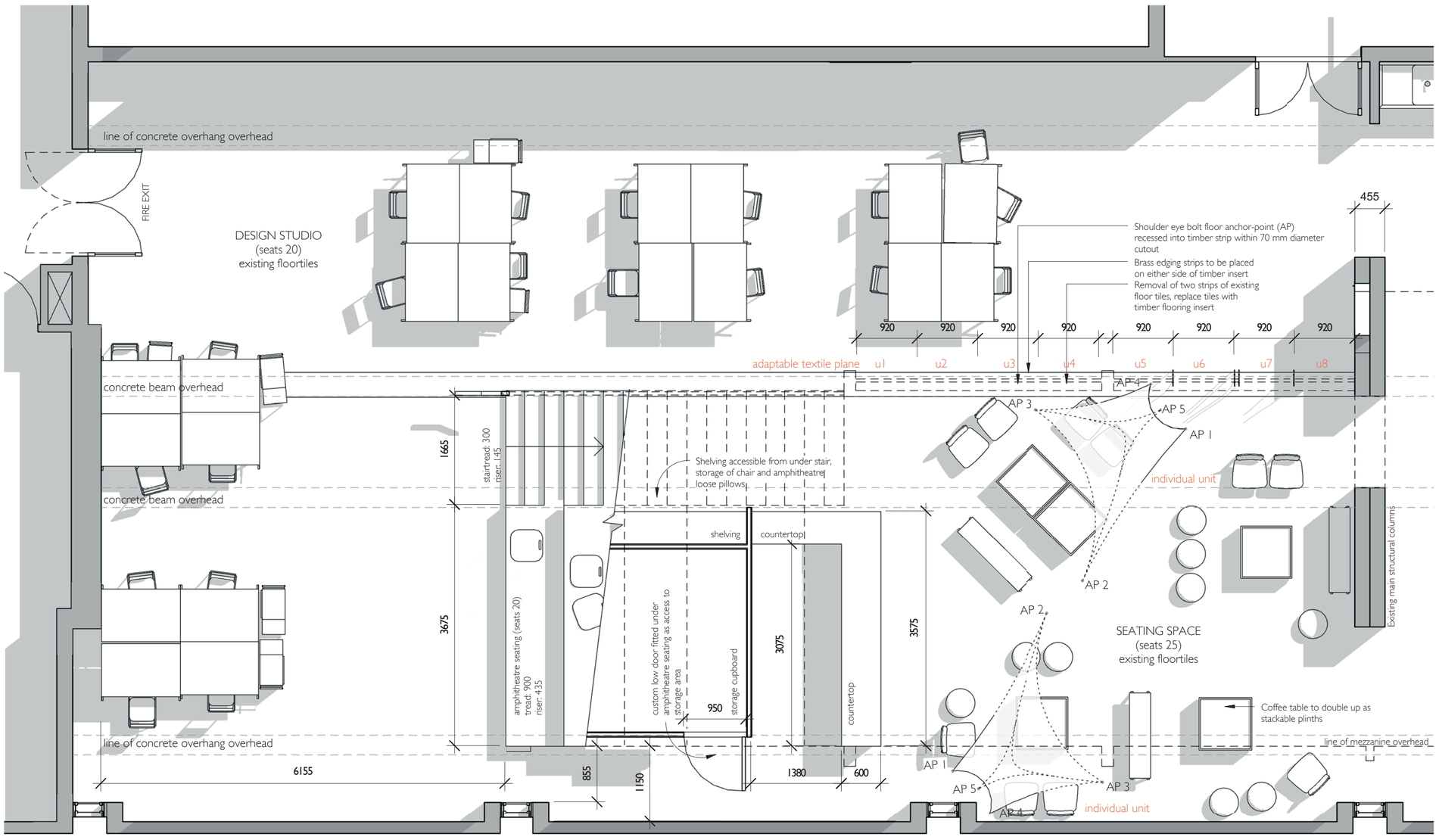


Figure 5.70.

NORTH

LEVEL 4 PLAN
STUDIO LAYOUT
SCALE 1:50

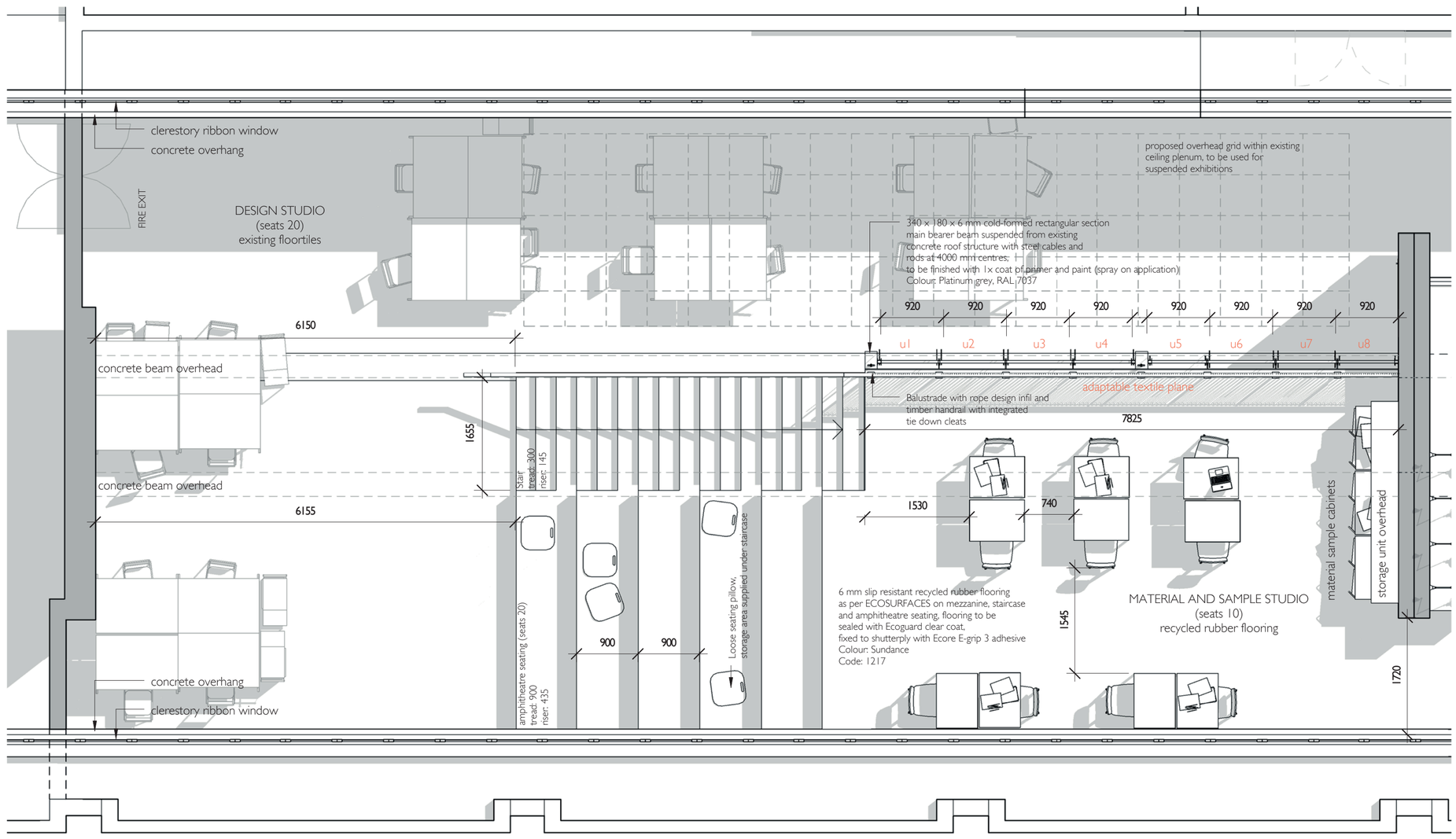


Figure 5.71.

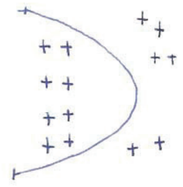
NORTH

MEZZANINE PLAN
STUDIO LAYOUT
SCALE 1:50

plans scale 1:100

SCENARIO THREE

space-making



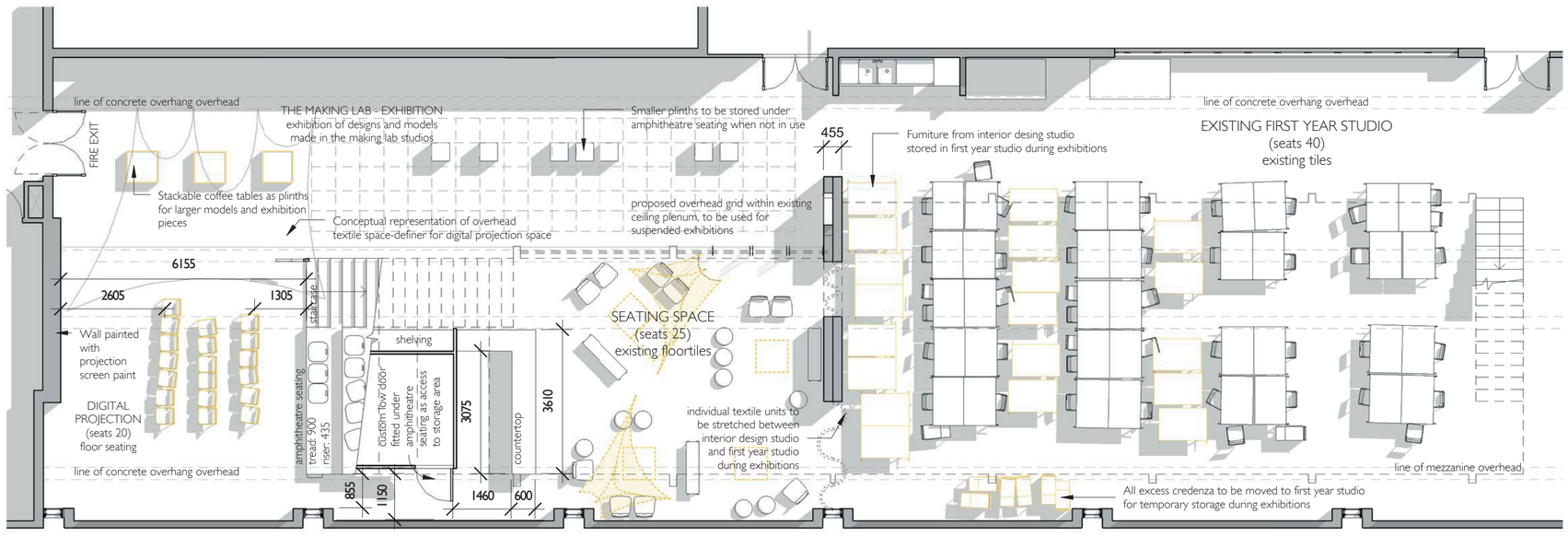


Figure 5.72.

NORTH

LEVEL 4 PLAN
EXHIBITION LAYOUT
SCALE 1:100

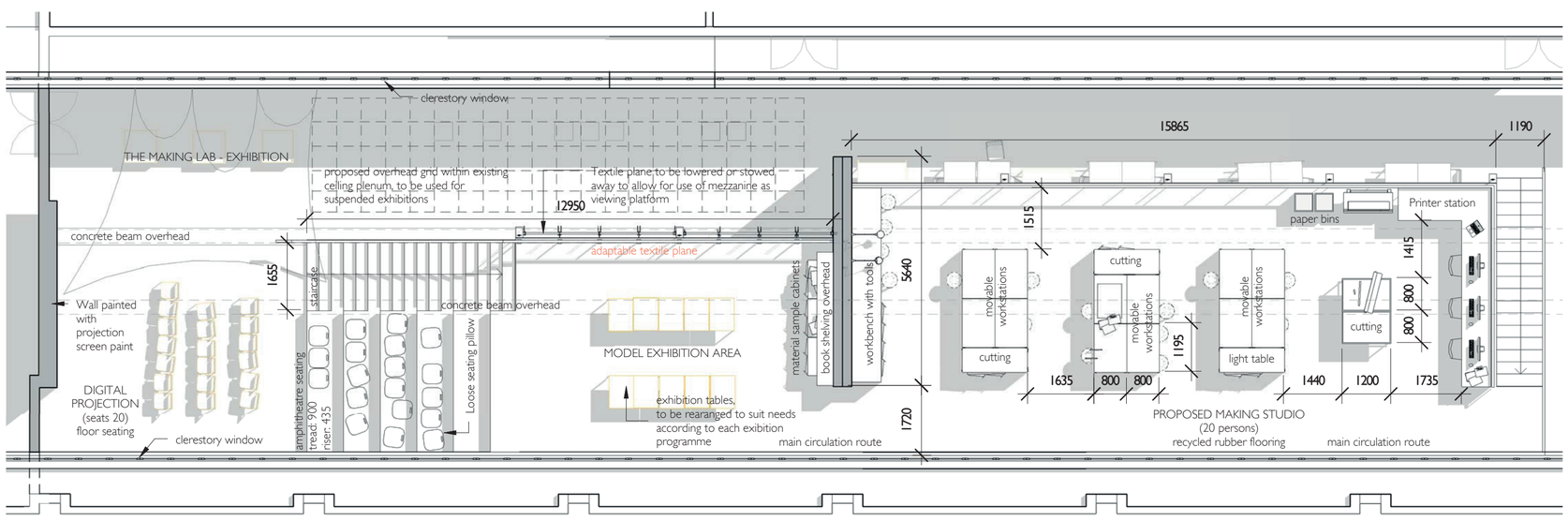


Figure 5.73.

NORTH

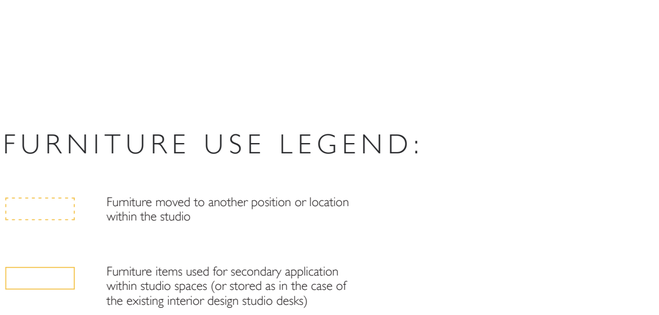
MEZZANINE PLAN
EXHIBITION LAYOUT
SCALE 1:100

FURNITURE USE LEGEND:

- Furniture moved to another position or location within the studio
- Furniture items used for secondary application within studio spaces (or stored as in the case of the existing interior design studio desks)
- Textile unit moved to another position or location within the studio
- Conceptual representation of textile for digital presentation

Figure 5.69. (duplicate)

SPATIAL USE DIAGRAM (Duplicate, see poster 25)



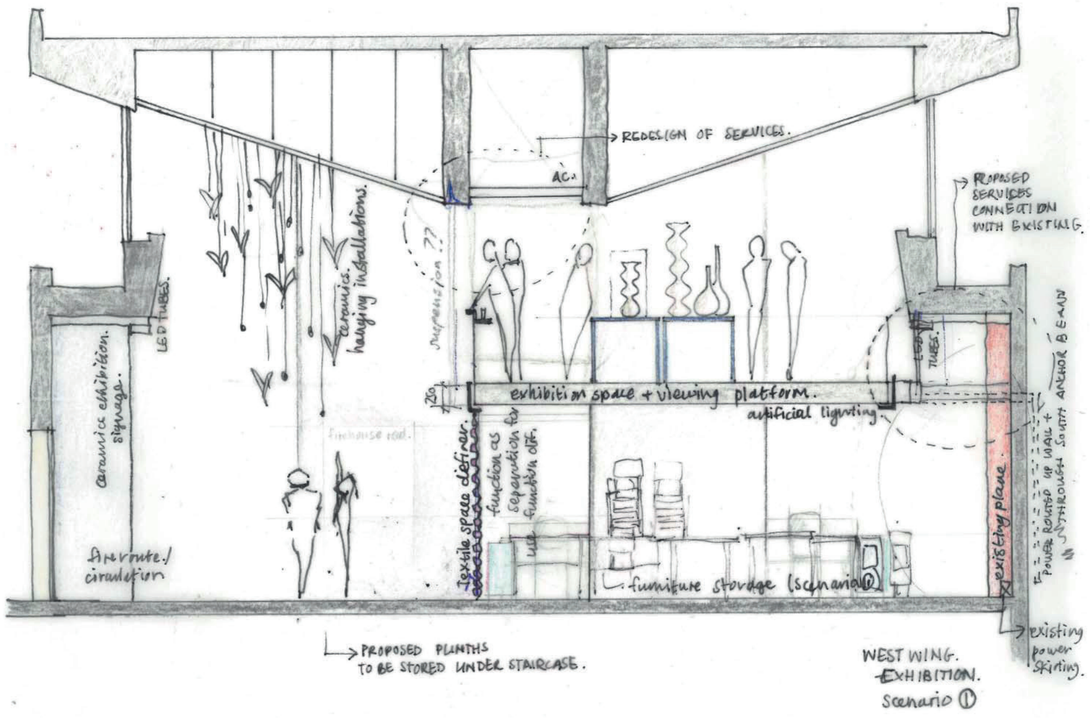
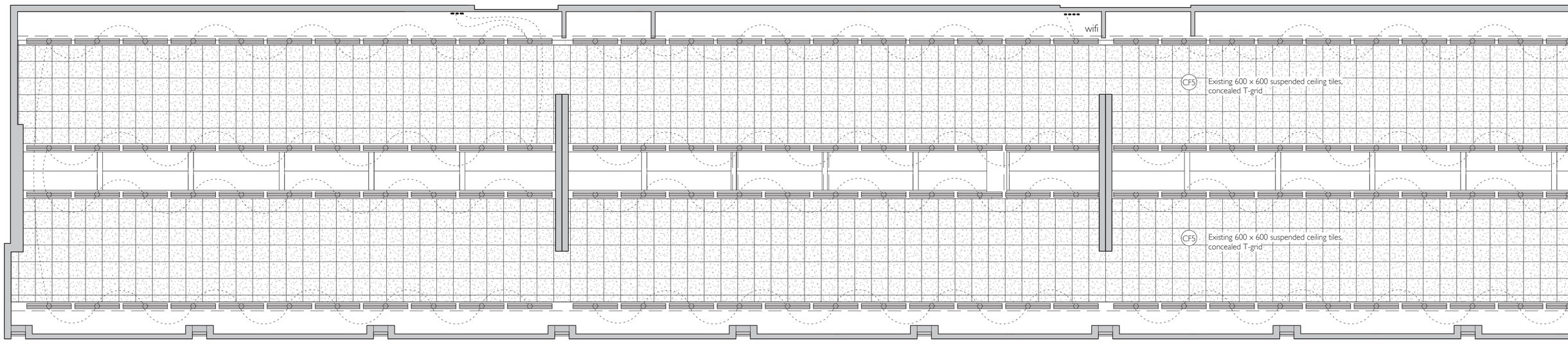


Figure 5.74.

SECTION DEVELOPMENT SKETCHES
EXHIBITION LAYOUT
SCALE 1:50

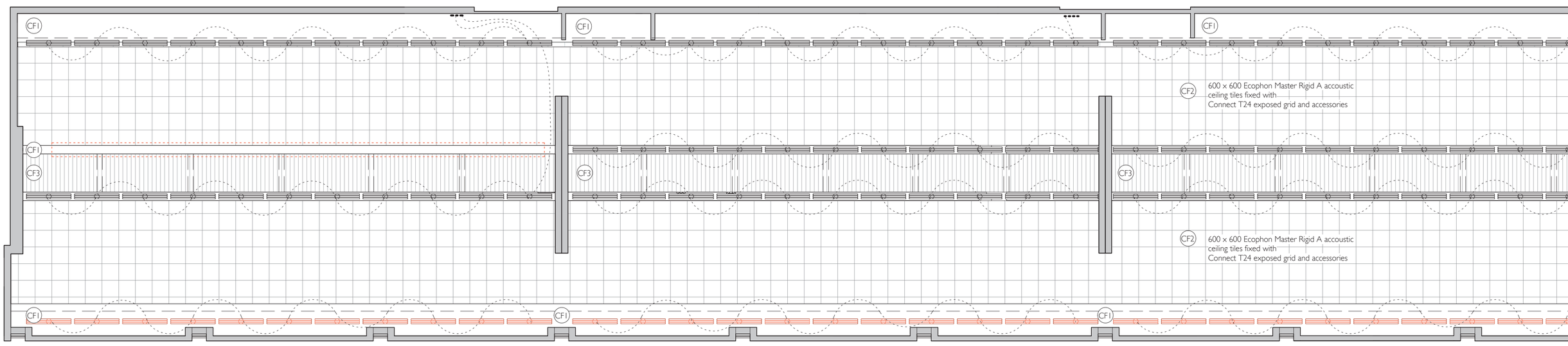
ceiling plans 1:100

LAYOUTS AND CALCULATIONS



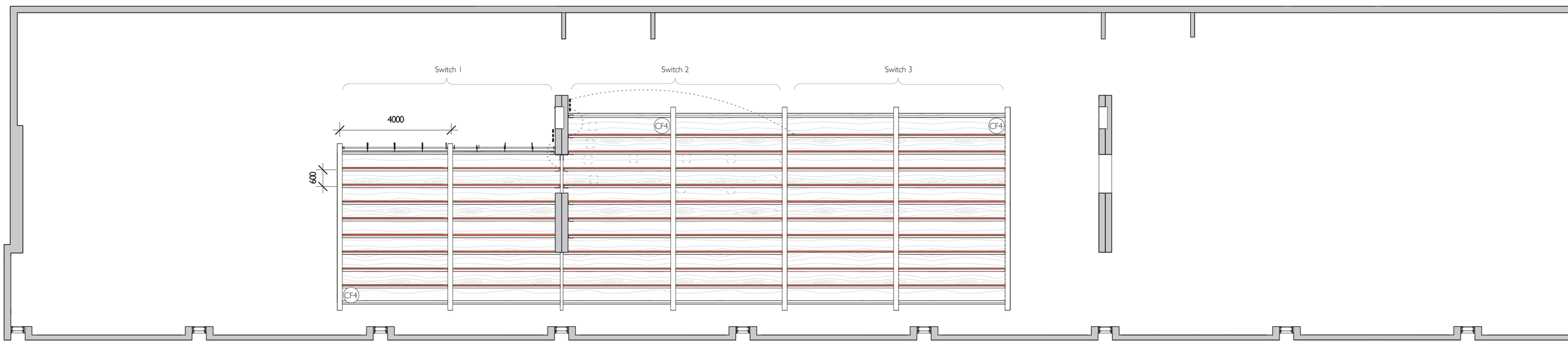
NORTH

Figure 5.75.
EXISTING MAIN STUDIO CEILING PLAN
SCALE 1:100



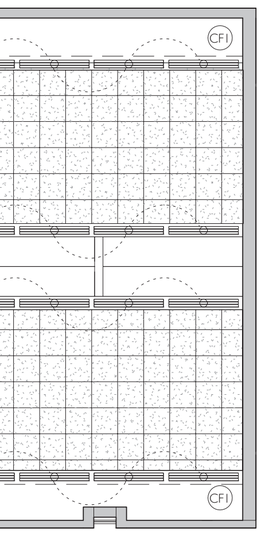
NORTH

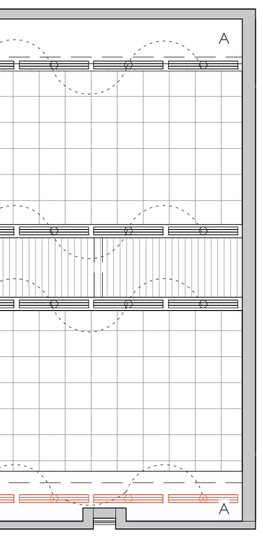
Figure 5.76.
NEW MAIN STUDIO CEILING PLAN
SCALE 1:100



NORTH

Figure 5.77.
NEW MEZZANINE CEILING PLAN
SCALE 1:100





CEILING LEGEND:

CF1 — Underside of existing concrete soffit, all holes to be filled and sanded. Surface to be skimmed with rhinolite and prepared for painting. Underside of soffit to be painted with PLASCON, waterbased, 'one coat ceiling paint', Ultra matt finish
Colour: Brilliant white

CF2 — Existing 600 x 600 suspended ceiling tiles with concealed T-grid hangers TO BE DEMOLISHED and replaced with NEW 600 x 600 Ecophon Master Rigid A accoustic ceiling tiles fixed with Connect T24 exposed grid and accessories

CF3 — New alluminium aircon directional fins to be installed to conceal existing airconditioning ducts

CF4 — 16 mm plywood sealed with WOODCOTE water-based, quick dry varnish as per MIDAS plywood ceiling to be sealed with a water-based quick dry varnish.

CF5 — Existing 600 x 600 suspended ceiling tiles with concealed T-grid hangers TO BE DEMOLISHED.

LIGHTING LEGEND:

Existing luminaires to be removed permanently

Existing luminaires to be cleaned and lamps to be replaced where needed with 58W "T8" Lumilux lamps (L58 W/840) as per OSRAM

Existing luminaires to be removed from soffit and moved back 700 mm, toward the Southern interior wall

90 x 100 continuous surface mounted LED luminaire as per REGENT to be fixed onto underside of plywood. Luminaire to be fixed against flat end of lipped channel as indicated on plan. Luminaire to be fitted with 24W/m, 230V, single LED strip light as per OSRAM

Dimmer switch, one way, with Crabtree classic range light cover
Stainless steel cover plates as per CRABTREE

Table 5.9.

LIGHTING CALCULATION:

	Symbol	Luminaire specification	Lamp specification	Quantity (luminaire x lamp)	Luminous flux	Total Watt	**Total luminous flux**	Efficacy (lumen/watt)
Existing		Surface mounted fluorescent luminaire with reflectors. Powder coated white	58 W "T8" Light colour 840 [cool white] [LUMILUX L58 W/840] by OSRAM	140 x 2	5200 lm	58 W	**1456000**	90 lm/W
Adjusted existing		Surface mounted fluorescent luminaire with reflectors of which **11 luminaires to be removed** (see new studio ceiling plan) Powder coated white	58 W "T8" Light colour 840 [cool white] [LUMILUX L58 W/840] by OSRAM	129 x 2	5200 lm	58 W	**1341600**	90 lm/W
New		90 x 100 continuous surface mounted LED, Charcoal grey (CG) [Linear Maxi surface] by Regent Lighting	24 W/m single LED strip, 4000 K, Dimmable by OSRAM	264 m	2420 lm/m	24 W/m	**638880**	100 lm/W

	Number of lamps	lumen per lamp	Luminous flux [lumens]	Total luminous flux [lumens]	Utilization Factor*	Maintenance Factor*	Working plane area [m ^{2}]	**Average illumination [lux]**
Existing	280	90	5200	1456000	0.4	0.5	708	**411**
Adjusted existing	258	90	5200	1341600	0.4	0.5	708	**378**
New	264	100	2420	638880	0.45	0.27	150	**517**

Existing : Room Index (RI) =W/2H
=11580/2(3975)
=1.4
UF =0.4

MF = LLMF x LMF x RSMF x LSF
=(0.90)(0.82)(0.69)(0.99)
=0.5

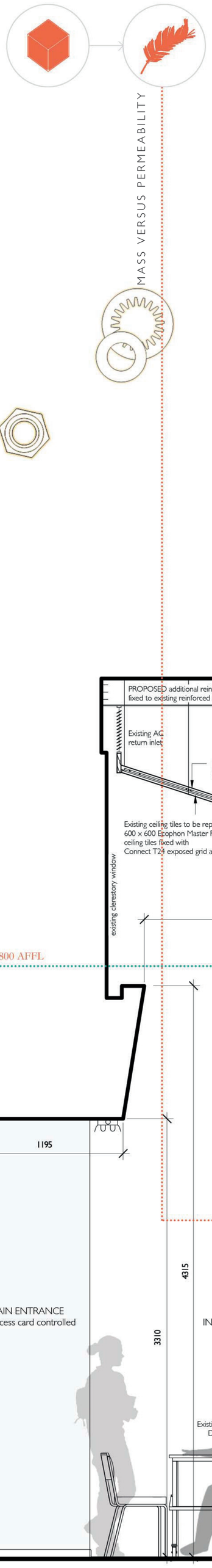
New: Room Index (RI) =W/2H
=7295/2(1835)
=1.98
UF = 0.45

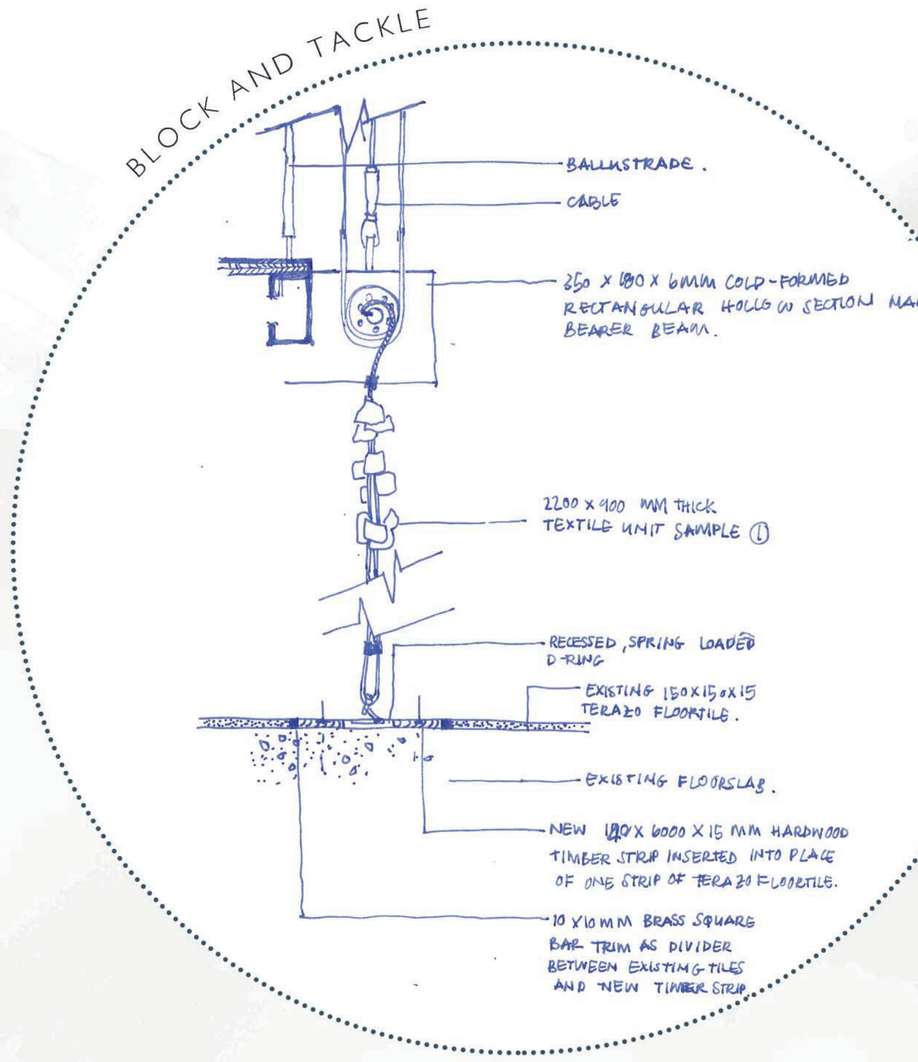
MF = LLMF* x LMF x RSMF x LSF*
=(0.7)(0.82)(0.69)(0.7)
=0.27

*LLMF and LSF for LED strip lighting, information not available. Values used for calculation taken from similar lamp type to allow for calculation.

interior elevation 1: 20

SCENARIO ONE & TWO





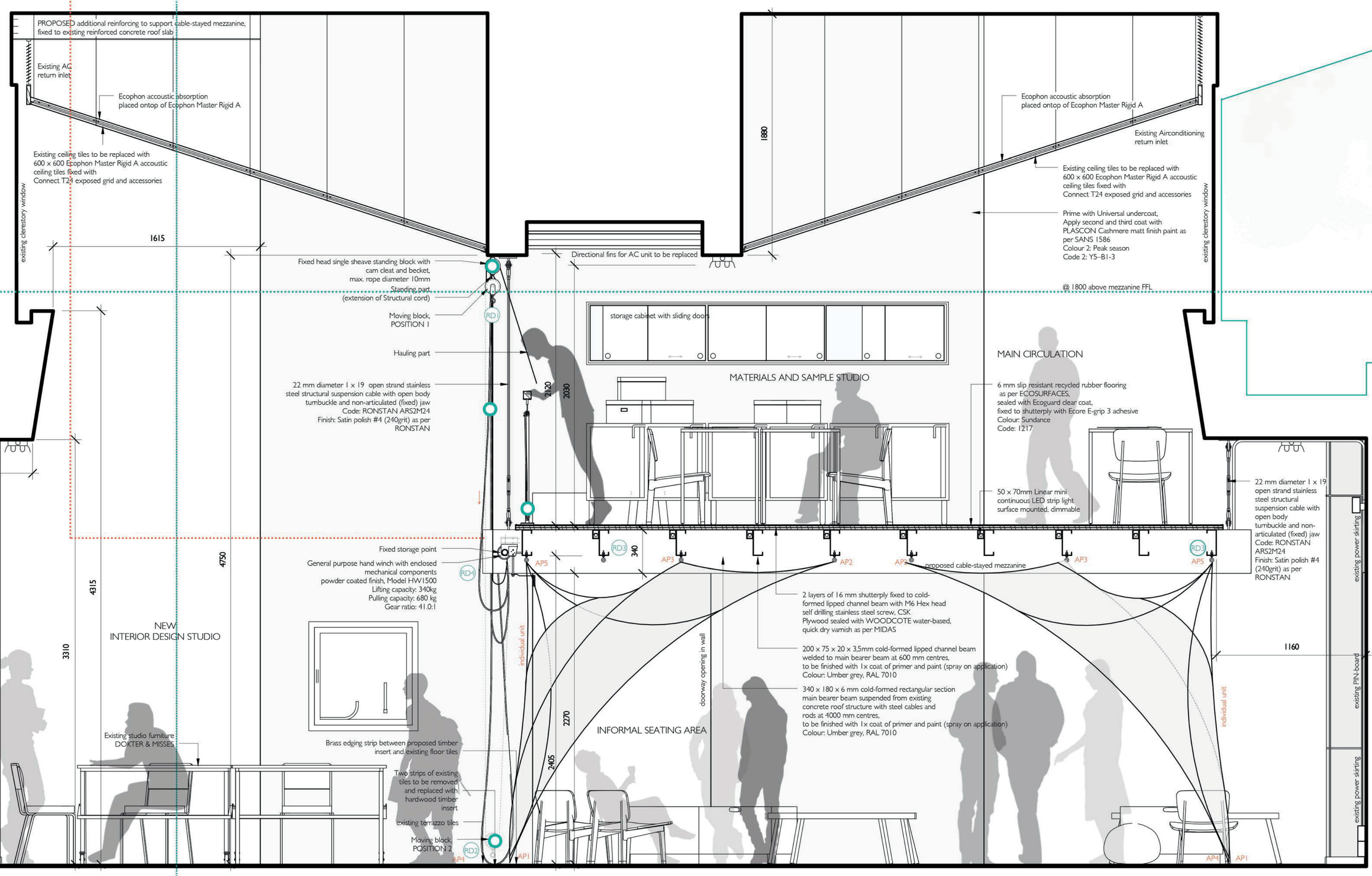
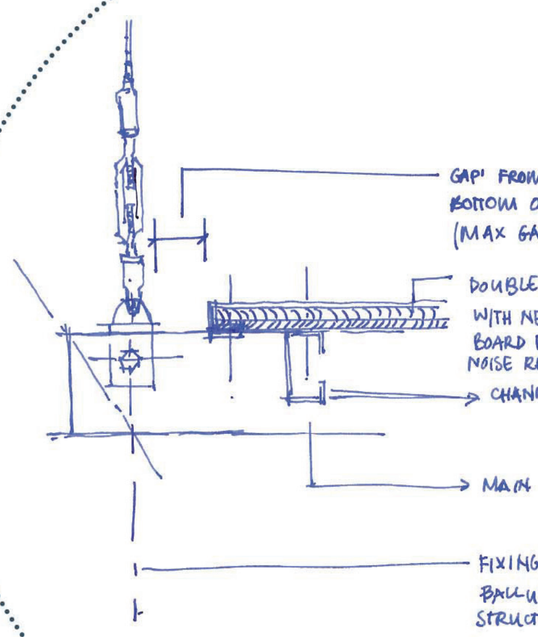


Figure 5.78.

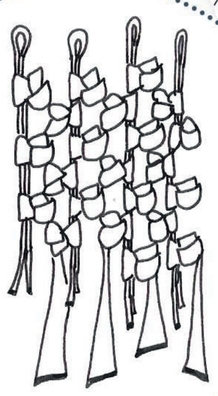
SECTION 1 - SCENARIO ONE & TWO WITH DETAIL SKETCHES
SCALE 1:20

CABLE-STAYED STRUCTURE

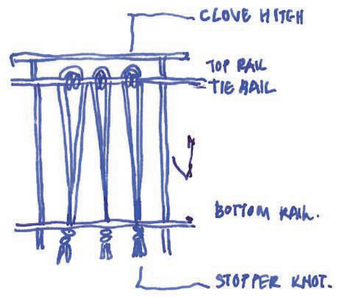


SECTION THROUGH
EDGE - BALUSTRADE CONNECTION DETAIL.

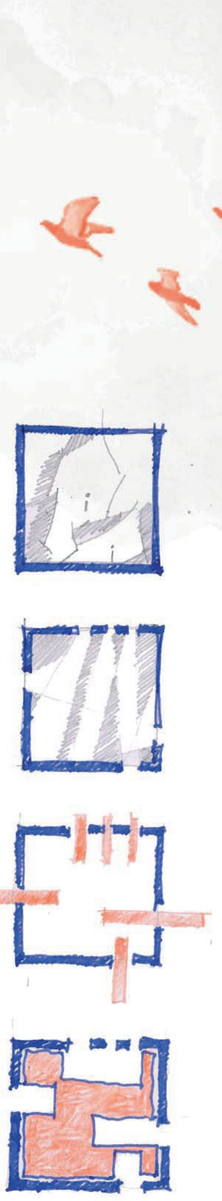
TEXTILE UNITS

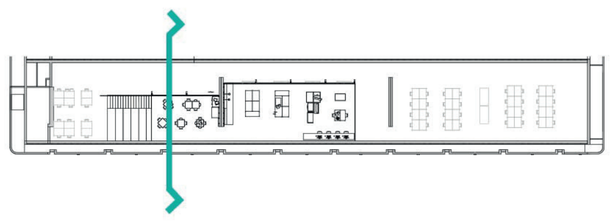


BALUSTRADE



BALUSTRADE FRONT VIEW (4.3)





cable-stayed structure

DEVELOPMENT OF STRUCTURE

5.10.1.
DEVELOPMENT OF CABLE-STAYED STRUCTURE

This mezzanine structure is not a textile space-defining element in itself, but assists in the making of space. With textile space-making in mind, the mezzanine structure is designed to be as lightweight as possible. The mezzanine structure is also designed to appear as permeable as possible. Connection and fixing details are designed to remain exposed. Similar to the way in which a knot simply is what it is, revealing its structure.

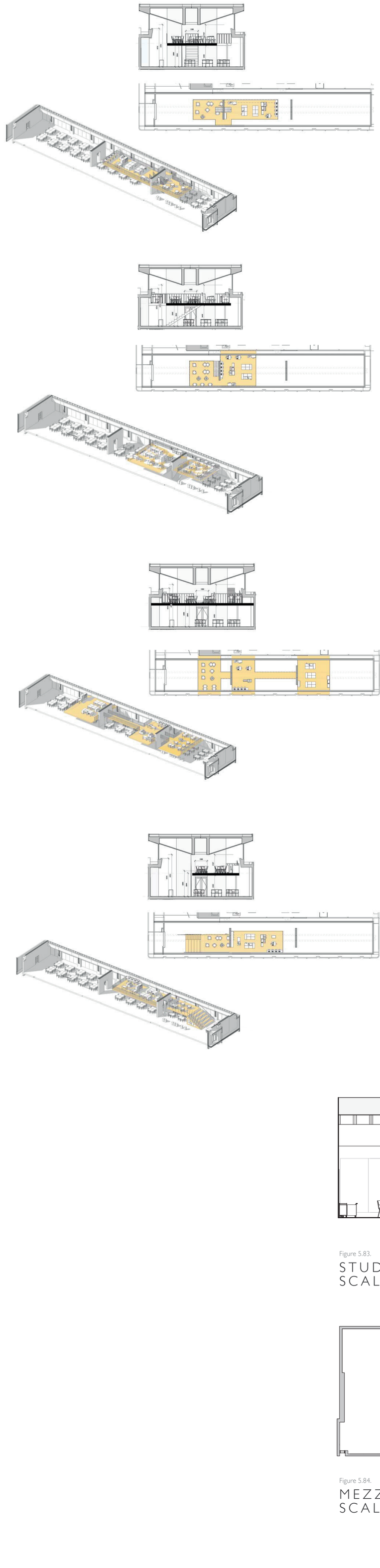
The existing interior volume consists of a virtually column free floor area. Due to the clerestory windows within the space, the concrete roof structure seems as if it floats. Two main columns or walls within the interior space act as the structure for the roof. The newly proposed cable-stayed mezzanine is suspended from the existing structure by means of cables. In this manner the mezzanine does not make use of any additional columns, allowing for an open floorplan wihtout obstruction.

Figure 5.79. Development of mezzanine form (right) and Figure 5.80. Sectional perspective of final form (below), shows a selection of images representing some of the various layouts, sizes and forms explored during the design of the mezzanine.

The final form of the mezzanine was influenced by the following factors:

- natural light
- meeting points between existing structure and proposed mezzanine
- structural fixing points for suspension cables
- existing studio layouts (in terms of student allocation)
- proposed programme and function of the mezzanine
- maximum potential for textile intervention

The main factor that influenced the final form of the mezzanine, was the fact that the test site for intervention merely acts as a space to test the spatial manifestation of the hand-knotted textile. This means that the mezzanine structure's main feature is to ensure maximum testing potential. The final form does not necessarliy represent the 'best' layout in terms of movement and placement of furniture, but allows for maximum utilisation concerning the textile unit.



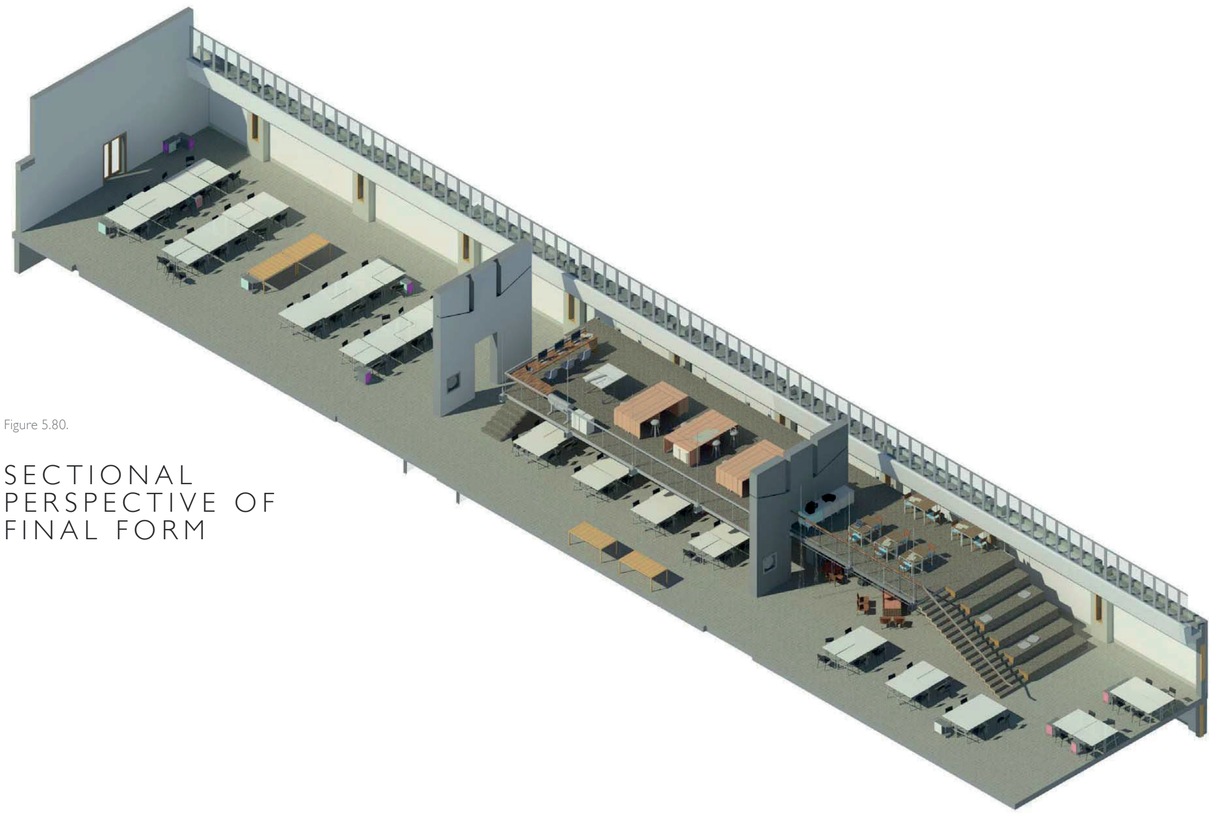


Figure 5.80.

SECTIONAL PERSPECTIVE OF FINAL FORM

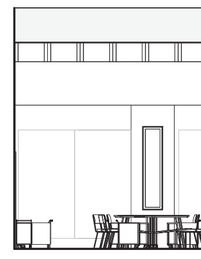


Figure 5.83.

STUDIO INT
SCALE 1:10

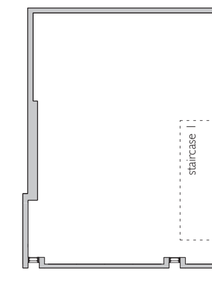
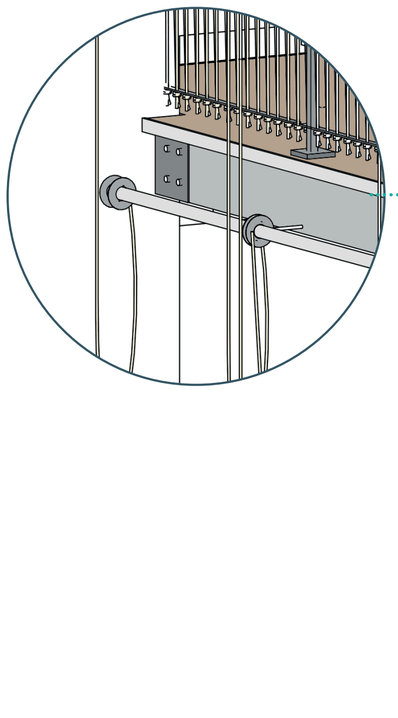


Figure 5.84.

MEZZANIN
SCALE 1:20



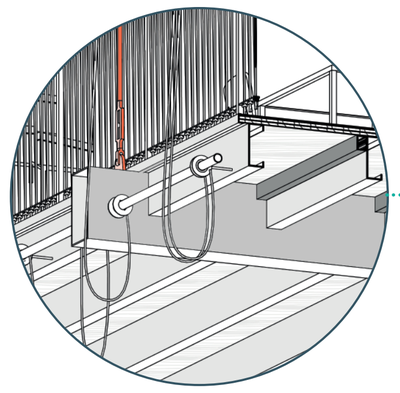


Figure 5.81. Sectional perspective and callout details

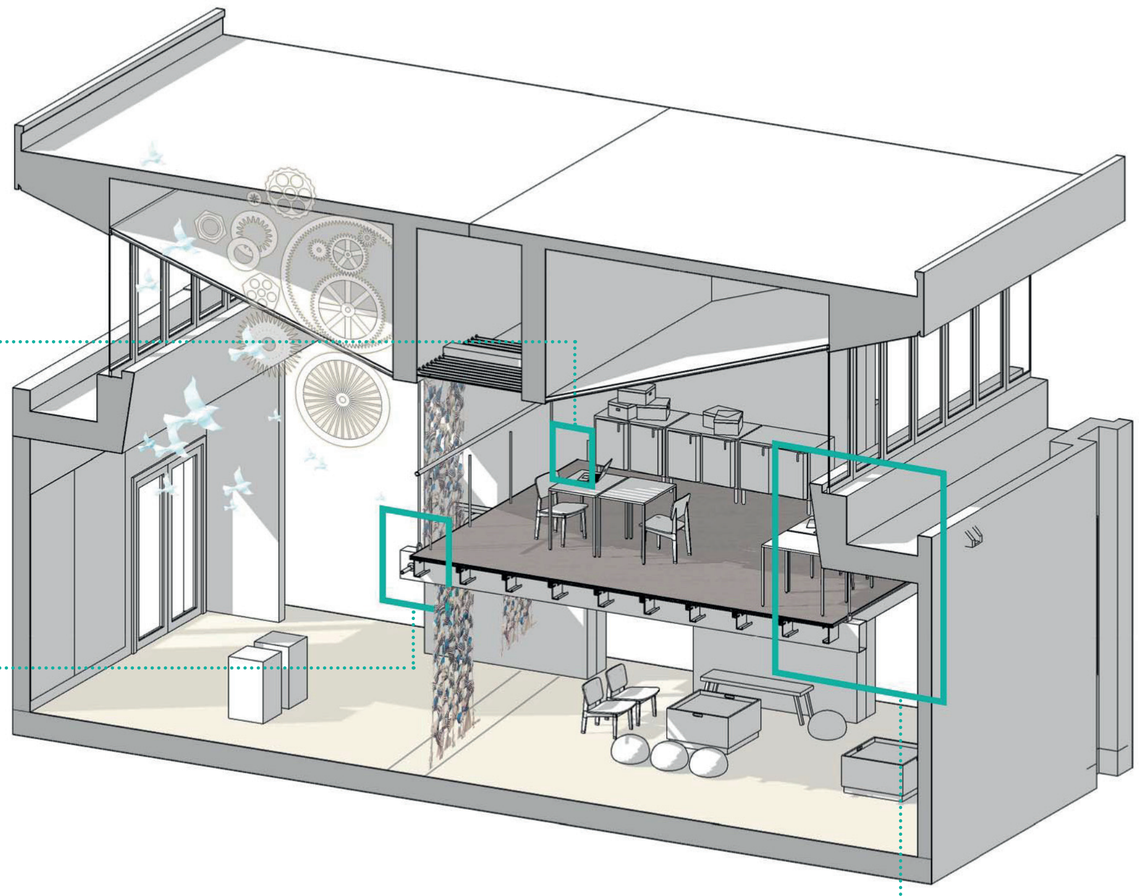
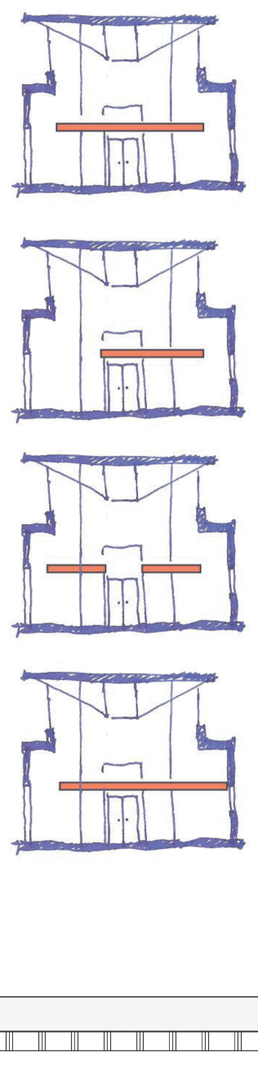


Figure 5.79.

DEVELOPMENT OF MEZZANINE FORM

(immediately left and below)



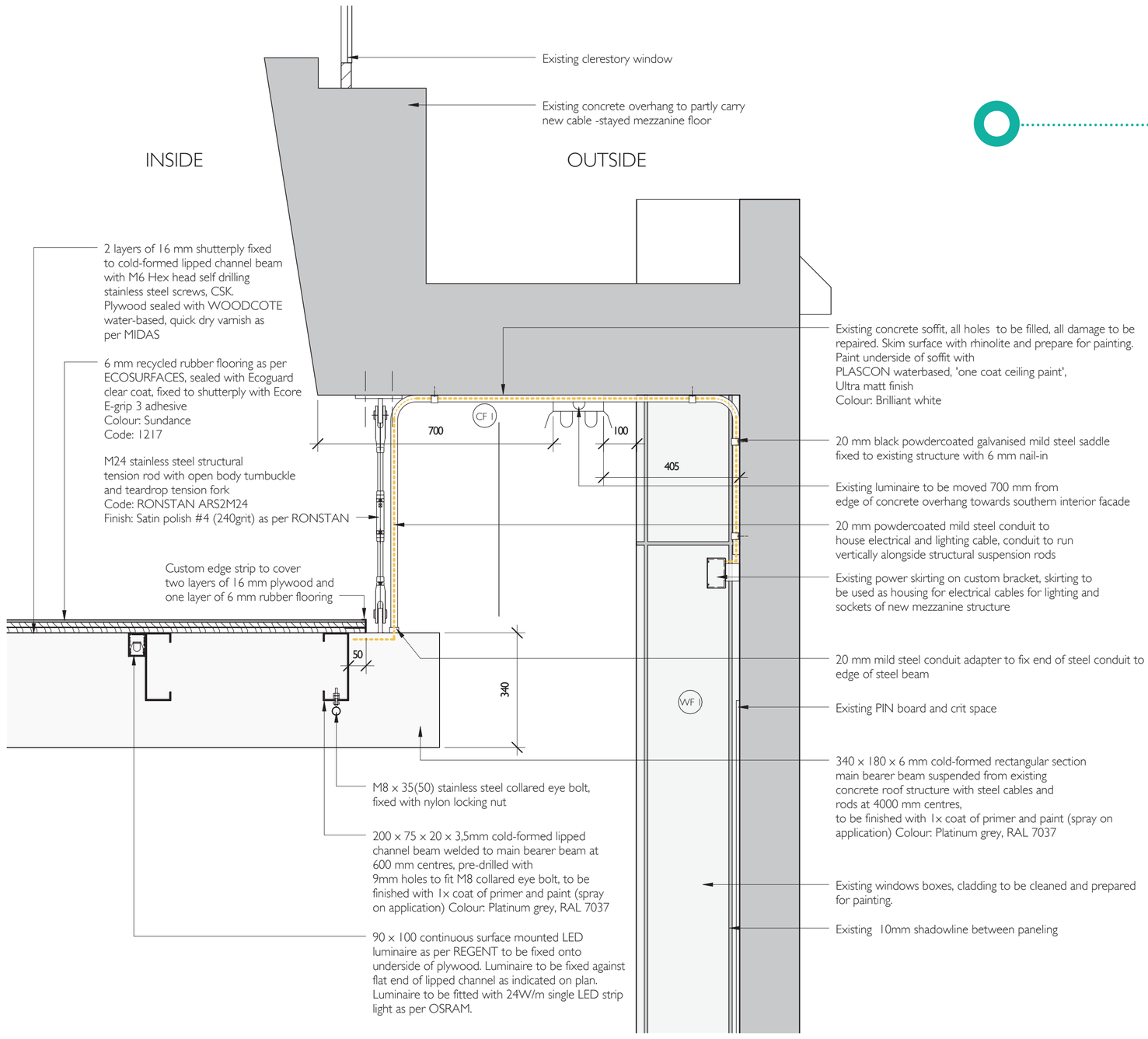
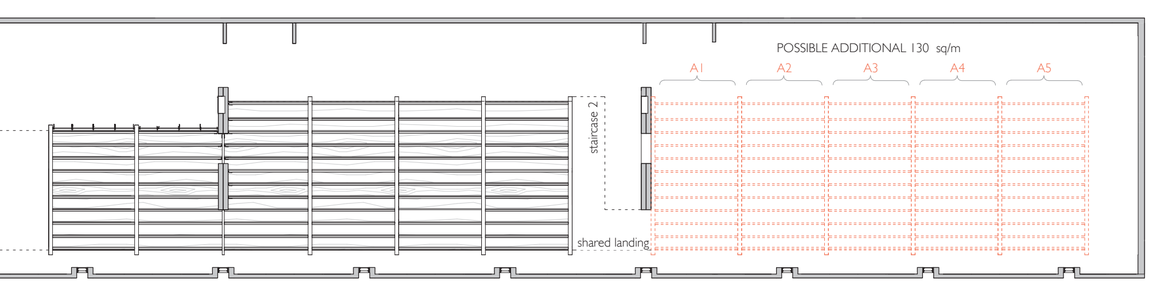


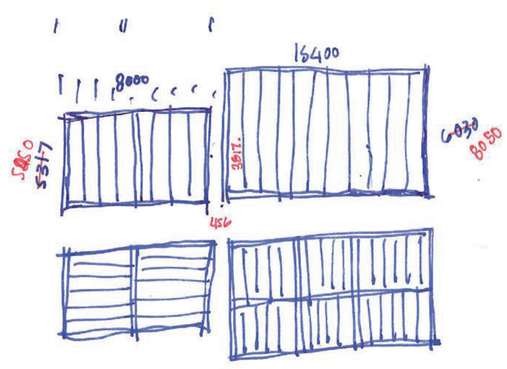
Figure 5.82.

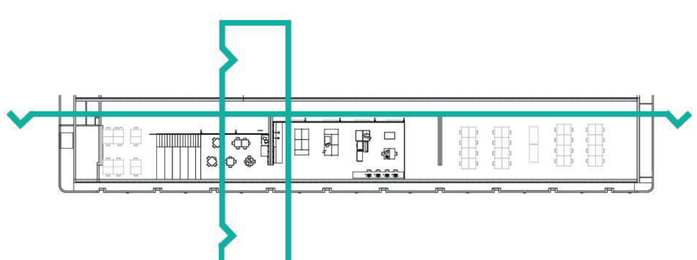
CABLE STAYED-STRUCTURE, EDGE DETAIL
SCALE 1:10

ERIOR ELEVATION



EXTENSION GRID LAYOUT





textile space-defining elements

INTERIOR ELEVATION

5.10.2.
DEVELOPMENT OF TEXTILE UNIT

The textile unit specifically designed for Scenario 2 - division of individual workspaces, acts as the base unit for all the Scenario's. The textile unit has a set of parameters that are adjusted during the fabrication process to suit the parameters and requirements for each of the scenarios. See poster 33 for the fabrication process on page 88.

Further each of the textile units work in conjunction with a rigging system. These rigging systems are what connect the 'soft' and the 'hard' elements. Here the soft elements or textile space-defining elements are the alternative space definers and the hard elements such as the mezzanine and the existing testing site for intervention, act as the traditional space definers. These rigging systems are discussed in greater depth on poster 32 on page 84.

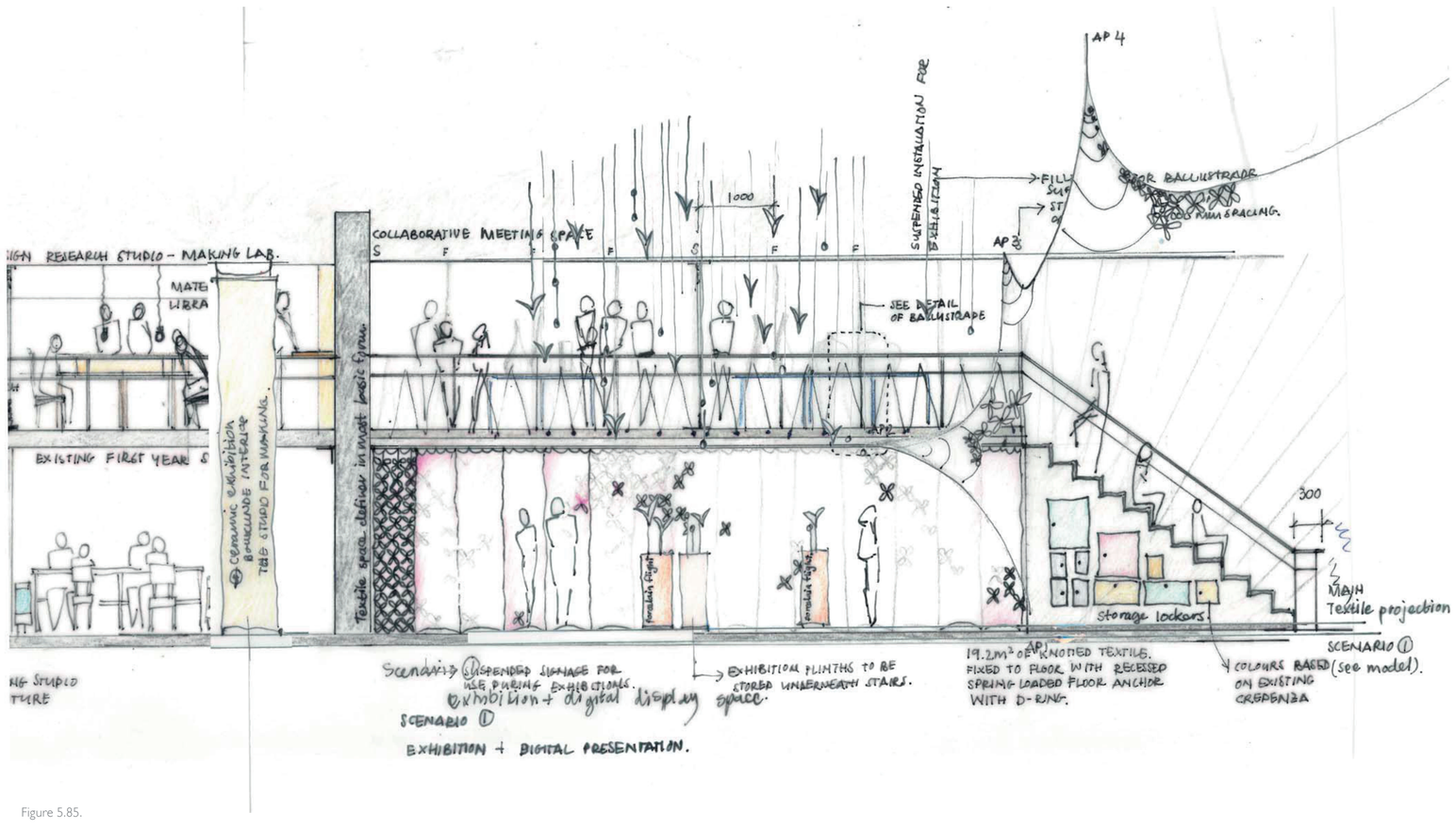


Figure 5.85.
SECTION DEVELOPMENT SKETCHES
SCALE 1:100

Figure 5.88.
ROPE SALLY
SCALE 1:5

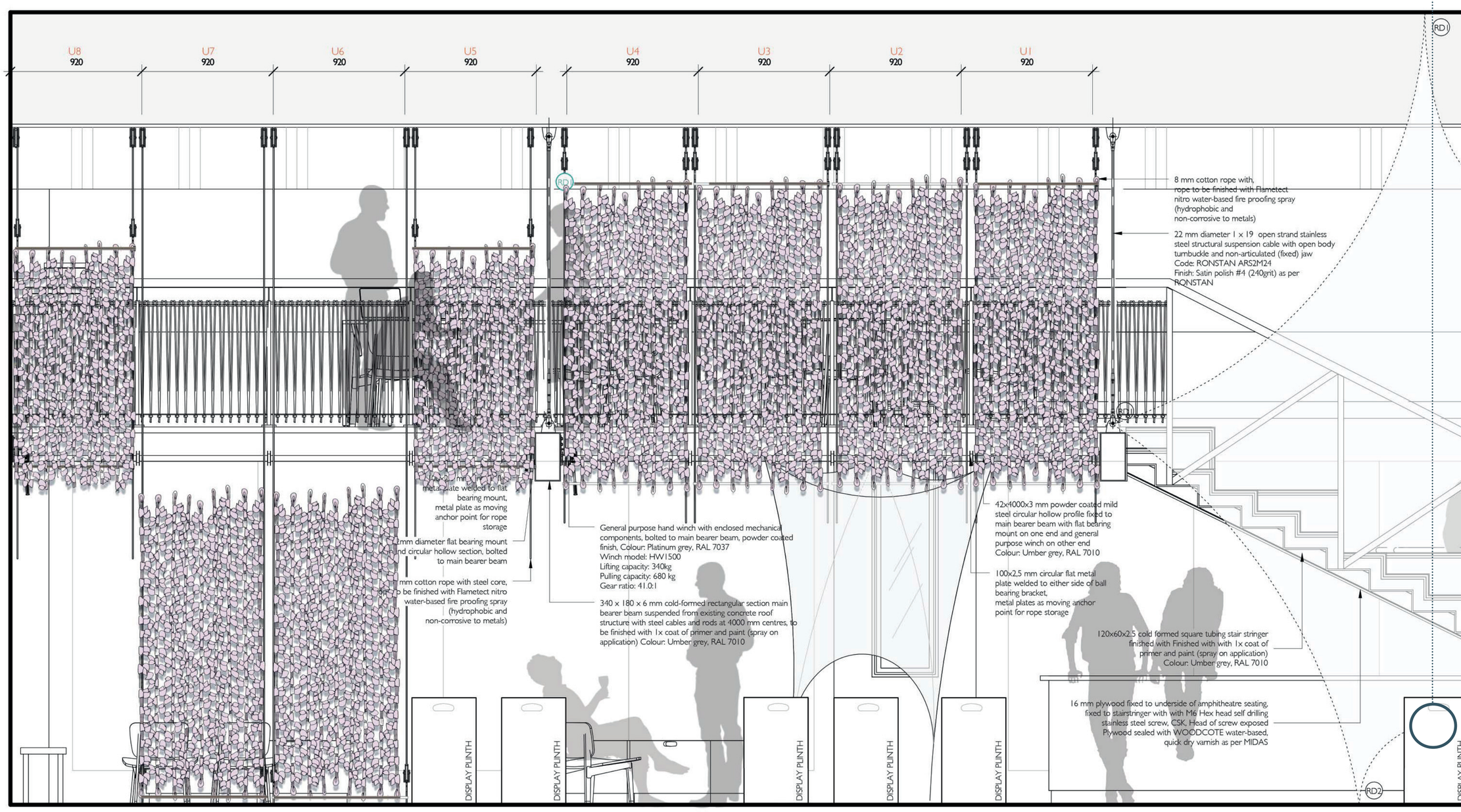


Figure 5.86.
SECTION 2 - SCENARIO ONE, TWO & THREE
SCALE 1:20

Moving Block
in a semi-lowered position
24 mm Timber dowel

60x60 mm timber handrail fixed onto mild steel flat bar to be finished with 1x coat of primer and paint, Colour: Umber grey, RAL 7010

#2485 ABOK, Larks head knot, tied onto steel profile

8 mm cotton rope with steel core, as vertical infil of balustrade, rope to be finished with Flametect nitro water-based fire proofing spray (hydrophobic and non-corrosive to metals)

Pre-drilled mild steel flat bar as bottom fixing point for rope infil, to be finished with 1x coat of primer and paint, Colour: Umber grey, RAL 7010

#515 ABOK, Overhand knot as stopper or terminal knot

Rope ends to be finished with clear Liquid rope whipping to prevent fraying

42x4000x3 mm powder coated mild steel circular hollow profile fixed to main bearer beam with round flange bearing and mounting shaft and general purpose winch on other end Colour: Umber grey, RAL 7010

Custom edge strip

100x2.5 mm circular flat metal plate welded to either side of round flange bearing mount, circular metal plate as moving Anchor Point for rope storage

42mm diameter round flange bearing and mounting shaft fixed around circular hollow section, bolted to main bearer beam

8 mm cotton rope, to be finished with Flametect nitro water-based fire proofing spray (hydrophobic and non-corrosive to metals)

General purpose hand winch with enclosed mechanical components, bolted to main bearer beam, powder coated finish, Colour: Platinum grey, RAL 7037
Winch model: HW1500
Lifting capacity: 340kg
Pulling capacity: 680 kg
Gear ratio: 41.0:1

340 x 180 x 6 mm cold-formed rectangular section main bearer beam suspended from existing concrete roof structure with steel cables and rods at 4000 mm centres, to be finished with 1x coat of primer and paint (spray on application) Colour: Umber grey, RAL 7010

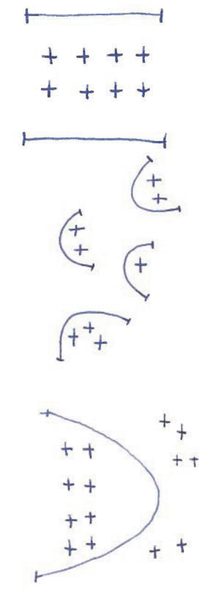
100x2.5 mm circular flat metal plate welded to either side of round flange bearing mount, circular metal plate as moving Anchor Point for rope storage

8 mm cotton rope, to be finished with Flametect nitro water-based fire proofing spray (hydrophobic and non-corrosive to metals)

Figure 5.87.

ANCHOR TO MEZZANINE
SCALE 1:10

application



textile scenario 3

rope infil balustrade

bottom rigging detail

digital exhibition space

suspended rigging details

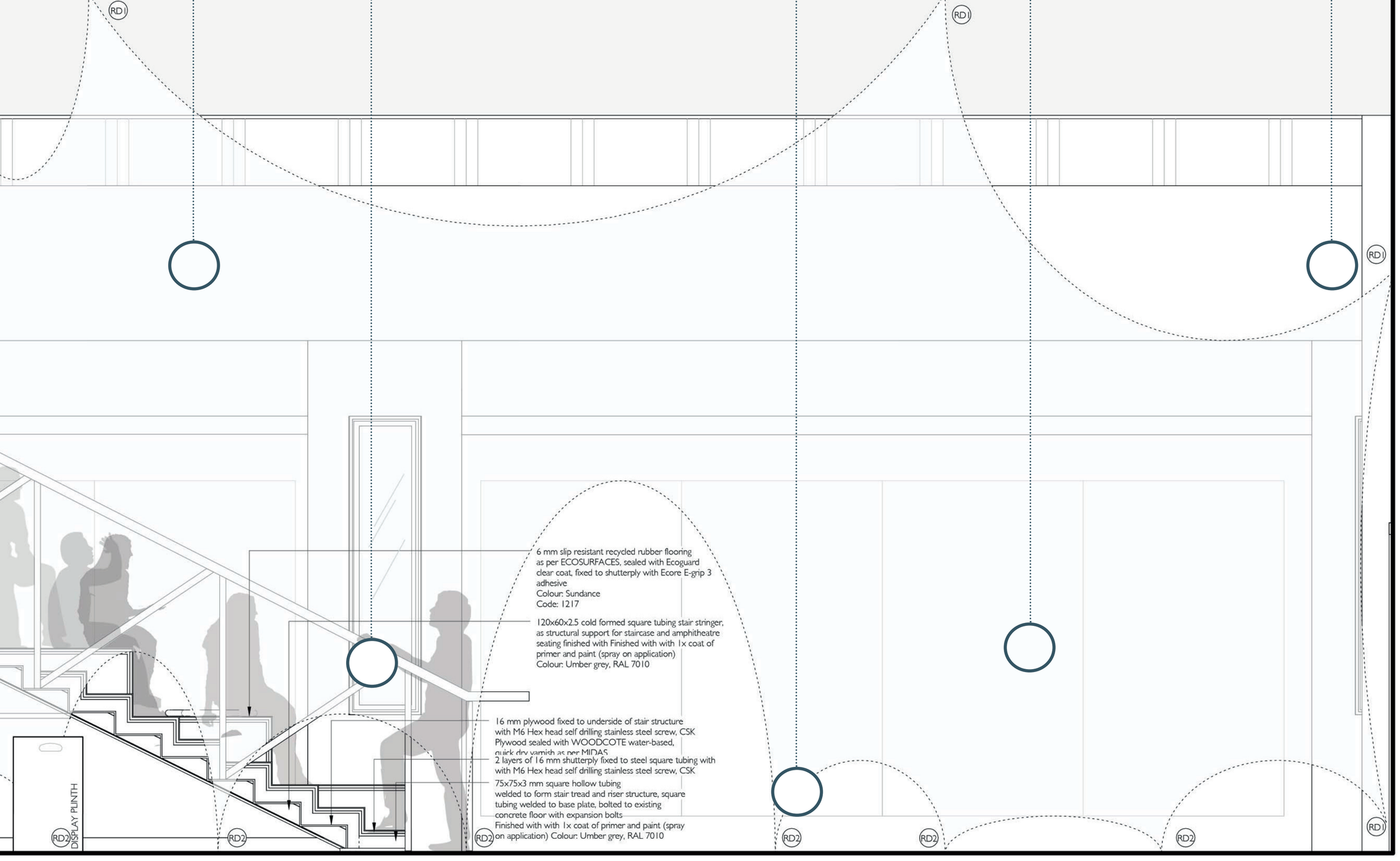
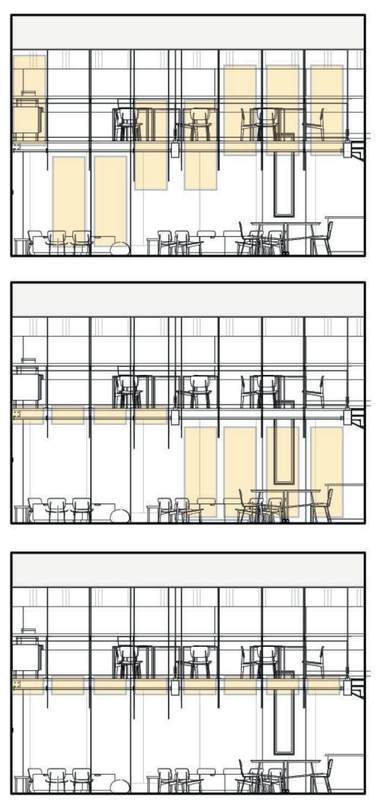


Figure 5.89.

CONFIGURATION DIAGRAMS:



rigging and hardware

FIXING DETAILS

5.10.3.
DEVELOPMENT OF RIGGING SYSTEMS

The basic rigging details are designed to accommodate the various textile units. The basic rigging details are presented on this poster. Further, the rigging details for the textile unit for scenario 2 are presented in more depth on this poster. See Figure 5. 90 - 5.94. These rigging details are indicated where appropriate on sections and further details.

WHAT IS A BLOCK AND TACKLE?

“A block and tackle is a system of two or more pulleys with a rope or cable threaded between them, usually used to lift or pull heavy loads. The pulleys are assembled together to form blocks and then blocks are paired so that one is fixed and one moves with the load. The rope is threaded, or rove, through the pulleys to provide mechanical advantage that amplifies the force applied to the rope.”
(www.rcsccwarrior).

PARTS OF A TACKLE

See Figure 5.97. Parts that make up a tackle (right).

1. **Standing block:** The block that is anchored and is not moving. This block changes the direction of the running part.
2. **Moving block:** The moving block is attached to the moving end of the rope (the end the cargo is on).
3. **Fall:** The fall is the rope that is rove through the block.
4. **Standing part:** The standing part does not move. It needs to be secured to either the standing block or some other fixed position.
5. **Hauling part:** The hauling part is the part that is pulled.

Mechanical Advantage: Mechanical advantage is the effect of using blocks and rope to act as a force multiplier. It is the amount by which the pull on the hauling part is multiplied by the tackle. This, in general, is equal to the number of parts of the fall at the moving block (www.rcsccwarrior).

GUN TACKLE

See Figure 5.98. Pulley type options (right).

“A gun tackle is made up of two single-sheave blocks. A gun tackle has a mechanical advantage of 2. (tpub.com). Your effort (E) acts upward upon the arm (EF), which is the diameter of the sheave. The resistance (R) acts downward on the arm (FR), which is the radius of the sheave. Since the diameter is twice the radius, the mechanical advantage (M.A.) is 2 (constructionknowledge.net).”

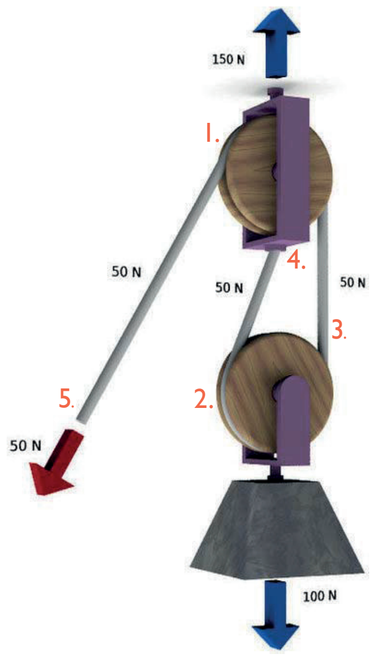
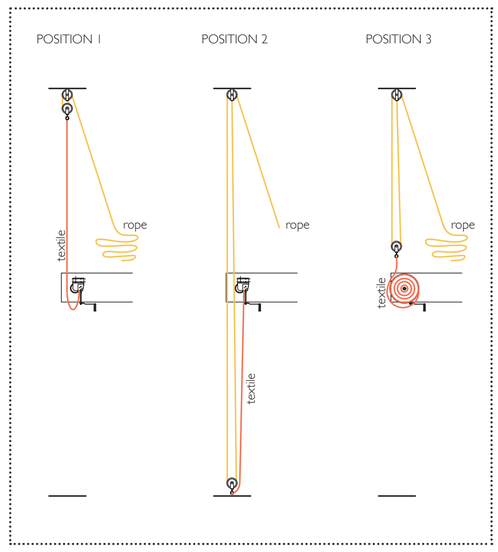


Figure 5.97. PARTS THAT MAKE UP A TACKLE (Constructionknowledge.net)

Figure 5.98.

PULLEY TYPE OPTIONS

OPTION 1: BLOCK & TACKLE (Mechanical advandage M = 2)



OPTION 2: PULLEY (NO mechanical advantage)

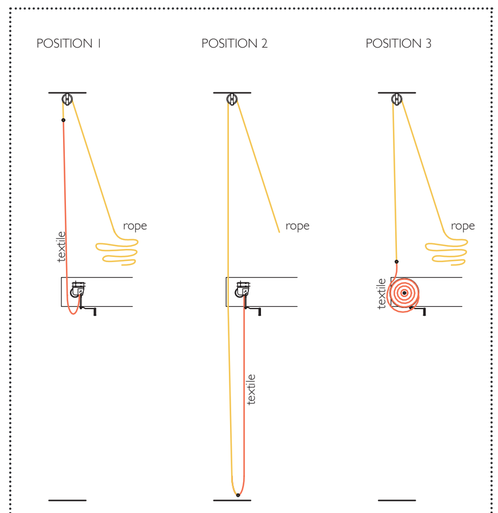
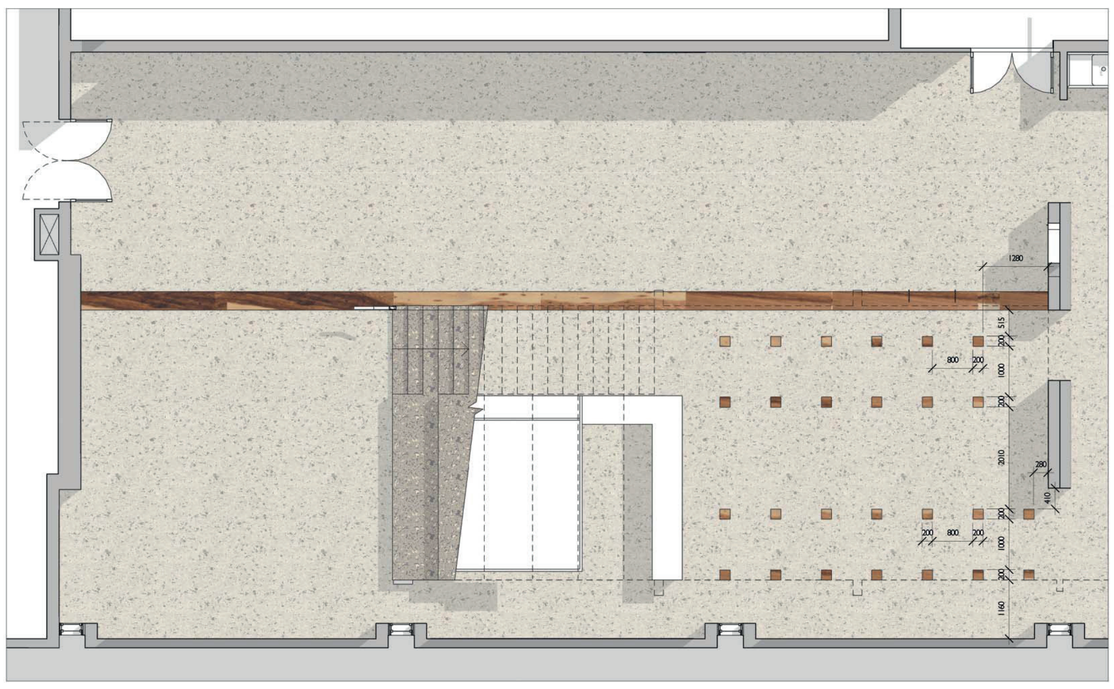


Figure 5.95.

FLOOR FINISH LAYOUT PLAN
(not to scale)



FLOOR FINISH LEGEND:

FF1 — 12x200x200 mm existing floor tiles

FF2 — 6x1220x76000 mm roll of recycled rubber flooring as per ECOSURFACES,
sealed with Ecoguard clear coat,
fixed to shutterply with Ecore E-grip 3 adhesive
Colour: Sundance
Code: 1217 of

FF3 — 12x200x200 timber floor insert, finished with Arboritic compo water-based sealant as per BEDSON
FInish: Clear matt

RIGGING HARDWARE LEGEND:

RD1

- Heavy duty stainless steel oval basket carabiner with straight double-locking screw-gate and swivel eye. Assorted colour locking gates.
- Heavy duty stainless steel double eye swivel hook, removable eyes.
- Large eye rope splice with whipping
- 8mm Nylon teardrop rope thimble with side keepers
- M8 Stainless steel collared eye bolt, fixed with locking nylon nuts and spring washers
- 32 mm diameter mild steel profile in 900 mm lengths as suspension rod for textile unit. Profile to be pre-drilled with 8 mm holes at 60 mm from each end.

Figure 5.96.

ANCHOR TO FLOOR TILE DETAIL
SCALE 1:10

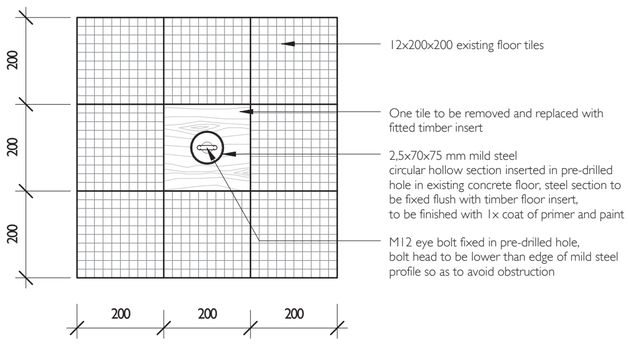
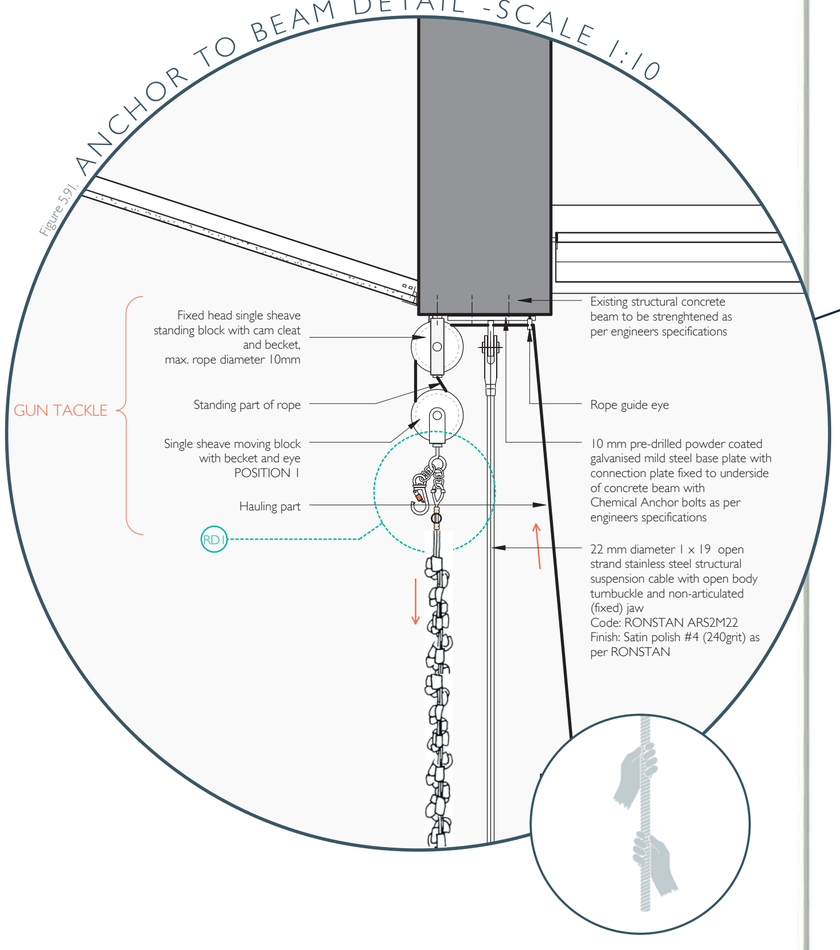


Figure 5.91. ANCHOR TO BEAM DETAIL -SCALE 1:10



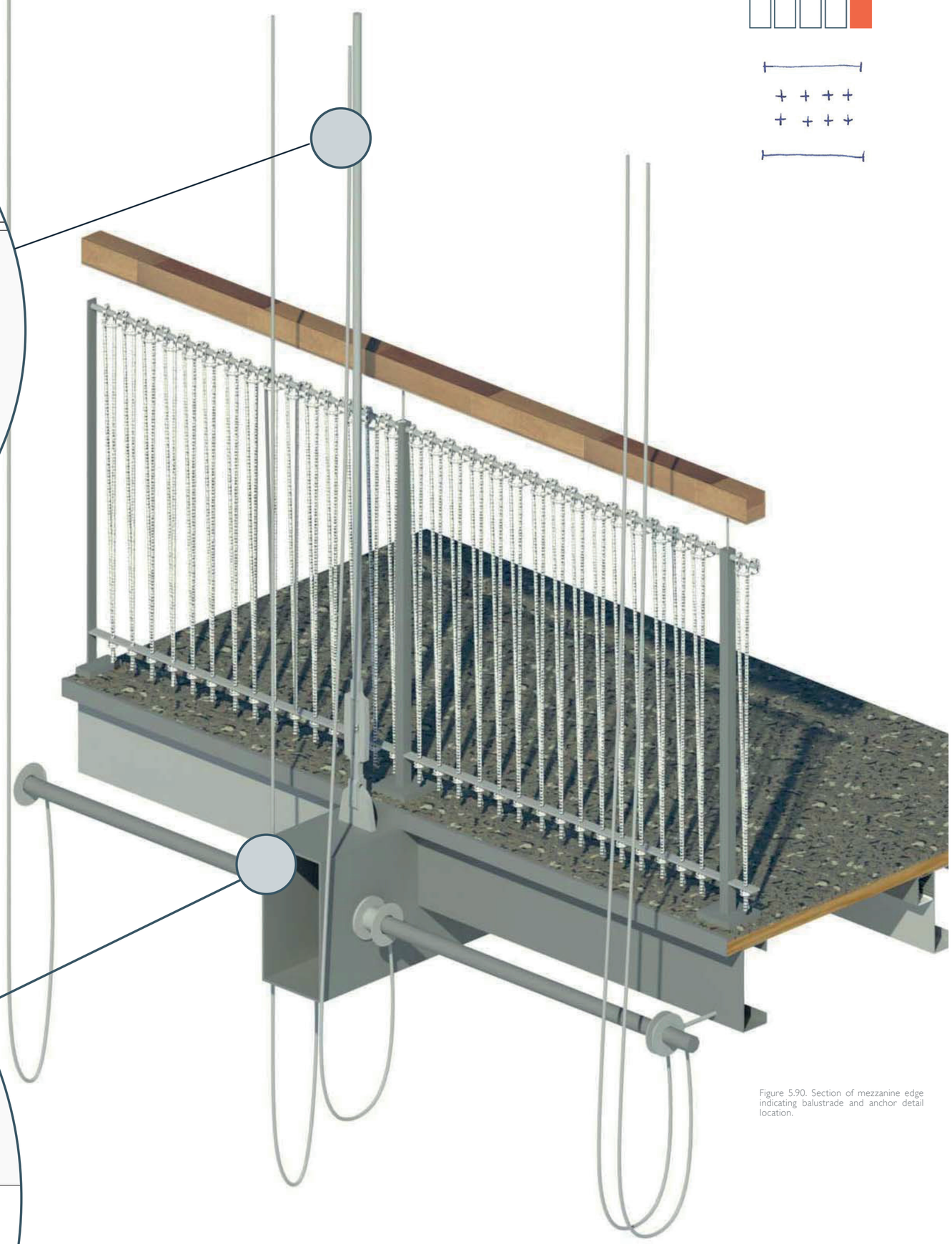


Figure 5.90. Section of mezzanine edge indicating balustrade and anchor detail location.

Figure 5.92. ANCHOR TO MEZZANINE DETAIL - SCALE 1:10

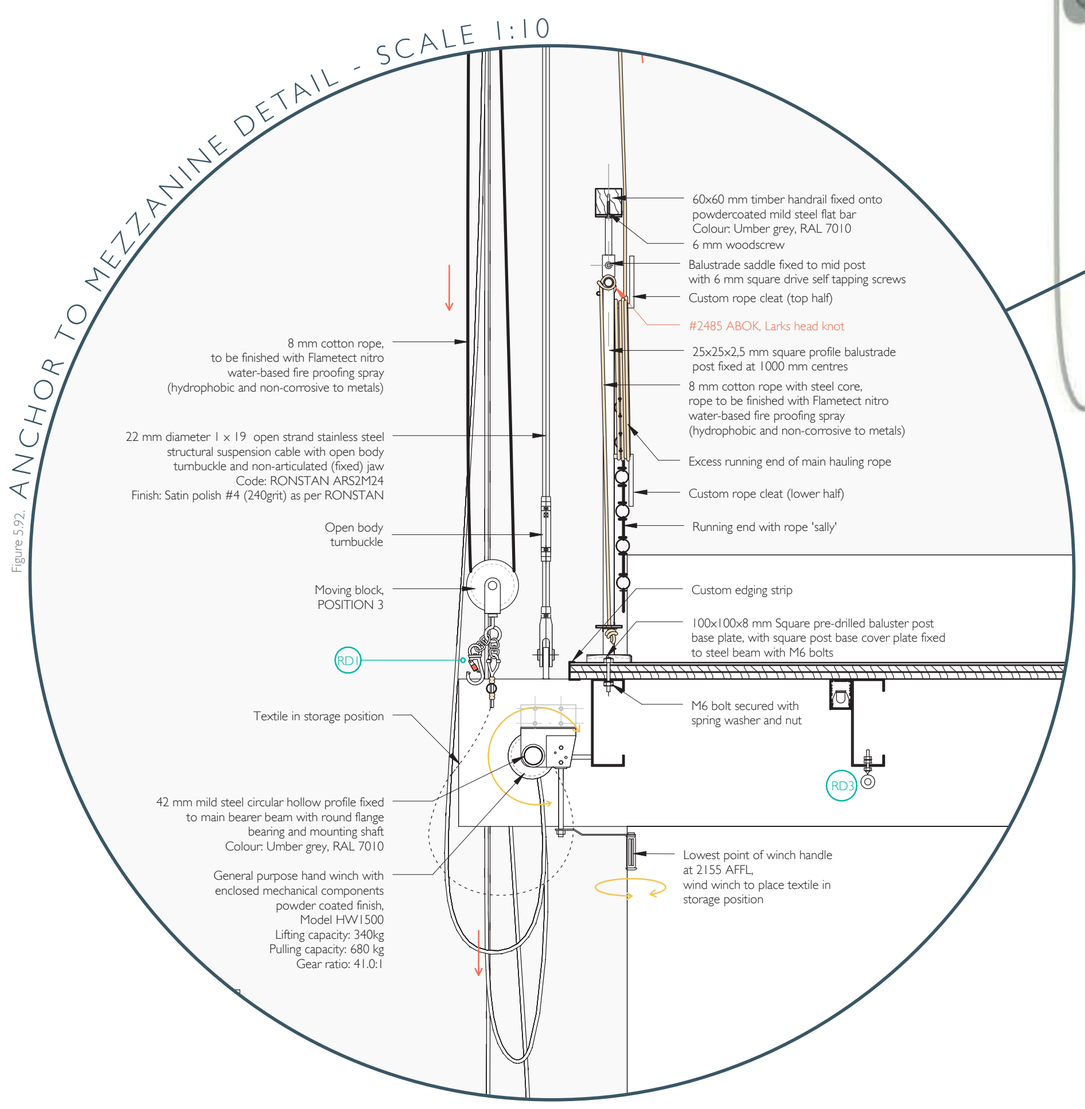
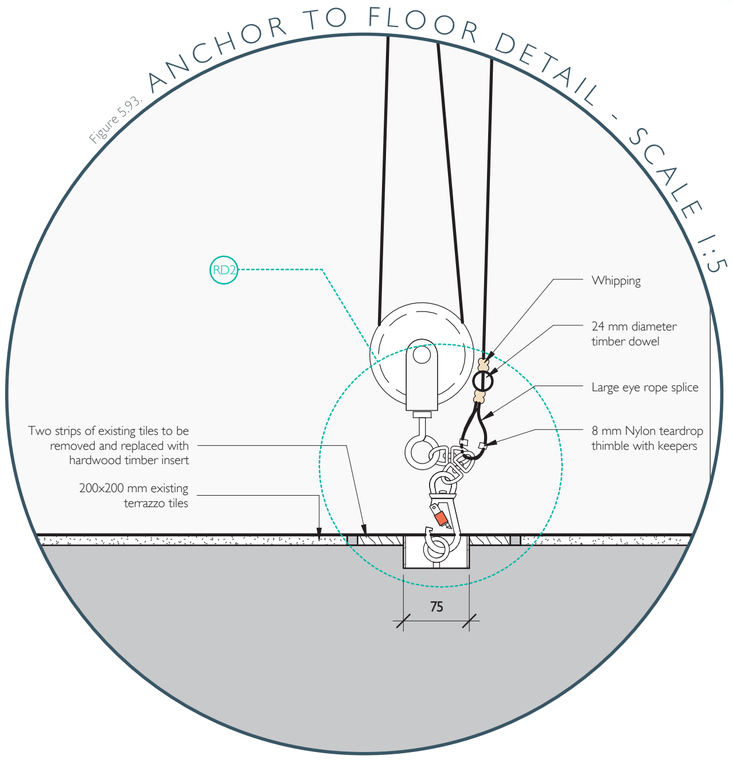
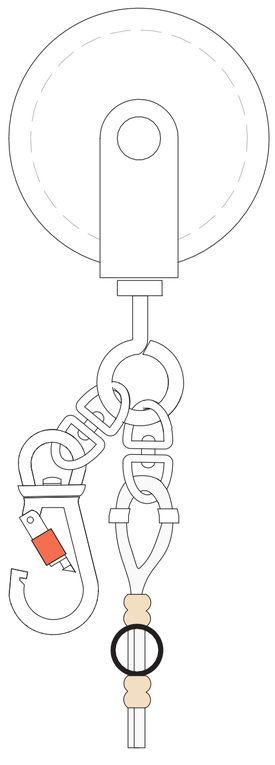


Figure 5.93. ANCHOR TO FLOOR DETAIL - SCALE 1:5





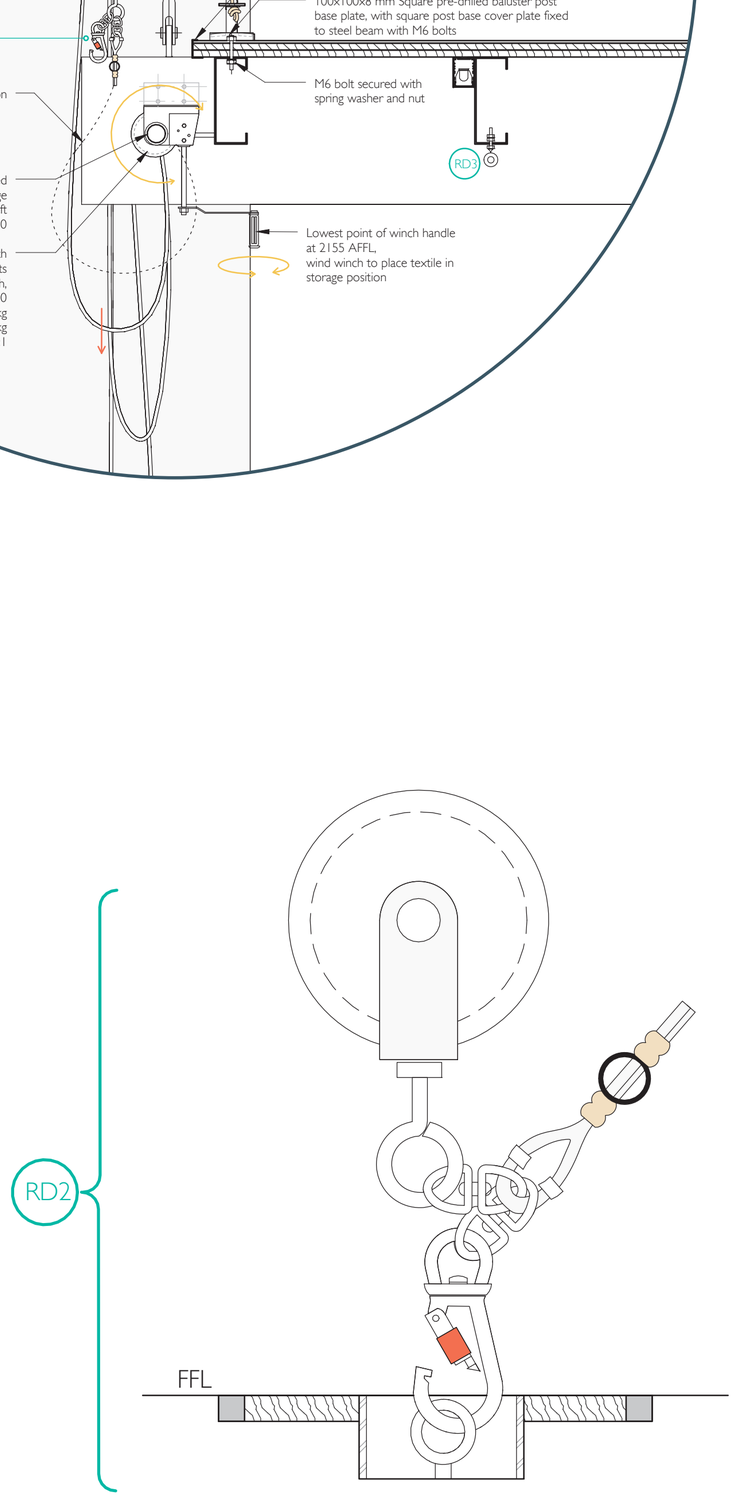
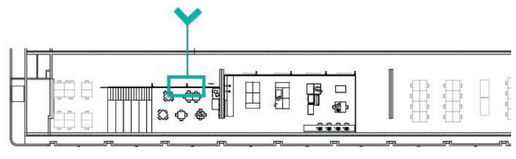


Figure 5.94.

RIGGING DETAILS
SCALE 1:2 (left)



5.11.
DOCUMENTING THE FABRICATION METHOD

This section provides instructions on the fabrication and construction process of a basic textile sample unit. The type of content and way that the fabrication process is displayed is based on a combination of different principles found in both knitting stitch patterns and friendship bracelets. A **knitting stitch pattern** typically consists of a description plus an image, diagrammatic instructions accompanied by a symbol key or a set of traditional instructions (Dummies, 2015). See Figure 5.99. Knitting stitch pattern (Craftcookie, 2015) on the opposite page. **Friendship bracelets** are handmade decorative bracelets knotted from hemp, yarn, linen, silk or cotton. Traditionally Friendship bracelets are worn until they wear through and naturally fall off the arm. The knotting process for making a Friendship bracelet is related to macramé or square knotting (Wisegeek, 2015). See Figure 5.100. Friendship bracelet pattern (Friendshipbracelet, 2015) on the opposite page for an example of a bracelet knotting pattern and knot instructions.

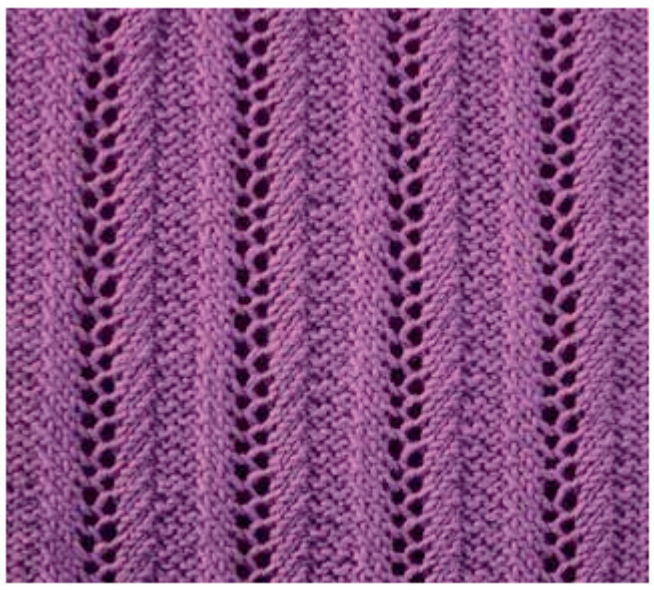
See section **5.9.1. Knot pattern instructions** on poster 32 (following page) for the full description and instructions on the fabrication process of an individual textile unit.

Figure 5.99.

KNITTING STITCH PATTERN

(Craft cookie, 2015)

Lace ribs 2



Description

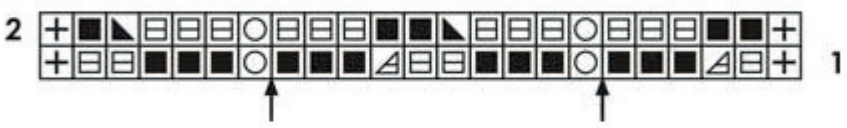
A lace rib stitch variation with narrow vertical stripes. See also Lace Ribs I and Lace Ribs III.

Difficulty level: Easy

Instructions

You need a stitch number multiple of 10 + 11 + 2 edge stitches. Repeat the pattern between the arrows as many times as you like.

Work right and wrong side rows as shown in the chart. Right side rows (1, 3, etc.) are worked from right to left. Wrong side rows (2, 4, etc.) are worked from left to right.



Symbol Key

- edge stitch

- knit 1

- purl 1

- 1 yarn over

- slip 1 knitwise, knit 1, pass the slipped stitch over

- purl 2 together

Traditional Instructions

Row 1: edge st, p1, p2tog, k3 * yo, k3, p2, p2tog, k3; repeat from * to last 6 sts, yo, k3, p2, edge st
Row 2: edge st, k1, sl1kw, k1, psso, p3, yo, * p3, k2, sl1kw, k1, psso, p3, yo; repeat from * to last 6 sts, p3, k2, edge st

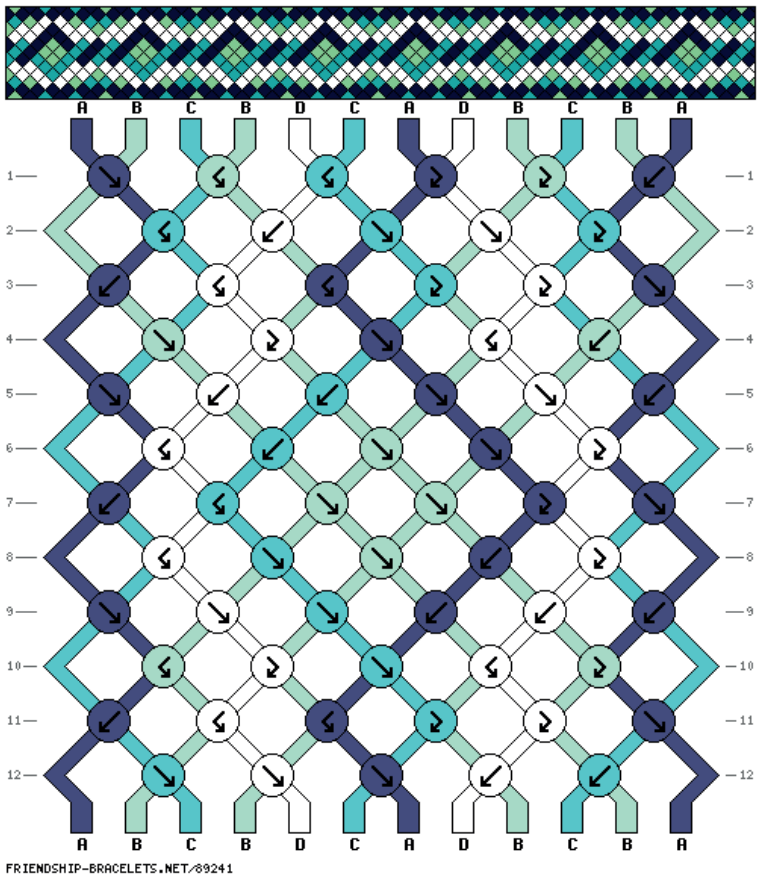
Repeat rows 1 through 2.

Figure 5.100.

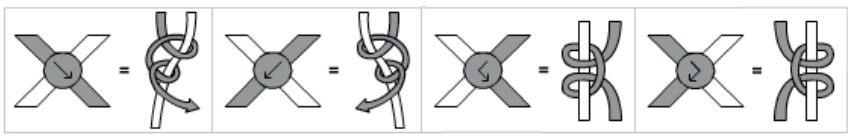
FRIENDSHIP BRACELET PATTERN

(Friendshipbracelet, 2015)

Pattern #89241



Knot instructions



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knotting instructions

HOW TO KNOT A TEXTILE UNIT

FOLD

Figure 5.101.

FABRICATION INSTRUCTION SHEET

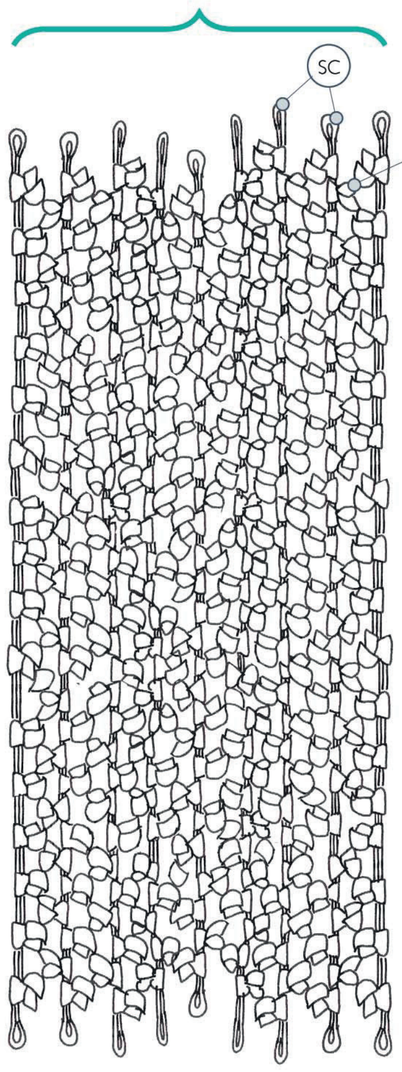
5.11.1.
DESCRIPTION

Dimensions: 900 x 2100 mm
Flat surface area: 1.89 sq/m
Approximate weight: 8-12kg dependent on type of Filler cord

Rectangular sample composed of cotton rope as Structural cord and Fabric strips as filler cord. Structural cords and Filler cords are tied together with the use of a Simple Noose Knot (See diagram indicating left hand oriented knot and right hand oriented knot).

FOLD

900 mm
9 rows of (2)7 mm structural cord with eye loops at the top and bottom of the textile unit.



2100 mm
9 rows of (2)7 mm structural cord with eye loops at the top and bottom of the textile unit.

FOLD

FOLD

5.11.2.
KNOT PATTERN INSTRUCTIONS

YOU WILL NEED:

To complete one hand-knotted sample unit you will need the following materials:

- Approximately 40 m of 7mm sash cord or cotton rope as Structural cord (SC). This can be a braided sheath with either a twisted or braided core. Cut these into 9 equal pieces. Temporarily whip the running ends using masking tape.
- Approximately xxx m of 15 mm wide strips of fabric as Filler cord (FC). The strips can be sewn together without a seam. You will need 8 separate strips of equal length.
- 18 eye bolts (M6 or M8 works well)
- 9 spring gate carabiners (6-8 mm works well)
- A Large working frame with M6 or M8 holes (depending on eye bolt size) evenly spaced approximately 100-120 mm apart at the top and bottom of the frame. NOTE, holes at top and bottom of frame should line up.

SETUP

See Figure xxx: Knot pattern diagram. and Figure xxx: Knot pattern (symbol) key.

Securely fix one row of 9 eye bolts at the top of the frame, these will be the Top Anchor Points. Securely fix one row of 9 eye bolts at the bottom of the frame. The bottom row of eye bolts should line up vertically with the top row of eye bolts. Clip one carabiner onto each of the top eye bolts. The bottom eye bolts will have no carabiners.

Ensure that all SC are secured to carabiner at top AP with a larks head knot. Running ends hang freely or if more rigidity is required, running ends can be passed through the eye. The knot is made using the FC. Each row, indicated by a gridline has to be finished consecutively, starting with row A left to right, row B left to right. Do not start the next row if the previous row of knots are not completed. All knots running down one structural cord follow a left hand right hand pattern.
Important: Dress each knot after tying. Orient print to Facing side.

TERMS:

CORD TYPE SET: Any collection of cords within one sample that are of the same material
PRIMARY CORD: The main carrying cord in any cord type set
SECONDARY CORD: The cord secondary to the primary cord in any cord type set
STRUCTURAL CORD: Any cords forming the structure or carrying the weight of any filler cord, cord type set.
FILLER CORD: Any cords forming the infill or body of a sample and is fixed by means of knotting to any structural cord, cord type set. The Filler cord does not carry the weight of the sample unit
ANCHOR POINT: Any point or fixing place to which a textile can be fixed using various configurations of rigging hardware
FACING SIDE: Facing side is the side of the sample unit that you see while knotting.
BACKING SIDE: Backing side is the side of the sample unit that faces away from you while knotting.

Term	Key
Primary cord	Pr
Secondary cord	Se
Structural cord	SC
Filler cord	FC
Resultant V	V
Cord type set	CTS
Sampe unit	U
Anchor point	AP
Facing side	FS
Backing side	BS

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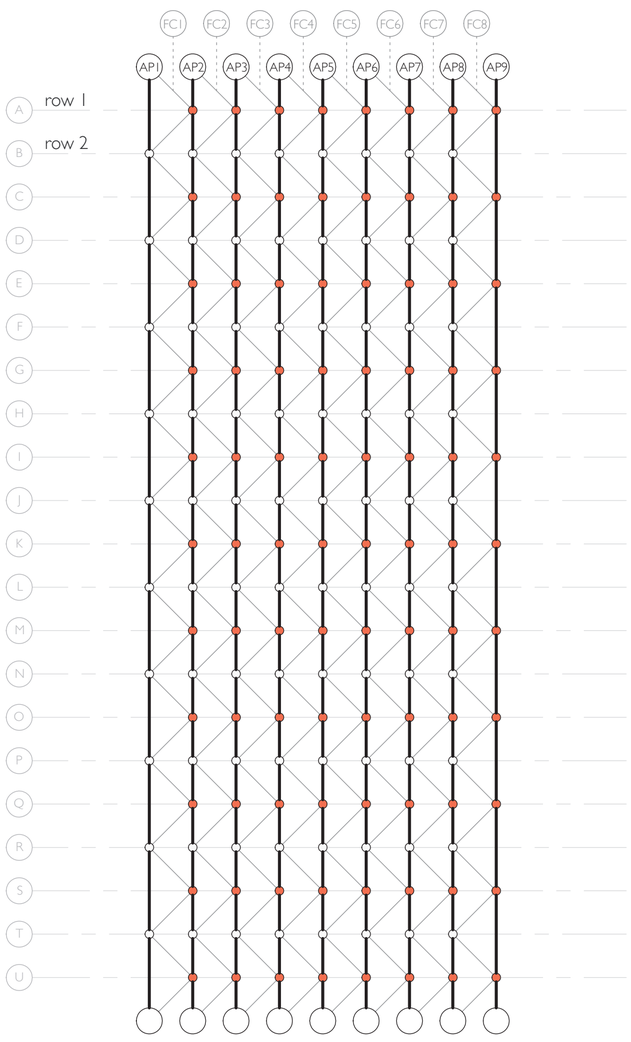
FOLD

KNOT PATTERN (SYMBOL) KEY:

- (AP) Anchor point (Eye bolt with carabiner)
- (A) Grid line or row allocation (Guide only)
- Left hand oriented simple noose knot (See instructions)
- Right hand oriented simple noose knot (See instructions)
- Structural cord, double strands of 7mm cotton rope
- Filler cord, double strands of 15mm fabric strips

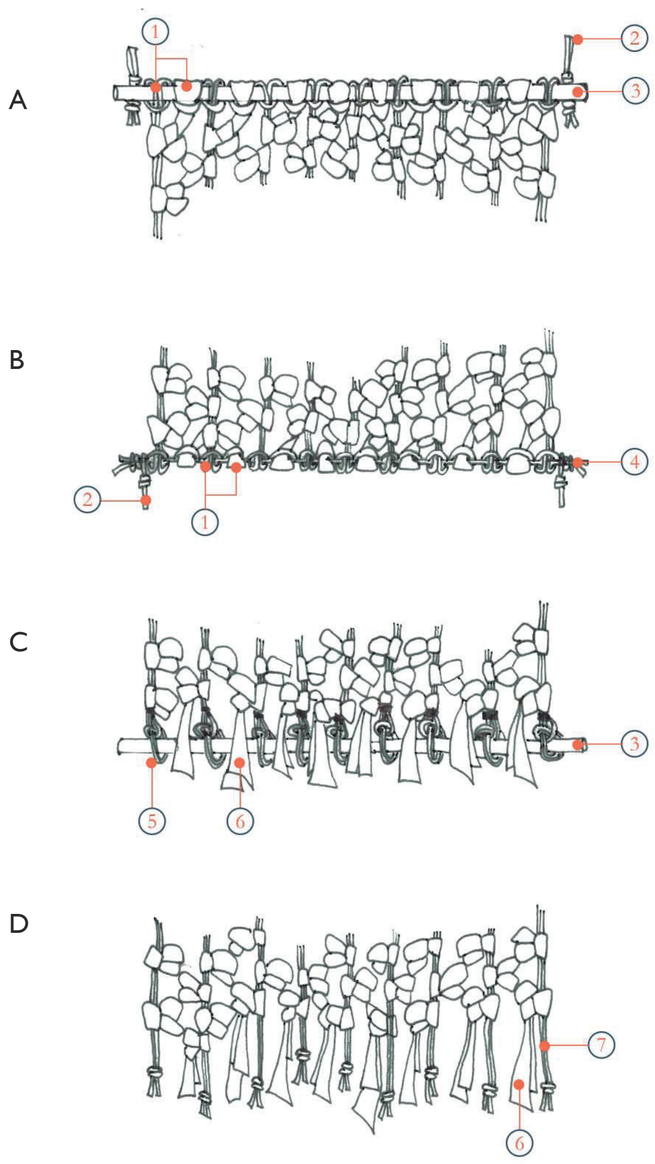
KNOT PATTERN DIAGRAM:



5.11.3.
UNIT EDGE VARIATIONS

The standard textile unit can be constructed using either a frame or dowel as top anchor point (as described in section xxx: Knot pattern instructions). Further, this anchor point can remain as part of the finished product or can be replaced with one of the variations as seen below.

FOLD



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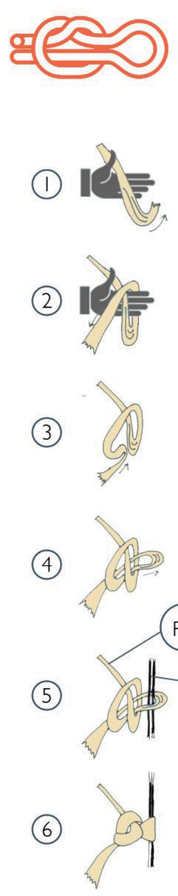
KNOT INSTRUCTIONS

LEFT HAND ORIENTED NOOSE KNOT



RIGHT HAND ORIENTED NOOSE KNOT

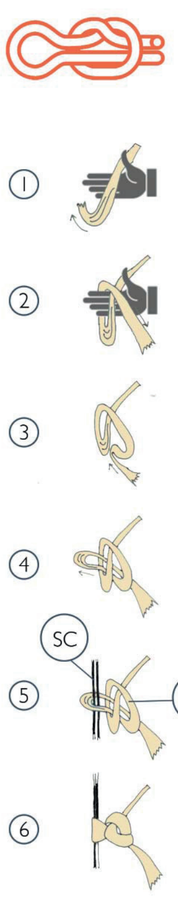


Figure 5.67.

EDGE VARIATION KEY:

1. ABOK #2485, Larks head knot
2. Large eye splice and with whipping
3. Dowel or steel circular profile as AP
4. Rope as AP
5. ABOK #1717, Half hitch-permanently siezed with whipping
6. FC running end hangs free
7. SC running end hangs free, finish rope tip with clear whip end dip, finish running end with stopper knot.

5.12.
MATERIAL SELECTION

The initial testing and making of the sample units were done using Design Team, printed cotton fabric strips. See **Section 5.3.4. Testing materials** on page 56. However, although cotton is a renewable resource, it has a severe environmental impact (Kadolph 2007: 48). Cotton is a water-intensive crop and mainstream farming methods make extensive use of agricultural chemicals. Although the cotton industry has improved recycling efforts, processing cotton remains an environmental concern (Kadolph 2007: 49). Organic cotton is a more environmentally friendly option, however additional costs related to lower fibre yields and the absence of hazardous chemicals results in organic cotton costing approximately twice as much as conventional cotton (Kadolph 2007: 50).

Further issues such as durability, light resistance (colour fastness), overall appearance retention and maintenance influenced the final decision on fabric fibre selection. See Table 5.10. Fibre ratings related to performance (Kadolph 2007: 28) on the opposite page, for a comparison of various fibre types. The final selected fibre type is a **polyester and cotton blend.** See Figure 5.103. Material selection, Fabric samples and Table 5.12. Fabric specification on poster 34 (following page). Polyester is sometimes referred to as '*...the workhorse fiber of the industry...*' and is the most widely used synthetic fibre (Kadolph 2007: 131). See Table 5.11.Properties of polyester on the opposite page (Kadolph 2007: 132).

5.12.1.
FINISHING AND MAINTENANCE

Due to the nature and overall focus of the project finishing and maintenance is only briefly considered.

Finishing:

Fire retardence is defined as '*the resistance to combustion of a material when tested under specifed conditions*' (Kadolph, 2007: 375). Flame-retardent **finishes** can be used on fabrics such as cotton, rayon, nylon and polyester. These finishes should be nontoxic, noncarcinogenic and be durable enough to withstand approximately 50 washes. Further, they should not affect texture or hand of the fabric and should also not contain any unpleasant odours (Kadolph, 2007: 376).

Most topical finishes require special care in laundering in order to preserve flame resistance.

The fabric strips will not receive any additional finishing, however, the rope will be finished with *Flametect Nitro Water-based fire proofing spray*/dip This finish is hydrophobic which will help protect the cotton rope against water and dirt.

Maintenance:

The temporal nature of the textile installation means that textile units that are dirty, damaged or fatigued can easily be replaced. The textiles can be hand-knotted on site and assembled in place of the textile unit being removed.

Further than this, any additional cleaning can be done through regular vacuuming of the textile as well as scheduled dry cleaning or washing of the textile unit. Vaccuming can be done by staff on site.

Table 5.10.

FIBRE RATINGS RELATED TO PERFORMANCE

(Kadolph, 2007: 28).

Rating	Abrasion resistance	Thermal retention	Resiliency	Light resistance
Excellent	Aramid Fluoropolymer Nylon Olefin Polyester	Wool Acrylic Modacrylic Polyester	Nylon Wool	Glass Acrylic Modacrylic Polyester
Good	Saran Spandex Flax Acrylic PBI Sulfar Cotton Silk	Olefin Nylon Aramid	Olefin Acrylic Modacrylic Polyester	Sulfar Lyocell Flax Cotton Rayon PBI
Moderate	Wool Rayon	Silk Spandex	Silk	Triacetate Acetate Olefin
Poor	Vinyon Acetate Glass	Flax Cotton Lyocell Rayon Acetate	Lyocell Flax Cotton Rayon Acetate	Nylon Wool Silk

Table 5.11.

PERFORMANCE PROPERTIES OF POLYESTER

(Kadolph, 2007: 132).

Properties of polyester	Importance to consumer
Resilient- wet and dry	Easy care
Dimensional stability	Machine-washable
Sunlight-resistance	Good for curtains and draperies
Durable, abrasion-resistant	Industrial uses
Aesthetic superior to nylon	Blends well with other fibres

knotting instructions

FABRIC SELECTION

Figure 5.102.
KNOT PATTERN DIAGRAM
SCENARIO ONE
(Not to scale)

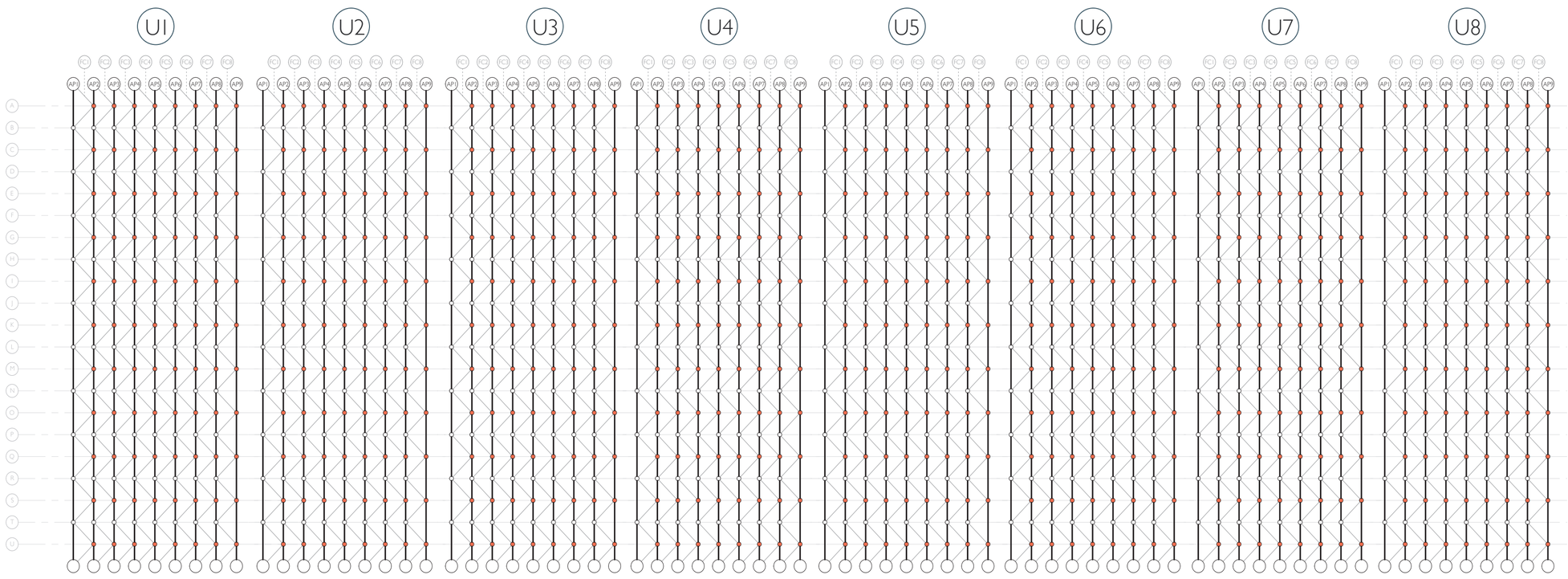


Table 5.12.
FABRIC SPECIFICATION:

U1			U2			U3			U4			U5			U6			U7			U8		
	FC1	T3		FC1	T1		FC1	T5		FC1	T1		FC1	T1		FC1	T4		FC1	T5		FC1	T5
	FC2	T3		FC2	T1		FC2	T8		FC2	T7		FC2	T7		FC2	T4		FC2	T3		FC2	T5
	FC3	T3		FC3	T7		FC3	T8		FC3	T7		FC3	T7		FC3	T5		FC3	T3		FC3	T5
	FC4	T8		FC4	T4		FC4	T8		FC4	T7		FC4	T7		FC4	T2		FC4	T8		FC4	T5
	FC5	T6		FC5	T2		FC5	T6		FC5	T6		FC5	T6		FC5	T2		FC5	T8		FC5	T5
	FC6	T6		FC6	T5		FC6	T5		FC6	T8		FC6	T8		FC6	T2		FC6	T8		FC6	T5
	FC7	T7		FC7	T5		FC7	T6		FC7	T8		FC7	T8		FC7	T2		FC7	T8		FC7	T5
	FC8	T7		FC8	T5		FC8	T6		FC8	T5		FC8	T5		FC8	T4		FC8	T5		FC8	T5

Figure 5.104.
TEXTILE UNIT SCENARIO ONE

order of assembly

TEXTILE UNIT SCENARIO ONE

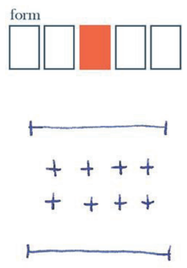
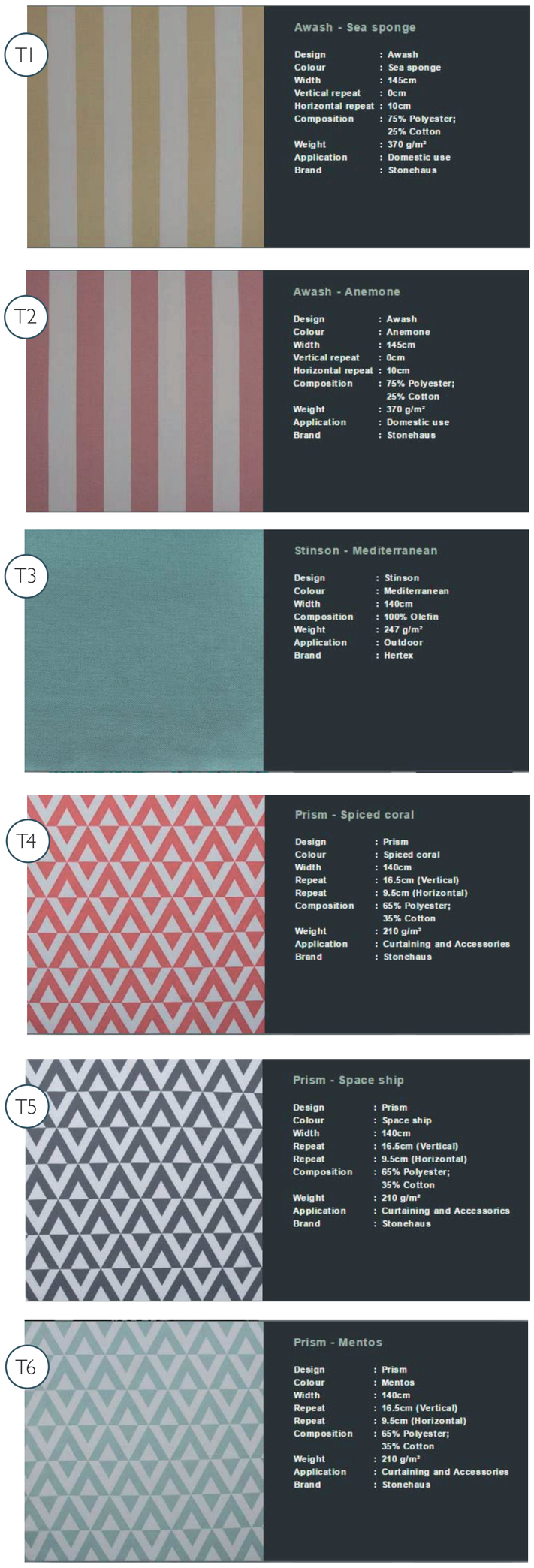


Figure 5.103.
MATERIAL SELECTION, FABRIC SAMPLES



5.12.2.
ASSEMBLY PROCESS

Basic assembly for the individual textile unit is discussed in Section **5.9.1. Unit edge variations** on the previous poster. This section provides a brief overview for the assembly of textile unit scenario two.

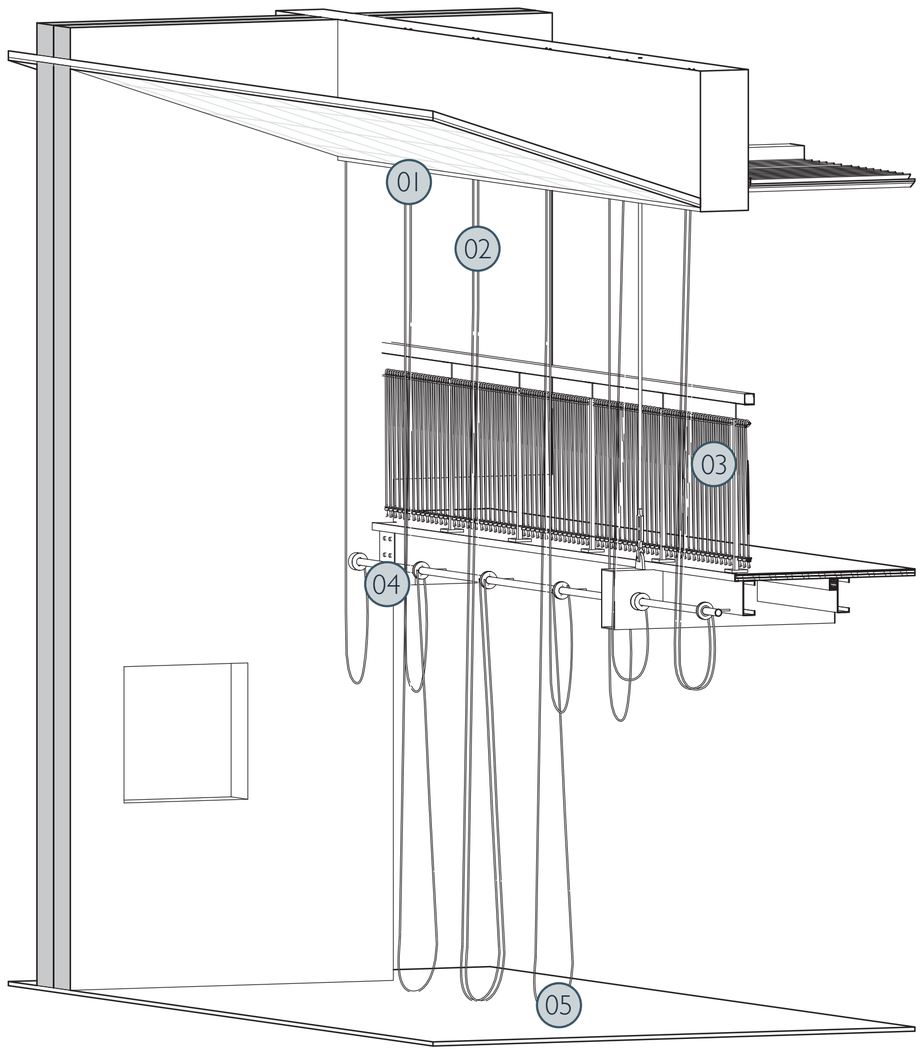


Figure 5.106. Order of assembly (above).

01 STEP ONE

Fixing Standing block to existing structure. See Figure 5.9.1. Anchor to beam detail on poster 32.

02 STEP TWO

Fixing Moving block to Standing block. See Figure 5.97. Parts that make up a tackle on poster 32.

03 STEP THREE

Ballustrade with custom rope cleat. See Figure 5.92. Anchor to mezzanine detail on poster 32, and Figure 5.87. Anchor to mezzanine detail front view on poster 31.

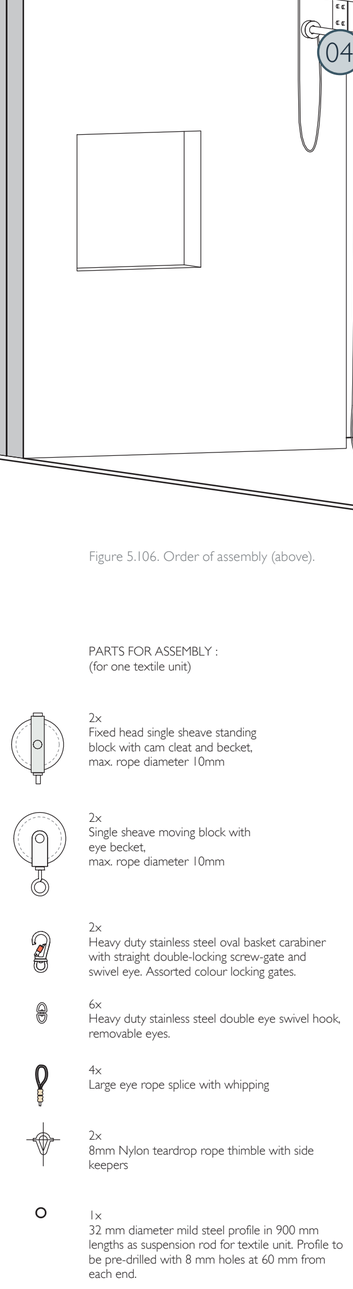
04 STEP FOUR

Fixing point to mezzanine floor. See Figure 5.93. Anchor to floor detail on poster 32.

05 STEP FIVE

Fixing point to existing floor.
See rigging detail 2 (RD2) on poster 32 for more detail.

PARTS FOR ASSEMBLY :
(for one textile unit)



2×
Fixed head single sheave standing block with cam cleat and becket, max. rope diameter 10mm

2×
Single sheave moving block with eye becket, max. rope diameter 10mm

2×
Heavy duty stainless steel oval basket carabiner with straight double-locking screw-gate and swivel eye. Assorted colour locking gates.

6×
Heavy duty stainless steel double eye swivel hook, removable eyes.

4×
Large eye rope splice with whipping

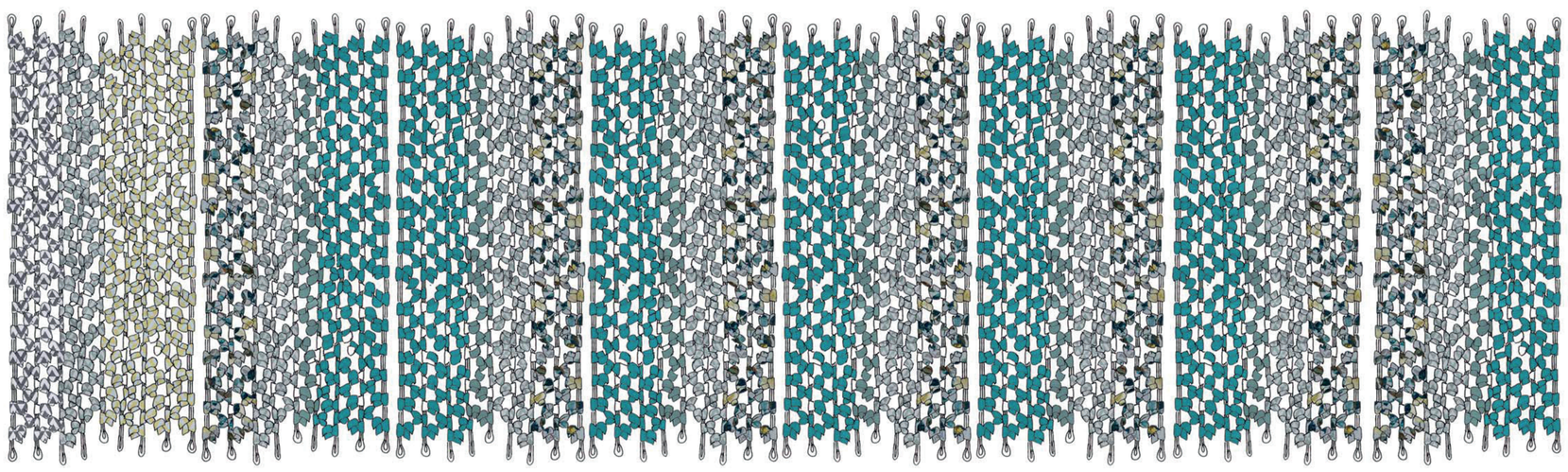
2×
8mm Nylon teardrop rope thimble with side keepers

1×
32 mm diameter mild steel profile in 900 mm lengths as suspension rod for textile unit. Profile to be pre-drilled with 8 mm holes at 60 mm from each end.

Table 5.13.
COSTING PER UNIT:

Item	Description	Quantity	Rand per Unit	Total cost
SASH CORD	7 mm diameter Cotton rope Colour: Natural CC273	38m	R5.00 p/m	R190:00
TEXTILE INFILL	Calico 2800 mm wide roll cut into 100-120 mm wide strips,	56 strips 5000 mm long	R65.00 p/m	R650.00
CARABINER	Heavy duty stainless steel oval basket carabiner with straight double-locking screw-gate and swivel eye. Assorted colour locking gates.	2	R60.00	R120.00
DOUBLE EYE SWIVEL HOOK	Heavy duty stainless steel double eye swivel hook, removable eyes.	6	R80.00	R480.00
EYE BOLT	8x80 Stainless steel eye bolt	2	R8.00	R16.00
THIMBLE	8mm Nylon teardrop rope thimble with side keepers	2	R6.00	R12.00
				R1468.00
				R960.00

Figure 5.105.
FABRIC SPECIFICATION
SCENARIO ONE
(Not to scale)



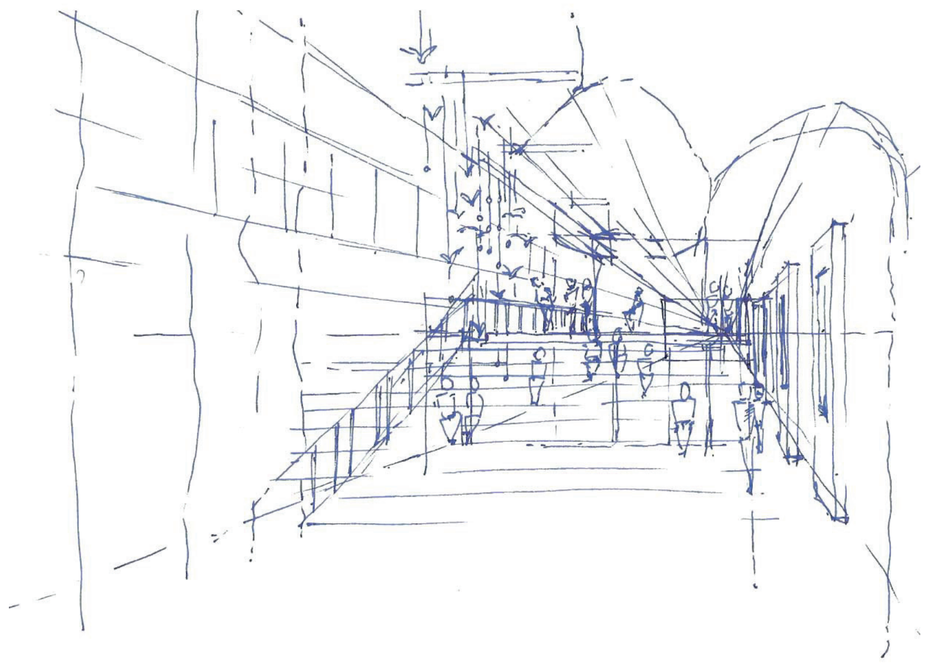
textile space-defining element

CONCEPTUAL DEVELOPMENT - SCENARIO THREE

5.13.
SCENARIO THREE
INITIAL DEVELOPMENT

The textile unit for scenario three is constructed with the same knots as in the textile units for scenario one and two. The knotting pattern for scenario one and two are 'flat' patterns. This means that the textile sample unit can be knotted using the knotting process as described on poster 33. (By means of a knotting frame). However, the knotting pattern for scenario three would be slightly different. See Figure 5.108. (right).

Due to the three-dimensionality of the sceanrio three knotting pattern, the basic flat pattern first had to be fully developed. This basic flat pattern then forms the basis for the development of a three-dimensional knotting pattern. The images below illustrate the initial development of the textile unit for scenario three.



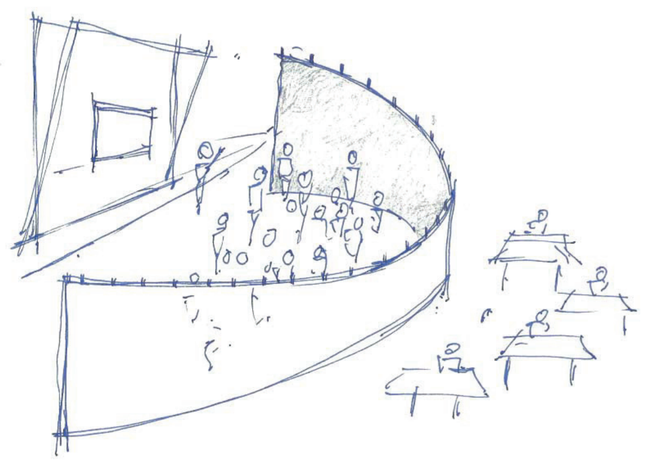
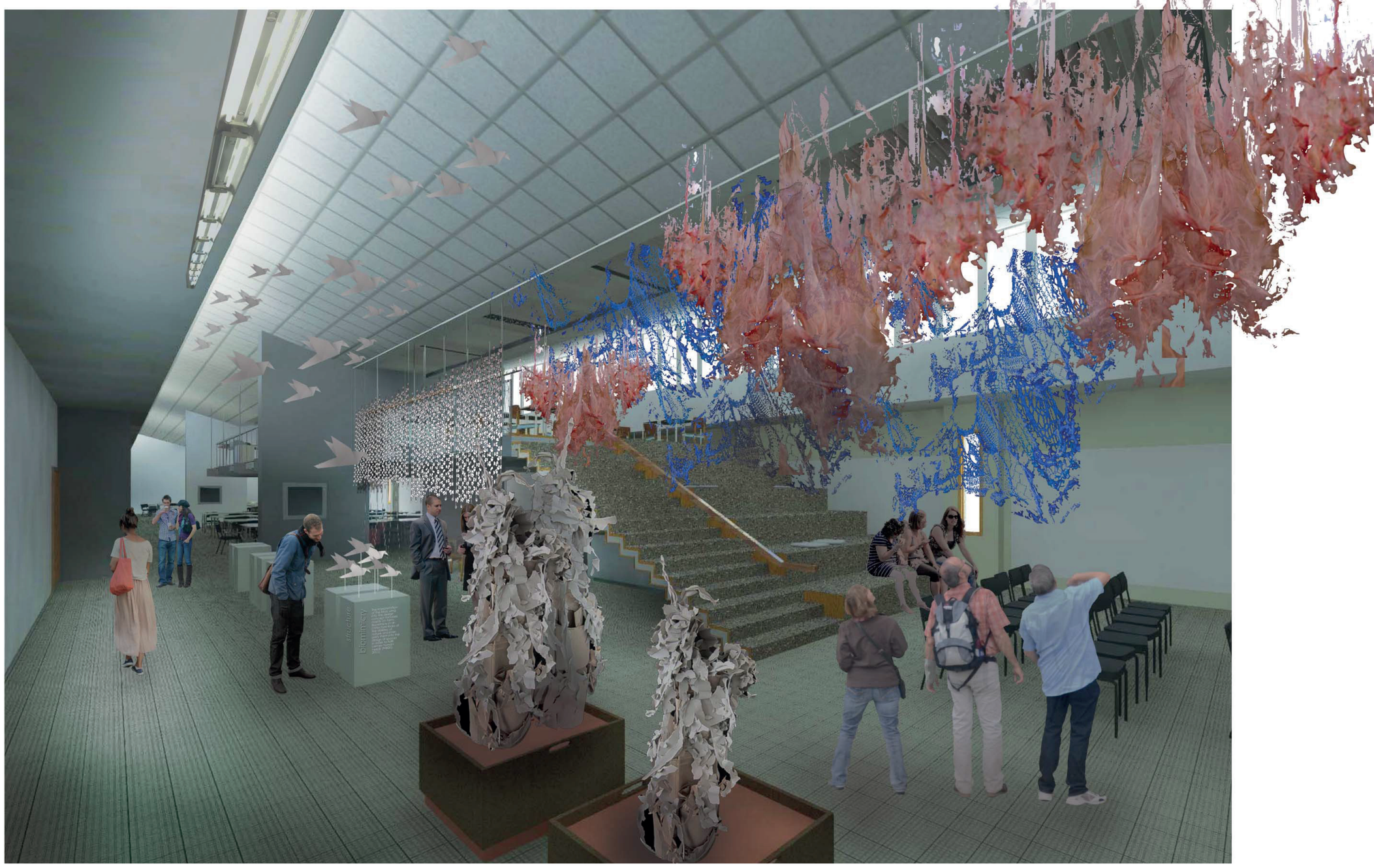


Figure 5.107.
design development sketches

Figure 5.108.
TEXTILE UNIT SCENARIO 3



planar irregularity
CONCEPTUAL DEVELOPMENT

PLANAR IRREGULARITY
INITIAL DEVELOPMENT

Figure 5.108. (below) indicates the initial textile fabrication diagram for the three-dimensional knotting patterns. Further development would indicate knot count and structural cord length. Once these two aspects are determined, approximate material usage and weight can be calculated. This would allow for more accurate specification of rigging hardware, rails and pulleys.

Figure 5.110. Indicates the preliminary development of a textile unit for the computer lab. This installation is a combination of the individual textile unit and a further development of the three-dimensional textile unit.

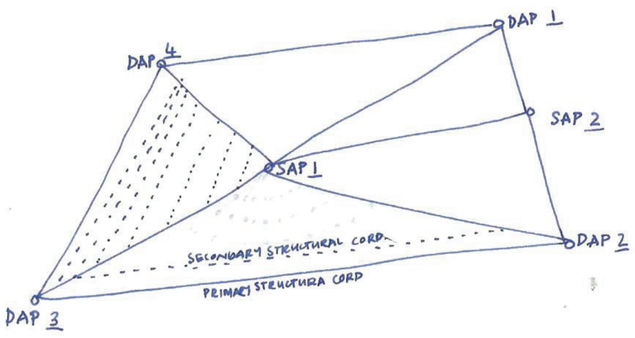


Figure 5.109.
INITIAL TEXTILE FABRICATION DIAGRAM

1. Build scaled model
2. Measure lengths of string, these then form the Primary cords
3. Calculate lengths of Secondary cord
4. Determine knot density in order to determine length of Filler cords.
5. Make scaled sample piece of large textile
6. Determine weight of final textile
7. Adjust fixing hardware and structural cordage

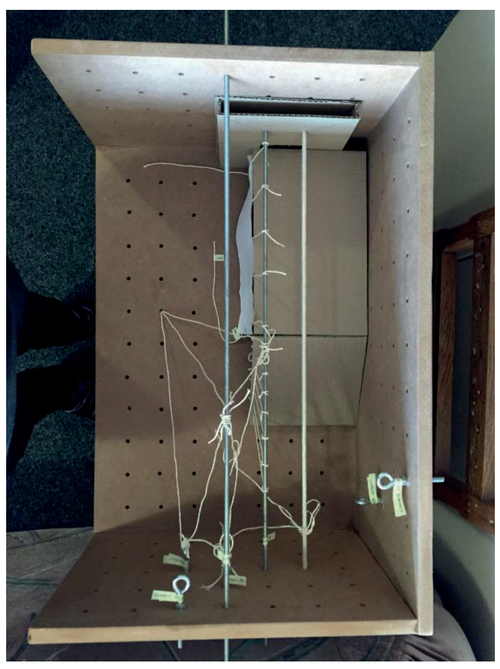


Figure 5.110. View of testing box with textile, scenario three (above).

ADDITIONAL TEXTILE INTERVENTION
COMPUTER LABS

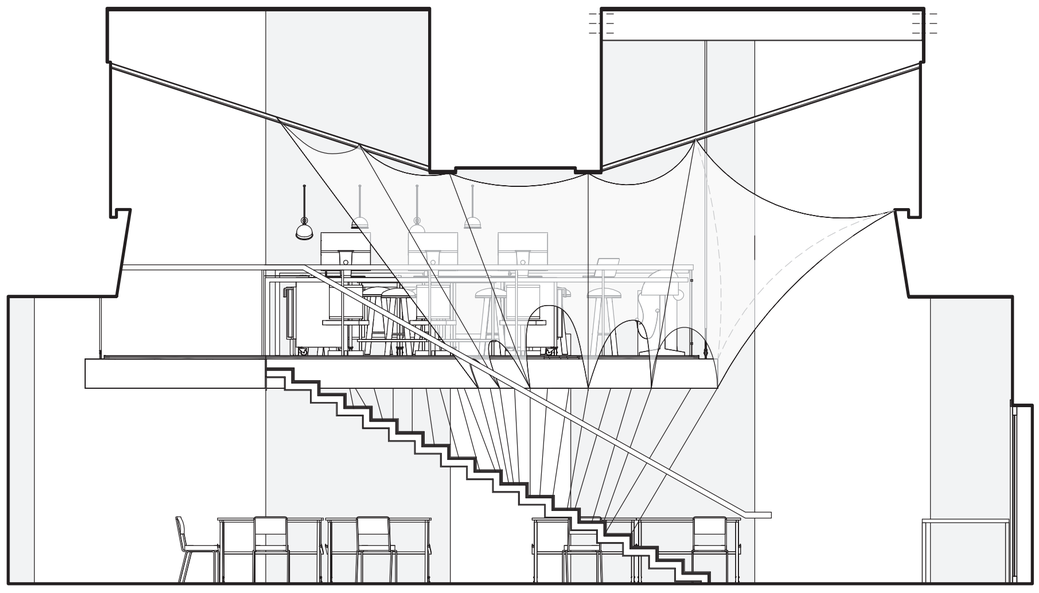
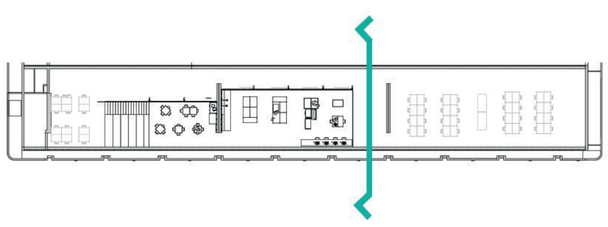


Figure 5.111.
SECTION 3 - COMPUTER LABS



5.14.
POSSIBILITIES AND RESTRICTIONS OF HAND-KNOTTED TEXTILES

Due to the parameters and requirements of the Hybrid research strategy, possibilities and restrictions of the hand-knotted rope and rope-like textiles were discovered and discussed throughout the making process. All observations, in terms of the possibilities and restrictions, can be found within Table 5.5. Test Matrix on poster 12, page 58. With each possibility or restriction (design cycle test result) a response and plan followed. These steps are documented graphically in Figure 5.20. Flow diagram on poster 13, page 59. Further, the major possibilites are discussed in the reflection sections of the design cycles and can be found on poster 14-17, page 60-63.

The knowledge gained through the process of making in terms of the material, the manner in which it responds to certain influences and the spatial possibitilies and restrictions are applied during the intervention design cycles

In summary,

- Textiles, specifically hand-knotted rope and rope-like textiles, posses an aesthetic and metaphysical quality that can not be duplicated with the use of traditional or conventional 'hard' space-defining elements. Therefore, textiles offer opportunity for unique spatial manifestations.
- Textiles create a unique connection between the user and the interior environment as it is always '*... present between the body and the hard fabric of the building...'* (Hoskyns, 2007: 87). To add to this, Hoskyns (2007:87) says that:

> For interior architecture not to include soft furnishings [textiles] is to strip the discipline of its relationship with the body, positioning it with the building rather than the body.

- Textile performs well in tension but does not naturally perform well as a 'structure' under compression.
- Textiles or fabric is naturally flat, but hand-knotted rope and rope-like textiles are inherently textured and bulky, offering opportunities for acoustic and visual spatial design responses.
- Textiles posses characteristics that allow for spatial responses that are adaptable and temporary. The temporality of textiles further offer interest in terms of user interaction and change.

5.15.
CONCLUSION

This chapter introduced the conceptual thinking behind the design response in the form of a large conceptual diagrammatic image board. The design process was described and applied to the various test sites in order to fully explore the hand-knotted textile. The design cycles were documented and include planning, making, observation and written reflection. The design process culminates in textile space-defining elements placed within the test site for intervention. Finally the chapter offers a short summary on the possibilities and restrictions of hand-knotted textiles.

final reflections

CHAPTER 6

"The studio is a laboratory, not a factory. An exhibition is the result of your experiments, but the process is never-ending. So an exhibition is not a conclusion.

-Chris Ofili

If the evolution of the interior design discipline from upholsterer to decorator to interior designer contributes to the devalued status of textiles within the interior, the research within this dissertation re-evaluates this position and reclaims this valuable lost territory. The dissertation investigated the construction of hand knotted textiles and their application within interior space. By translating traditional rope knotting techniques into alternative textile fabrication methods the study explored the characteristics and manifestations of textiles within interior space. Further it placed emphasis on the use of textiles as a valuable interior design material.

The dissertation employs a hybrid research strategy. The combination of the Practice-based Research method and the Action research method allows for the independent exploration of the textile and its potentials while still providing the framework for rigorous documentation, allowing for a dissertation where research is conducted through the act of making.

This final section of the dissertation brings together the various themes as discussed within the preceding chapters and can be seen as a final reflection. The section briefly reflects on the final outcomes of the exploration of textile space-defining elements and the hybrid research method. Whereafter it lists the research contributions. The section concludes with recommendations for further study.

a conclusion

6.1.
PERSONAL REFLECTION

As stated in Chapter 2: Methodology, reflection plays an important role in the Hybrid research strategy. This section acts as the final reflection of the dissertation 'Knowing through making'. The reflection is written from a personal viewpoint and consolidates thoughts and ideas about the process and experiences throughout the year. The essay does not cover all the parts of the process but highlights some important lessons I have learnt, suggests things that could be done differently and gives an overall picture of the design journey.

The initial dissertation topic was focussed towards ideas of decoration and the issues that the discipline of interior design has with the act of decorating. The topic of decoration is a controversial one and a source of many discussions between my fellow interior design students and I. I had considered early on that I wanted to experiment, build and 'make' using textiles as part of my dissertation's study. Consolidating the discussion on decoration and the exploration into 'making' with textiles proved to be a struggle.

With assistance from the examiners and my study leaders, the topic was narrowed and focussed on a specific area within the discipline, broadly related to concepts of decoration, but directed more to the use of textiles. It was also decided that a very specific research method would be needed to address the topic. At this point in the process I decided to combine the Action Research method and the Practice-based Research method. These two methods have many aspects in common but each have strengths of their own that play toward the concepts that I wanted to approach through my research. The PBR method allowed me the freedom to make and experiment and due to its cyclical nature, the AR method assisted in the process of documentation and iteration.

The speed at which the dissertation evolved from the beginning of the year up until the June exam proved radical. Due to the initial doubts about the research topic, the research strategy was implemented later in the year than is ideal. This contributed to the lack of 'made' knowledge early in the design process resulting in initial responses largely based on 'collected' knowledge. I suggest that any students that focus on Research through making should start the process of 'making' much earlier on within the year to avoid this. However, this would mean that the student would need to select the research field and research method at the start of the year. Ideally the student would need to decide whether they wanted to research in a traditional way (collected knowledge) or in an alternative manner (made knowledge).

Once the decision about the specific research method was made and fully understood, the process evolved more naturally. It became clear that the project was one where research was done through making, and the selected research methods were well geared toward this aspect.

Conducting continuous rigorous research, through the act of making, proved more difficult than originally anticipated. I continuously searched for inspiration and ideas, whether through discussion with students and lecturers, old books on the topics of textiles and decoration found in the library or image boards made from photos collected from the internet. These conventional research techniques assisted me in the act of making. But, ultimately I discovered that in order to continue making, I had to simply continue making. 'Playing' with the material took up a lot of my time and initially this was a cause of concern to me. When I compared my progress and completed tasks to students with more conventional projects, it seemed as if I was much furhter behind than I should have been. It was only during the June exam that the progress I had made became evident. The rigorous manner in which the documentation was done and the continual observation and reflection added significantly to the design development.

The next obstacle that I discovered employing the Hybrid research strategy, was when I had to alternate between the act of 'making' and other, more traditional, design techniques (such as sketching on plan and section). The transition seemed forced and the jump seemed to inhibit the use of design intuition. In order to move beyond these hurdles, I completed small design charrettes on intermittent occasions. These charrettes related directly to the issue at hand and were used as a 'translation' mechanism. Other more alternative design tools included the development of the range of various testing sites. These sites allowed for a more fluent transition between making and the more traditional design techniques.

During the making process I found that sketches and hand written notes were more useful and valuable than digital documentation. Similar to the act of making, sketching offers a more tactile experience and changes made to drawings clearly illustrate the iteration process. This iteration process was also very evident while sketching on bumf overlaid onto plans and sections, emphasizing the process of iteration that already exists within the parameters of conventional design methods. I also made sure that all sketches and handwritten notes on pages were always dated. This allowed me to continuously

refer back to notes, observations and reflections made earlier on in the year. Further documentation included photographs of physical samples as well as spreadsheets which documented the fabrication processes and materials used. This documentation process will allow other students the opportunity to follow the entire process of Research through making from the initial onset to the final results.

The development of the physical design process ran parallel to the development of the theoretical underpinnings of the dissertation. With each completed design cycle I discovered and documented new aspects about the knotted-rope textile. I contemplated associations and perceptions that designers and users have concerning the use of textiles. The learning curve was steep and with each step, observations became more specific and iterations more focussed. The debate about textiles, decoration and the act of making as a research method continued throughout the building. I had many insightful discussions and disagreements with peers and lecturers from the interior and architectural disciplines. These discussions strengthened my opinions and influenced my design decisions. Ultimately these types of interactions made me realise the importance of the studio environment.

True to the requirements of the hybrid research strategy, the majority of decisions were made through various cycles of iteration. Additionally many design and dissertation topic decisions were guided by the various milestone critiques. Large jumps in progress followed each critique, stressing the importance of responding to commentary. With this I learnt the significance of clearly communicating the observation and reflection parts of the hybrid research strategy. This should be done verbally as well as visually.

Due to continual development it is hard to reach final conclusions in the design part of the study. I think here the specific aims and delimitations that are set up at the start of the study creates an important parameter. It allows for precise decision making. Future students should keep in mind that these limitations need to be set up early in the year to ensure the desired end result. Yet, they should also understand that these limitations also adapt and grow as the study continuous throughout the year.

As conclusion to my personal reflection, the findings of the research is listed in **section 6.1.1.**

6.1.1.
FINDINGS

1.
The exploration of hand-knotted rope and rope-like materials revealed and illustrated various possibilities and restrictions that textiles present when utilized as space-defining elements. These findings were documented throughout the various design cycles as observations and finaly employed in the test site for intervention as a part of the design response.

2.
A construction method and a set of fabrication drawings for the manually constructed textile unit (scenario two) was developed and presented as *Knotting instruction.*

3.
This dissertation serves as an example of research carried out by making, within the context of the interior design discipline. All procedures, methods and outcomes were described throughout the process and potentially serve as an informal guide to future projects employing similar research strategies.

4.
The Hybrid research strategy employs a combination of the Practice-based Research method and the Action Research method. The Practice-based Research method places emphasis on the creative outcome or interior artefact as well as the process involved in its creation. The Practice-based Research method offers opportunity to carry out research that is focussed on the idea of making and is well suited to the Interior design discipline.

6.2.
RESEARCH CONTRIBITIONS

The dissertation makes the following contributions:

- The study contributes to the understanding of how hand-knotted rope and rope-like **textiles react** and manifest under certain test conditions.
- The study contributes an **alternative spatial application** for hand-knotted rope and rope-like textiles within the interior environment.
- The study contributes a **new fabrication technique and documentation process** as well as **new terminology** concerning rope and rope-like materials to the discipline of interior design.
- The study makes a contribution to the discipline of interior design at the University of Pretoria by applying a **hybrid research strategy** that includes the Practice-based Research method.
- The study makes a contribution to the discipline of interior design as it employs the **act of making** as a way to do **research**.
- The study and research methods applied, contributes **critique** on the current manner in which **teaching and learning** within the Department of Architecture takes place. The discipline of interior design is concerned with interaction between the user and its environment, yet the current design process is far removed from this tactility.
- The study contributes to the **present discussions** regarding the definition of the boundaries of the **interior design discipline** in relation to the architectural discipline and the architectural profession.

6.3.
RECOMMENDATIONS

The dissertation makes the following recommendations for further study:

- That the three-dimensional textile unit and the spatial manifestations thereof, be further explored and developed.
- That the associations and resultant meaning of the hand-knotted textile be analysed and supplemented with empirical data collected through the study in order to determine its meaning within the discipline of interior design.
- That the dependency between a material choice, selected construction technique, the resulting form and its eventual spatial application be further explored.
- That the potential role of the act of decorating within the interior design discipline be investigated. This includes an investigation and analysis of the types (or scale) of decoration that already manifest within the interior environment and what the meaning of each of these are.
- That a greater understanding of the relationship between making and research within the interior design discipline be reached.
- That research methods that facilitate the act of making within the interior design discipline be further investigated and developed.

6.4.
CONCLUSION

The chapter, and the study, is concluded with a personal reflection essay discussing the various lessons learnt during the development of this dissertation. This essay highlighted times where great development took place as well as areas of difficulty. The personal reflection essay also made suggestions for future improvement. Lastly the research contributions were listed followed by recommendations for further study.

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CHAPTER 7

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appendix A

Construction of sites

5.3.1.1.

CONSTRUCTION OF THE TESTING FRAME

The testing frame was constructed from two unused pin-boards (referred to as Board A and Board B) See Figure 1: Pin board before alteration. Initially the shape and specific requirements of the testing frame were derived from the characteristics and opportunities offered by rope and rope-like materials.

Board A acts as the backdrop to the testing frame. The OSB was cleaned, sanded by hand and finished with white PVA paint. Holes were drilled into the backboard in order to allow for the fixing of rope and hardware. The 8mm diameter holes are set 200mm (centre to centre) and run on a horizontal and vertical grid. This allows for the shaping of three dimensional textile space

Board B acts as the main frame onto which hardware and rope can be fixed. The OSB board was removed from the existing frame, the frame was cleaned and holes were drilled into the inner part of the frame. The 8mm diameter holes were spaced 100mm centre to centre. Holes 1-19 were placed at the top and bottom of the horizontal frames and holes A-J were placed vertically down the sides of the frame. The numbering system was incorporated for documentation purposes. Finally Board B was painted white.

To complete the testing frame Board A and Board B were fixed together. The feet of the frames were bolted together using M6 bolts and two pieces of 32x32x600 mm timber batons. The tops of the frames were fixed by spanning two pieces of 2.6x25x25x450mm mild steel equal angles between the two frames and fixing them with self-tapping screws. These materials were left unfinished and unpainted.

The completed testing frame is 2020mm wide, 1670mm high and 435mm deep. See Figure 2: Completed testing frame in use (right). The completed testing frame includes the addition of M6 eye bolts as fixing points. For physical parameters of the testing frame see section 5.3.1. on poster 10 (page 54+55).

Figure 1: Pin board before alteration

Figure 2: Completed testing frame in use

5.3.2.1.
CONSTRUCTION OF THE TESTING BOX

Where the testing frame acts as quite a rigid test site, the testing box allows for more fluidity and malleability of the textile. This is due to the increased amount of fixing points and the fact that the grid is aligned. Not only does the grid allow for the fixing of eye bolts but the aligned holes also mean that threaded rods can pass through both of the side panels simultaneously.

For physical parameters of the testing box see section 5.3.2. on poster 10 (page 54+55).

The testing box was constructed using 16 mm MDF. The form of the box was designed to be 'neutral'. Therefore the dimensions of the box was not based on the testing site for intervention, but was built to be an empty rectangle. This was done to ensure maximum flexibility in terms of spatial response.

Initially the dimensions of the bottom panel of the box was based on the dimensions of an A2 sheet of paper (420mm x 594mm). It was altered to 400mm x 580mm to use the available MDF sheet in the most efficient way. The side panels simply matched these parameters with a height proportionally to the size of the bottom panel. Therefore the side panels were designed to be 300mm high.

The three side panels and bottom panel were drawn out onto the available MDF sheet with pencil. The panels were cut whereafter the sides of the panels were sanded lightly to remove any rough edges. The panels were then glued to each other. Wood screws were used to secure the panels to each other. Initially it was determined that the box would need to be strong enough to resist pulling, tugging and tension from ropes and strings. Later however it became clear that the nature of the type of testing to take place within the box would change. See Table 5.2. Testing box, observation and response on poster 10 (page 54+55)

After the wood dried a grid was marked out onto the exterior of the box. This grid was then used to drill 6mm holes into the box. After drilling the box was sanded inside and outside to get rid of any pencil lines and excess glue.

M6 eye bolts and later 6mm threaded rod was placed through the holes within the box.

See Figure 3: Testing box in use (right).

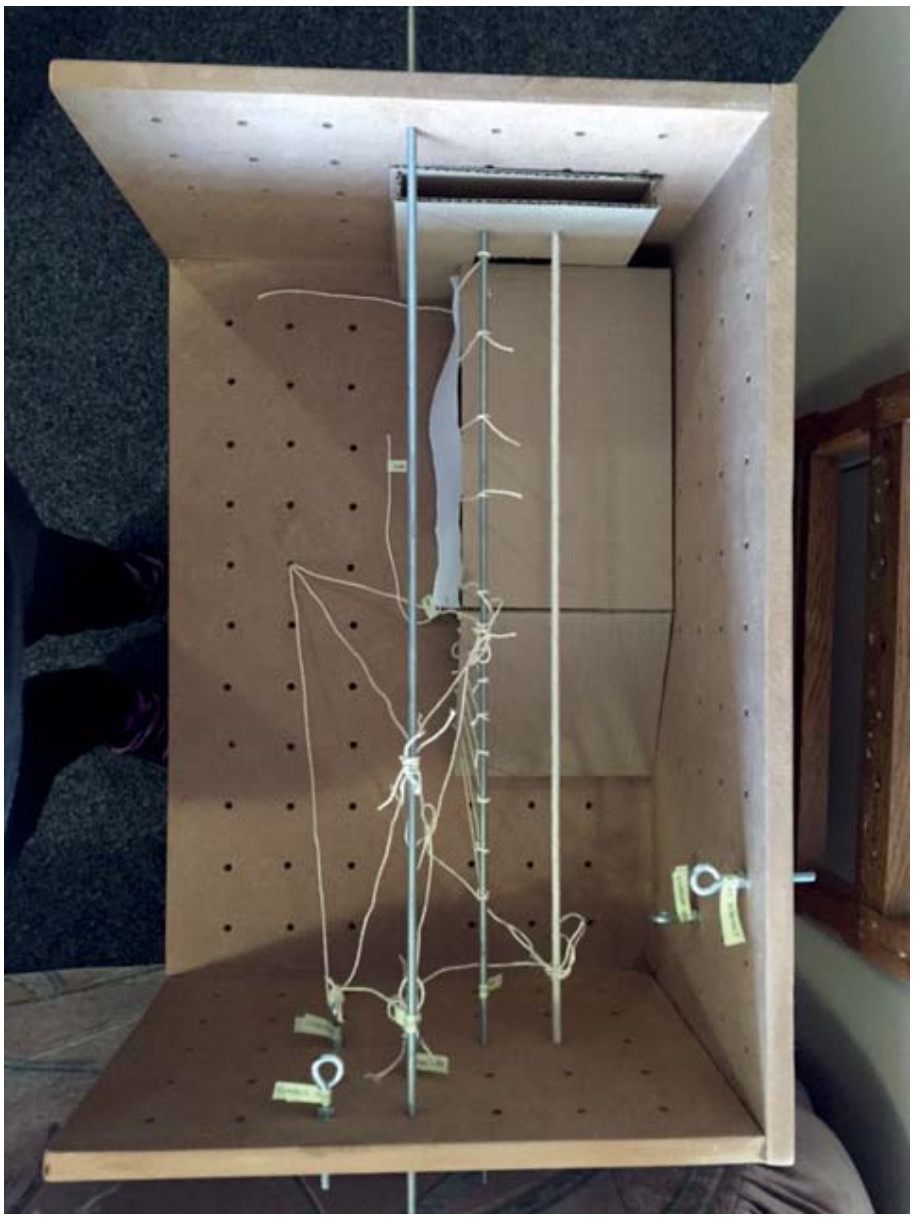
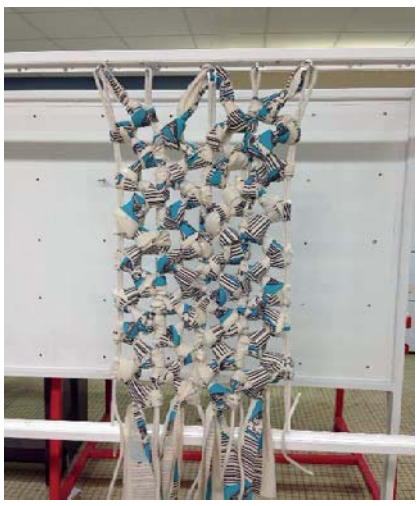
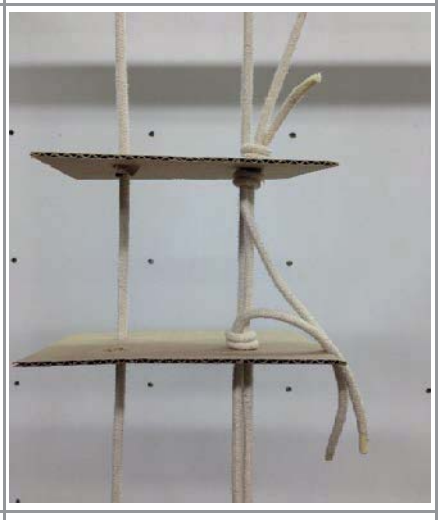
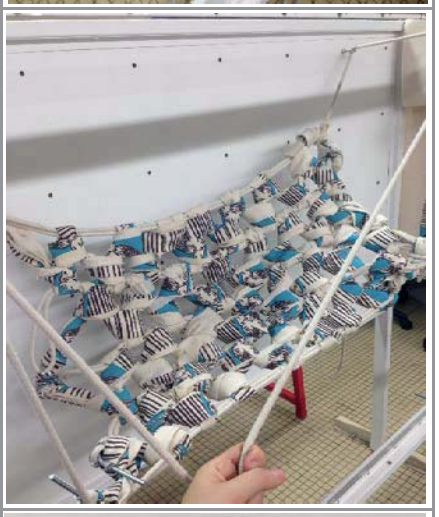


Figure 3: Testing box in use

appendix B

Data collection and synthesis

TEST NR	STEP	DESCRIPTION	PHOTO
1	1	Fix three ropes to upper frame (loop through eye bolt) One primary cord centred (10) Two filler cords (A and B) either side of the primary cord (9,11)	
	2	Select FC-A and make an overhand loop knot towards the PC Place PC through the eye of loop FC-A Pull the running end of FC-A to dress the knot	
	3	Repeat step 2 using FC-B Push knot from FC-B up against FC-A to ensure a snug fit	
	4	Hang one AC over left V and one AC over right V Ensure that ends meet	
	5	Select FC-A and make an overhand loop knot towards the AC Place AC through the eye of loop FC-A Dress knot	
	6	Repeat step 5 using FC-B	
	7	Repeat steps 2-5 until end of rope is reached	
2	1	Fix five PC (14,16) to the upper frame Fix four FC (13,15,15,17) to the upper frame	
	2	Select the first FC and make a simple noose not toward the second PC (angling the FC-A toward the right to reach the second PC). Place running end of first PC through the eye of loop FC-A. Pull the running end of FC-A to dress the knot	
	3	Repeat step 2 using the second FC and the second PC . Push knot from FC-B up against FC-A to ensure a snug fit	
	4	Select the FC-C and make a simple noose not toward the fourth PC (angling the FC-A toward the left to reach the fourth PC). Place running end of first PC through the eye of loop FC-C. Pull the running end of FC-C to dress the knot	
	5	Repeat step 4 using the fourth FC and the fourth PC . Push knot from FC-D up against FC-C to ensure a snug fit	
	6	Repeat steps 2-4, angling each of the FC to the PC opposite the existing knot criss crossing down the PC one row at a time. Repeat the steps until the remaining PC is covered completely with FC.	
3	1	Fix two rope loops through four eye bolts so that each of the four running ends hang towards the floor	
	2	Insert four evenly spaced holes in two rectangular sections of board material	
	3	Tie an overhand knot about 400mm down the front two rope ends and feed the rope ends through the two front holes of the board. Tie two more overhand knots below the board to secure the board between the two sets of knots	
	4	Repeat this step using the two back ropes	
	5	There should now be two boards secured horisontally between hanging rope ends	
	6	When pulling on the front top rope loop (Between the two widely spaced eye-bolts) the horisontal boards should tip to a diagonal position	
4	1	Fix two rope loops through four eye bolts so that each of the four running ends hang towards the floor	
	2	Insert four evenly spaced holes in two rectangular sections of board material and feed the ends of the rope through the board material	
	3	Add and extra loose piece of rope through each of the four holes	
	4	Use the loose piece of rope to tie the first half of the Double Fisherman's Knot above the board and the second half of the knot below the board. Slide the knots toward each other to secure the board snuggly between the two knots	
	5	Feed each of the four main rope ends through the four holes in the second board	
	6	Add a third loose piece of additional rope through the bottom tier board	
	7	Repeat step 4	

TEST NR	STEP	DESCRIPTION	PHOTO
5	1	Fix two rope loops through four eye bolts so that each of the four running ends hang towards the floor	
	2	Insert four evenly spaced holes in two rectangular sections of board material	
	3	Push running ends of the two front ropes through the front holes in the board material, stick each of the two running ends through a washer.	
	4	Loop each of the two running ends in order to stick them back through the washer and through the holes in the board material	
	5	Take the two running ends that are now at the top of the board material and tie a fisherman's stopper knot to hold them in place	
	6	Place two individual loose pieces of rope through each of the loops that are at the bottom of the board product	
	7	Pull the ropes toward the board to create a snug fit	
6	1	Fix two rope loops through four eye bolts so that each of the four running ends hang towards the floor	
	2	Insert four evenly spaced holes in two rectangular sections of board material	
	3	Place the two front ropes side by side through a washer	
	4	Split the two ropes and place through the two front holes in the board material	
	5	Once ropes are through the holes bring them together again and place through a large washer (repeat step 3 and 4).	
	6	Repeat steps 3,4 and 5.	
7	1	Fix two rope loops through four eye bolts so that each of the four running ends hang towards the floor	
	2	One at a time, fix the four loose loop ends from Sample 1 to each of the free running ends of the rope by means of an overhand loop	
	3	Ensure that all loose rope ends are secured	
	4	Dress the knots	
	5	There should now be a textile secured horisontally between hanging rope ends where the board product was placed initially	
	6	When pulling on the front top rope loop (Between the two widely spaced eye-bolts) the horisontal textile sample should tip to diagonaly	
8	1	Fix two rope loops through four eye bolts so that each of the four running ends hang towards the floor	
	2	One at a time, fix the four loose loop ends from Sample 2 to each of the free running ends of the rope by means of an overhand loop	
	3	Ensure that all loose rope ends are secured	
	4	Dress the knots	
	5	There should now be a textile secured horisontally between hanging rope ends where the board product was placed initially	
	6	When pulling on the front top rope loop (Between the two widely spaced eye-bolts) the horisontal textile sample should tip to diagonaly	
9	1	Fix primary cord to main frame with eye bolt and carabiner by means of larks head knot.	
	2	Suspend dowel and fix with double stranded clove hitch knot	
	3	Seperated two strands from each other and and tie two separate clove hitch knots	
		See poster for more images	

TEST NR	STEP	DESCRIPTION	PHOTO
10	1	Fix primary cord to main frame with eye bolt and carabiner by means of larks head knot.	
	2	Suspend dowel and fix with double stranded clove hitch knot	
	3	Seperated two strands from each other and and tie two separate clove hitch knots	
	4	Add two additional anchor points (eye bolt with carabiner) onto the back board of the main frame	
	5	Position dowel securely by fixing the additional ropes to the dowel by means of clove hitch knots	
		See poster for more images	
11	1	Use rope fixing structure as created in test 10	
	2	Remove knot at the end of the dowel and shift textile sample 2 over the end onto the dowel (Use the filler cord as fixing point)	
	3	Add a secondary dowel in the bottom end of the sample, in the loops of the filler cord	
12	1	Use rope fixing structure as created in test 10	
	2	Remove knot at the end of the dowel and shift textile sample 2 over the end onto the dowel (Use the structural cord as fixing point)	
	3	Add a secondary dowel in the bottom end of the sample, in the loops of the filler cord	
13	1	Fix five Primary Cord's to the upper frame	
	2	Fix three Filler Cords consecutively inbetween each of the PC's	
	3	Select FC-A and make a Simple noose knot towards the first PC. Place the running end of the second PC through the eye of loop FC-A. Pull the running end of FC-A to dress the knot	
	4	Repeat step 3 using FC-B and the second PC. Ensure that FC-B is ontop of FC-A in the diagonal cross formed by the two filler cords.	
	5	Repeat steps 3 and 4 with the remaining FC's and PC's. Ensure that the FC joining from the left always crosses over the FC joining from the right.	
	6	Repeat steps 3-5 until end of rope is reached	
14	1	Fix sample one to testing frame as when constructed	
	2	Firmly secure bottom end of the sample to the testing frame using structural cords	
	3	Pull on left and right hand sides of the sample holding on to the strucutral cord	
15	1	Fix sample one to testing frame as when constructed	
	2	Firmly secure bottom end of the sample to the testing frame using structural cords	
	3	Grip structural cord in the middle of the sample and pull towards self	

TEST NR	STEP	DESCRIPTION	PHOTO
16		The process is similar to the construction process followed to construct sample 13. Here the spacing between filler cord and structural cord is double.	
	1	Fix three Primary Cord's to the upper frame	
	2	Fix three Filler Cords consecutively inbetween each of the PC's	
	3	Select FC-A and make a Simple noose knot towards the first PC. Place the running end of the second PC through the eye of loop FC-A. Pull the running end of FC-A to dress the knot	
	4	Repeat step 3 using FC-B and the second PC. Ensure that FC-B is ontop of FC-A in the diagonal cross formed by the two filler cords.	
	5	Repeat steps 3 and 4 with the remaining FC's and PC's. Ensure that the FC joining from the left always crosses over the FC joining from the right.	
	6	Repeat steps 3-5 until end of rope is reached	
17	1	Firmly secure bottom end of sample 16 to the testing frame using structural cords	
	2	Pull on left and right hand sides of the sample holding on to the strucutral cord	
18	1	Firmly secure bottom end of the sample to the testing frame using structural cords	
	2	Grip structural cord in the middle of the sample and pull towards self	
19	1	Fix sample one to testing frame as when constructed	
	2	Firmly secure bottom end of the sample to the testing frame using structural cords	
	3	Take hold of all four corners of textile sample two and pull away from each anchor point	
20	1	Fix five Primary Cords to carabiner within upper frame. Fix to carabiner using Cow hitch knot.	
	2	Fix five Filler Cords to side of frame. Select the uppermost FC and make a Simple noose knot towards the firts PC. Feed the PC through the eye of the loop of the FC. Pull the running end of FC to dress the knot	
	3	Repeat step 2 with the same FC and remaining PC's	
	4	Repeat step 2 and 3 with the remaining FC's and PC's	
	5	Dress the knots	
21	1	Firmly secure bottom end of sample 16 to the testing frame using structural cords	
	2	Pull on left and right hand sides of the sample holding on to the strucutral cord	
22	1	Firmly secure bottom end of sample 16 to the testing frame using structural cords	
	2	Grip structural cord in the middle of the sample and pull towards self	

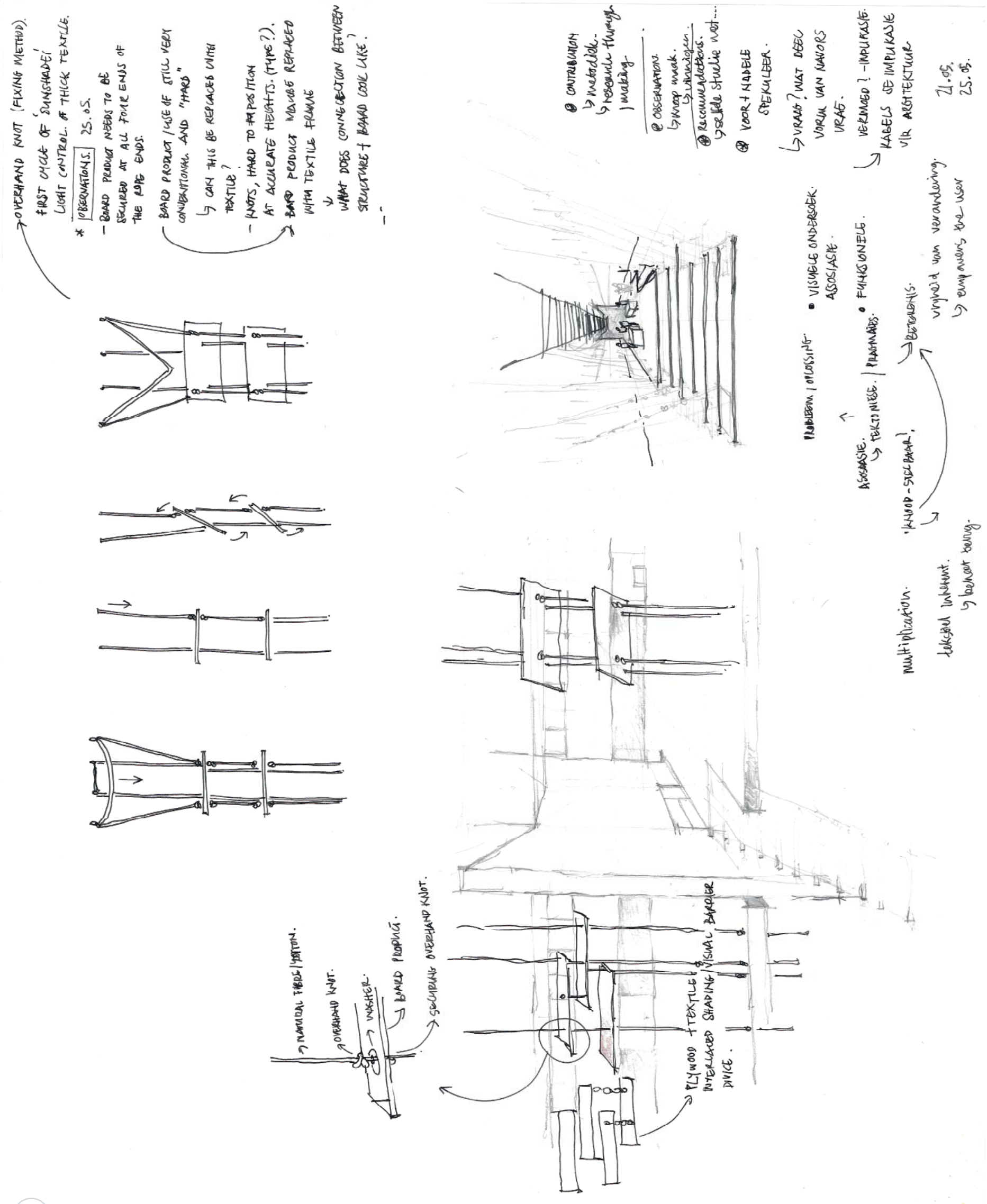
Term	Key
Primary cord	Pr
Secondary cord	Se
Structural cord	SC
Filler cord	FC
Resultant V	V
Cord type set	CTS
Sampe unit	U
Anchor point	AP
Facing side	FS
Backing side	BS

TERMS:

CORD TYPE SET: Any collection of cords within one sample that are of the same material
PRIMARY CORD: The main carrying cord in any cord type set
SECONDARY CORD: The cord secondary to the primary cord in any cord type set
STRUCTURAL CORD: Any cords forming the structure or carrying the weight of any filler cord, cord type set.
FILLER CORD: Any cords forming the infill or body of a sample and is fixed by means of knotting to any structural cord, cord type set. The Filler cord does not carry the weight of the sample unit
ANCHOR POINT: Any point or fixing place to which a textile can be fixed using various configurations of rigging hardware
FACING SIDE: Facing side is the side of the sample unit that you see while knotting.
BACKING SIDE: Backing side is the side of the sample unit that faces away from you while knotting.

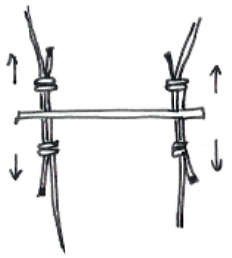
appendix C

Raw data



(2).

CHANGED KNOT TO DOUBLE FISHERMANS KNOT.



OBSERVATIONS. (3)

- IN ORDER TO PUSH KNOTS TOGETHER TO SECURE BOARD PRODUCT, USE DOUBLE FISHERMAN KNOTS, THIS IS SUCCESFULL FOR THE FIRST LAYER, BUT DOESN'T WORK IF USING THE SAME ROPE FOR THE SECOND LAYER.
- ↳ THUS, SECOND LAYER NEEDS 3rd PIECE OF LOOSE ROPE.
- RUNNING END OF ADDITIONAL ROPE STICKS OUT PAST THE ~~KNOT~~ KNOT BUTT END.
- WHAT WILL THE EFFECT ON THE KNOTS BE IF PRESSURE IS APPLIED TO THE BOARD?
- BOARD PRODUCT CAN BE ACCURATELY POSITIONED ON THE ROPE.

↓

- WHEN ADDING THIRD ROPE, KNOTS DO NOT SLIDE CORRECTLY. ONLY TOP LAYER FUNCTIONS CORRECTLY.

→ LOOPING ROPE A THROUGH ROPE B WITH WASHER A BOTTOM STOPPER AND FISHERMAN'S KNOT AS TOP STOPPER.

OBSERVATIONS:

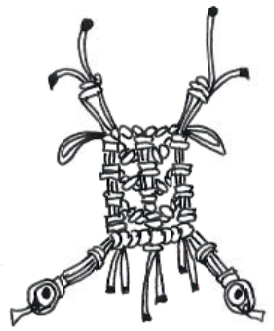
- KNOT PUSHES SECURELY AGAINST THE TOP SIDE OF THE BOARD.
- SECOND LAYER, TO FIX, BECOMES PROBLEMATIC WITH 2 ROPE ENDS. (2)

→ LOOP 2 ROPE ENDS THROUGH WASHER AND HOLES IN BOARD PRODUCT

OBSERVATIONS:

- NO TENSION, NOT SECURE, NOT EVEN
- NOT STRONG

(1)

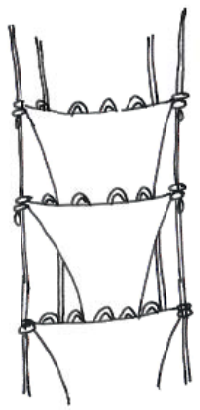


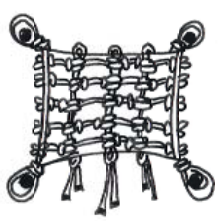
(4) → SAMPLE ONE KNOT AND FIXING POINT ELONGATED

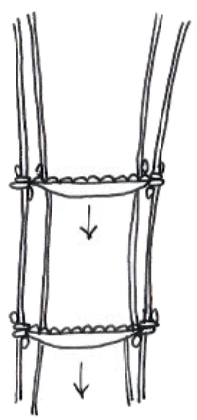
SEE (3). (5)

CURRENTLY LOOSE ENDS VISIBLE ON SAMPLE PIECE ARE HANGING EXPOSED.

↳ DESIGN / ITERATE SAMPLE TO 'HIDE' ~~TO~~ RUNNING ENDS OF ROPE.







(5)

- ALSO, TEXTILE STRUCTURE/SPACE DEFINING ELEMENT NOT AESTHETICALLY PLEASING. [EXAGERATE SAGGING].

TEXTILE SAMPLE TOO THICK AND HEAVY.

↓

THUS A NEED FOR A LIGHTEER TEXTILE.

(5) OBSERVATIONS:

- SPANNING TEXTILE 2 BETWEEN TENSILE STRUCTURE RESULTS IN SAMPLE "SAGGING" TOWARDS THE CENTRE (LOOKS LIKE A HAMMOCK)
- MOVING STRUCTURAL FIXINGS DOES NOT SOLVE THIS PROBLEM. AS PRIMARY CORDS RUN FROM LEFT TO RIGHT ? NOT FROM FRONT TO BACK, ANOTHER CAUSE COULD BE THAT STRUCTURE ROPES ARE NOT PULLED TAUGHT ENOUGH RESULTING IN SAGGING.

OVERALL OBSERVATION:

- SIZE OF FLAT TEXTILE SAMPLE DETERMINES POSITION OF ANCHOR POINTS ON FLOOR/MEZANINE.

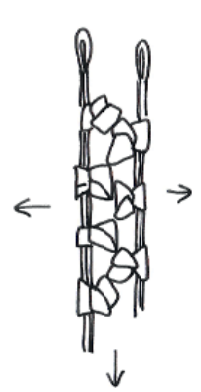
FISHERMANS KNOT + OVERHAND LOOP KNOT.

→ FIX 'FLAT' THICK TEXTILE (SAMPLE 1) BETWEEN 4 (DOWN) ROPES.

→ THIS FLAT TEXTILE THEN REPLACES THE HARD BOARD PRODUCT.

(4). OBSERVATIONS:

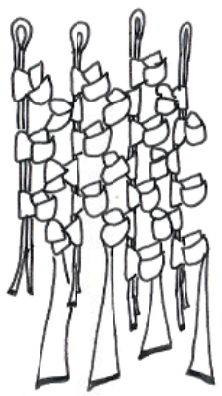
- TYPE OF KNOT USED TO FIX SAMPLE CREATES VERY LONG CONNECTION POINTS. NOT GREAT AESTHETICALLY.
- BOARD IS SIMPLY 'REPLACED' BY FLAT TEXTILE - THUS DOESN'T EXPLOIT CHARACTER OF TEXTILE TO THE FULLEST.
- LOOSE RUNNING ENDS OF SAMPLE UNEAT.
- —27.05.
- —25.05.
- —26.05.



→ TO MAKE RIND. SEE ⑥.

- OVERHAND LOOP KNOT FOR THICK TEXTILE SAMPLE.
- ONE SEGMENT CAN BE REPEATED TO FORM ENDLES WIDTH + HEIGHT FOR SAMPLE.

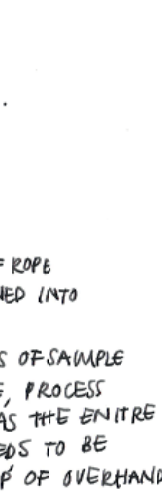
(DRAWING OF KNOTTINGPACE).

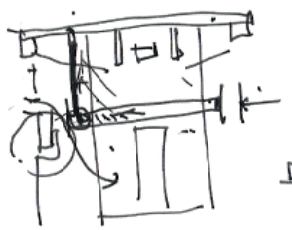


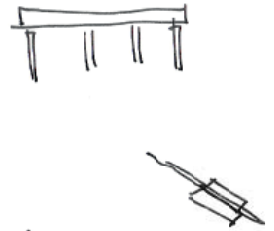
* OBSERVATIONS:

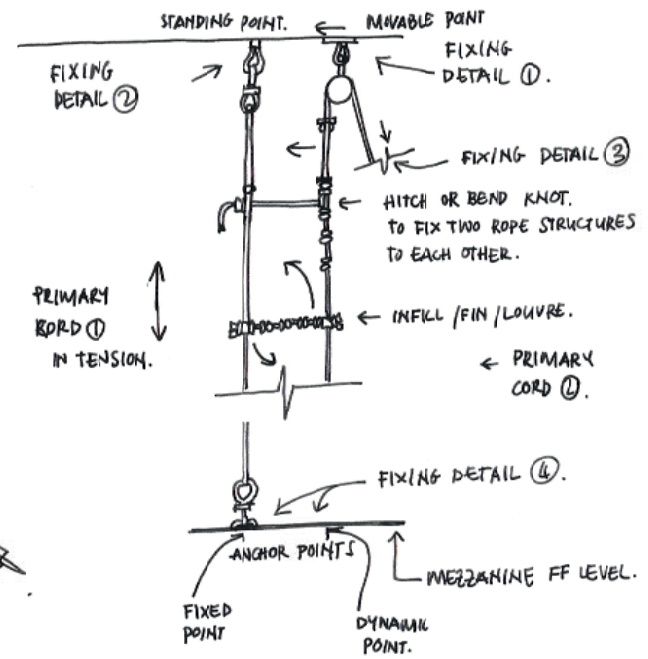
- RUNNING ENDS OF ROPE NEED TO BE DESIGNED INTO KNOTTING PROCESS.
- WHEN LONG PIECES OF SAMPLE NEED TO BE MADE, PROCESS WILL BE TEDIOUS AS THE ENTIRE RUNNING END NEEDS TO BE FED THROUGH 'LOOP' OF OVERHAND LOOP KNOT.
- PRIMARY CORD LENGTH TO BE DETERMINED BEFORE MAKING PROCESS, FILLER CORD CAN SIMPLY BE ADDED ONTO THE END BY STITCHING IT ON.
- TEXTILE COULD POTENTIALLY BECOME VERY HEAVY.
- TEXTILE STILL VERY 'FLAT'!
- HEAVY = 'WEIGHTY' TEXTILE PANEL.

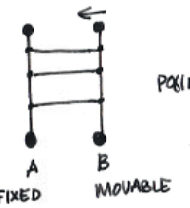
DESIGN NEED FOR LIGHTER TEXTILE SAMPLE MAYBE USE OF LIGHTER INFILL MATERIAL. OR. THE LOUVRE SYSTEM IS A DESIGN SUGGESTION FOR THE SEMI-PRIVATE SPACE THUS CAN BE LESS DENSE.



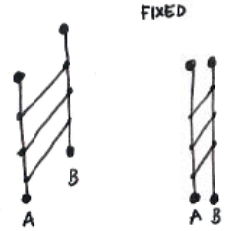






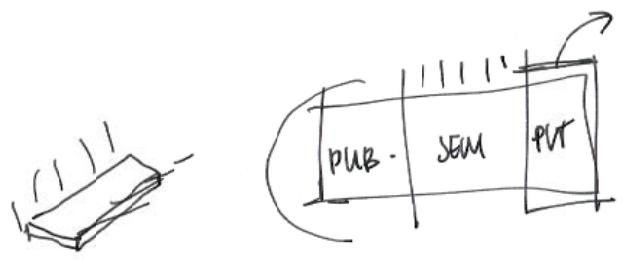


POSITION ① OPEN

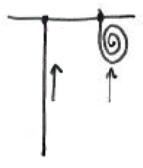


POSITION ② CLOSED

een kan nie sonder ander nie.
'FACILITATE'.



WAT WIL TEKSTIELE DOEN?
TYDBLIK.



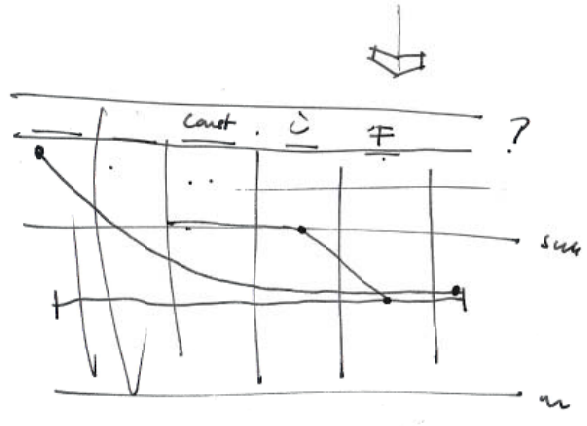
EKOLOGIESE VOORDEEL?

KOMPOSISIE.
INVLOED
IMPAK.
KONSTRUKSIE.

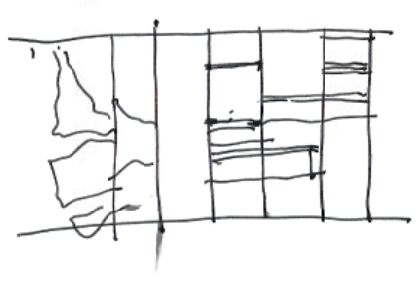
WAT JY SIEN. } ASSOSIASIES. → BETEKNIS.

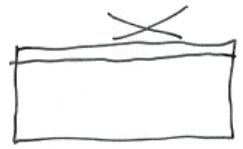
HARD. SAG.

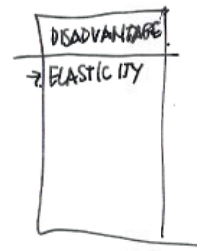
HOEKOM?
WAT HET EK BEREIK.
VOORDELE.
RIGIDITY.
↳ BYVOEG.



METAPHYSICAL.







28-05.
27-05.

* CONCLUSION AFTER TEST (5).

RESULTS IN ~~TOW~~ TWO ~~BRE~~ BRANCHES OR CYCLES.

(A) DESIGN A 'LIGHTER' (WEIGHT) TEXTILE. → ~~LESS~~ DENSE 'MORE OPEN' → THINNER TEXTILE/ROPE.

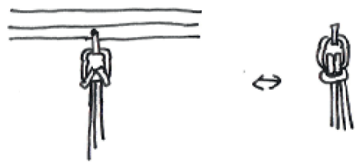
(B) DESIGN A MORE RIGID TEXTILE.

↓

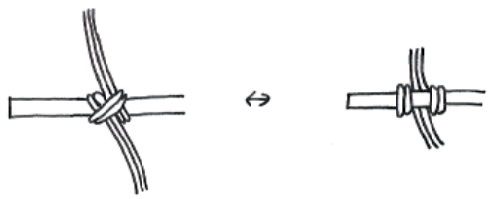
TEST (6). (B) RE-INVESTIGATING RIGIDITY. → MAGNETS, WIRE, TIMBER, STEEL. } FRAME, SUPPORT, FIXINGS, LOOPS

EXTRA - USE OF TIMBER DOWEL (19MM X 910MM. AS 'STRUCTURE' TO ENHANCE TEXTILE FORM:

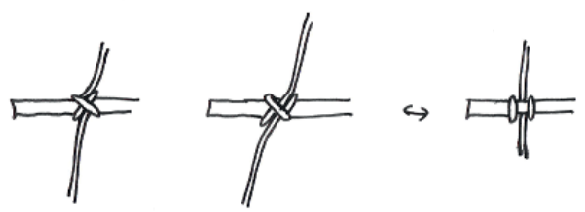
FIXING ROPE TO FRAME. [LARKS HEAD / COW HITCH]

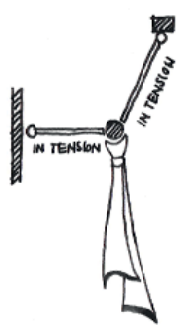


FIXING ROPE TO DOWEL. [CLOVE HITCH [DOUBLE] CORD

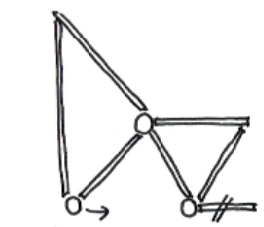


FIXING SINGLE ROPE

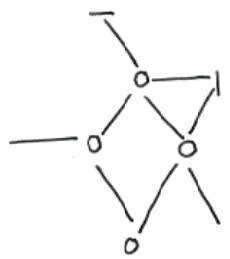




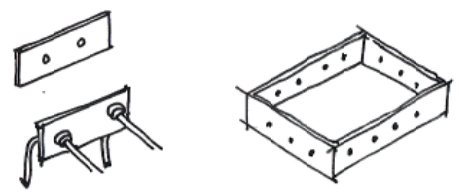
DOWEL AT REST.



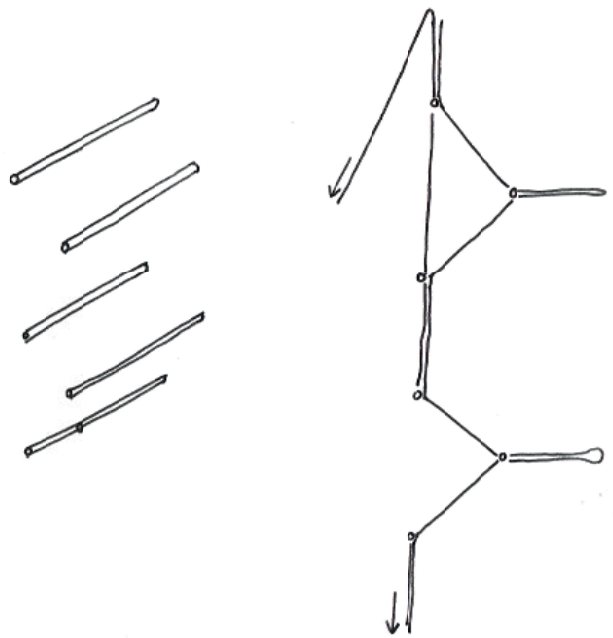
NOT AT REST.



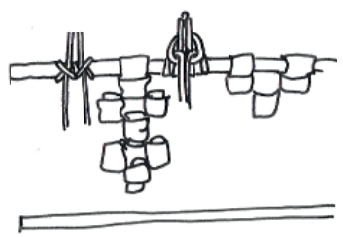
* POTENTIAL INCORPORATE FRAME



* POTENTIAL RIGID STRUCTURE.



(6) CONTINUED.



→ DRAWING OF KNOTTING BACK.

→ FIX DOWEL THROUGH TEXTILE SAMPLE.

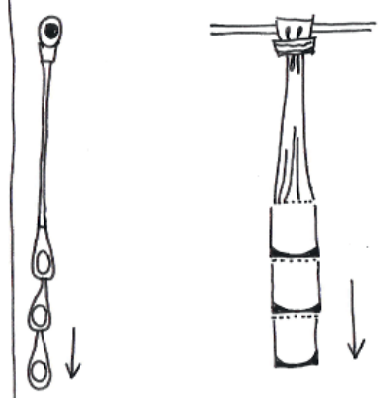
→ TEXTILE PC RUN PARALLEL TO DOWEL.

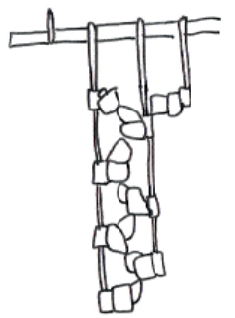
OBSERVATIONS.

- TEXTILE IS STRETCHED EASILY DECREASING IN STRUCTURAL INTEGRITY WITH EACH PULL.
- DOWELS FLATTEN OUT THE TEXTILE SAMPLE MAKING IT MORE RIGID.
- DOWEL MIGHT NEED TO RUN THROUGH, CROSSING THE PC AT A RIGHT ANGLE.

→ BUT WHEN PULLING DOWELS AWAY FROM EACH OTHER, SAMPLE BECOMES FLAT HORIZONTAL ELEMENT.
BUT BECAUSE PC HORIZONTAL WITH DOWEL SAMPLE STRETCHES. (WOULD EVENTUALLY COME APART).

* WEIGHTED TEXTILE.





- LOOP DOWEL THROUGH OPEN ENDS OF TEXTILE SAMPLE.

OBSERVATIONS.

- TEXTILE SAMPLE OBVIOUSLY 'LONG'
- WHEN PULLING AT BOTH ENDS OF SAMPLE (WHERE FIXED TO DOWELS) SAMPLE STRETCHES OUT INTO FLAT HORIZONTAL PLANE/ELEMENT.
- SAGGING IN TEXTILE IS REDUCED.
- SAMPLE MUCH MORE STURDY WITH PC ASSISTANCE.
- KNOT USED FOR FIXING NOT BEST SELECTION, FIX WITH DIF. KNOT.
- LOOPS OF SAMPLE OBVIOUSLY NOT MOST SECURE WAY OF FIXING TOP PART OF SAMPLE,

↓

- FINISH: ENDS OF SAMPLE IN PREPARAT. TO BE FIXED TO OTHER ITEMS.

29-05.
31-05.

SPATIAL,
THREE DIMENSIONAL
ELEMENT THAT DEFINES SPATIAL ZONES. → GO BACK TO CHING
EXPLOITING THE CHARACTER OF TEXTILES
↳ HORISONTAL + VERTICAL PLANES.
} CAN TEXTILES FORM PLANES THAT COMBINE THESE?
} 3-DIMENSIONAL SPACE DEFINING ELEMENTS.

SYLVIE KRUGER

A SPACE CAN BE DEFINED BY A SIMPLE VERTICAL / HORISONTAL PLANE

THERE IS NOTHING WRONG WITH YOUR TELEVISION SET. DO NOT ATTEMPT TO ADJUST THE PICTURE. WE ARE CONTROLLING TRANSMISSION. IF WE WISH TO MAKE IT LOUDER, WE WILL BRING UP THE VOLUME. IF WE WISH TO MAKE IT SOFTER, WE WILL TUNE IT TO A WHISPER. WE WILL CONTROL THE HORIZONT. WE WILL CONTROL THE VERTICAL. WE CAN ROLL THE IMAGE, MAKE IT FLUTTER. WE CAN CHANGE THE FOCUS TO A SOFT BLUR OR SHARPEN IT TO CRYSTAL CLARITY FOR THE NEXT HOUR. SIT QUIETLY AND WE WILL CONTROL ALL THAT YOU SEE AND HEAR. WE REPEAT: THERE IS NOTHING WRONG WITH YOUR TELEVISION SET. YOU ARE ABOUT TO PARTICIPATE IN A GREAT ADVENTURE. YOU ARE ABOUT TO EXPERIENCE THE AWE AND MYSTERY WHICH REACHES FROM THE INNER MIND TO THE OUTER LIMITS.

– THE OUTER LIMITS, 1963.

TU. TE.
PCS PCS PCS
PCM PCM PCM

STRAND IN A PLANE

BUT NOT A SINGLE DIMENSIONAL FIELD.

TEXTILE IN A SINGLE VERTICAL PLANE.

IF STRAND MOVED, SECOND DIMENSION CAN BE CREATED.
MORE STRAND OUT OF THIS PLANE, THEN THE ONLY LIMITATION IS THE MIND + THE LENGTH OF THE ROPE.

'THE QUESTION OF WHAT KNOT IS BEST FOR A PARTICULAR NEED IS PERHAPS THE MOST IMPORTANT OF ALL TO BE CONSIDERED.'
ASHLEY 1944:8.

(SUFFICIENT)
• PLANAR IRREGULARITIES/ INTERRUPTIONS. [ON TU + TE LEVELS.]

FC
FC
NFC
FC
FC.
PC.

RIGID ELEMENT?

A TEXTILE IS NEVER SIMPLY A FLAT PLANE LIMITED TO ~~ONE~~ A SINGLE DIMENSIONAL FIELD.

• SPAN / STRETCH
• TEMPORALITY
• COVER / DRAPE
• CONTAIN — HARD FORMS — SOFT FORMLES.

• THUS COULD ONE SAY, THAT DUE TO THE TEMPORAL NATURE OF TEXTILES, THAT IF THE TEXTILE 'ELEMENT / OBJECT' IS REMOVED FROM THE SPACE, THE THE SPATIAL ZONE CANNOT CONTINUE TO EXIST.
• IN THIS WAY THE TEXTILE IS NOT SIMPLY ADDITIVE / SECONDARY BUT FORMS THE PRIMARY CONTRIBUTOR TO THE FORMATION OF THAT SPATIAL ZONE.

IT COMPLETELY CHANGES / REDUCES THE NATURE OF THE CREATED SPATIAL ZONES TO REMOVE THE TEXTILE ELEMENT.

DIE VRAAG IS NIE: KAN 'N ANDER MATERIAAL DIESELFDE FUNKSIE DIEN NIE (WANT IN WERKLIKHEID IS ENIGE IETS 'N NOONTREKLIKHEID). DIE VRAAG IS, WAT WORD VAN DIE RUIMTE AS TEKSTIEL ELEMENT VERWYDER WORD. KAN DIE RUIMTE VOORTBLEEF SONDER DIE ELEMENT??

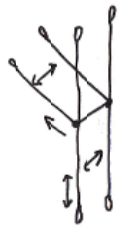
PERHAPS, ANOTHER MATERIAL COULD PERFORM THE SAME UTILITY FUNCTION BUT, CAN IT PERFORM THE SAME AESTHETIC FUNCTIONS?
(THESE 2 ASPECTS TOGETHER MAKES TEXTILES UNIQUE).

PC.
FC CAN BE DESIGNED TO FORM PATTERN + COLOUR COMBINATIONS.
NOT SIMPLY HAPTIC, BUT PATTERN PLAYS A ROLE IN THE UNDERSTANDING OF DESIGN.

① ② ③

03_06

(14) * PLANAR IRREGULARITIES WITHIN TEXTILE UNIT.

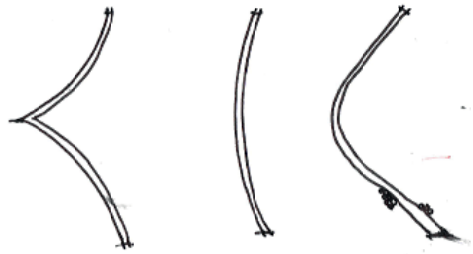


OBSERVATIONS.

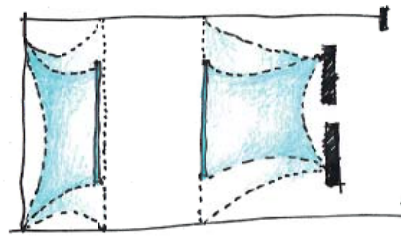
- WHEN EXERTING A FORCE ON VERTICAL ELEMENT, STRUCTURAL INTEGRITY IS DECREASED.
- UNIT WILL NOT BE STRUCTURALLY ADEQUATE WITHOUT RIGID REINFORCING. THE ROPE RUNNING FROM THE TOP TO THE BOTTOM
  ↳ SO 2: ADD RIGID ELEMENT TO THE UNIT.
  OR
- CAN THE FC BE USED TO CREATE PLANAR IRREGULARITIES RATHER THAN THE FC'S.?
  OR.
- CAN UNITS BE USED TO CREATE ELEMENTS WITH PLANAR IRREGULARITIES. OR WILL THE SAME PROBLEM OCCUR?

(14) EXISTING TEXTILE UNITS.
* PLANAR IRREGULARITIES.

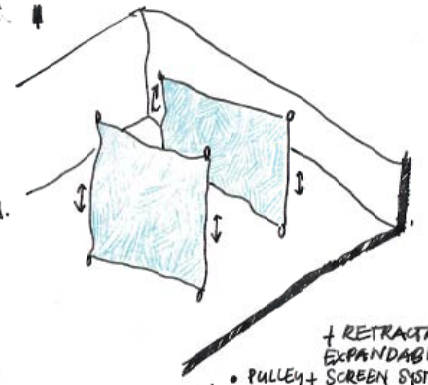
(SAMPLE 2).
EXISTING PLANE.

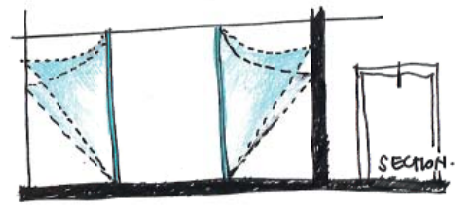


- KEYWORDS
- RETRACT, RECEDE
- EXPAND
- STRETCH
- DRAW IN
- COMPRESS



PLAN.

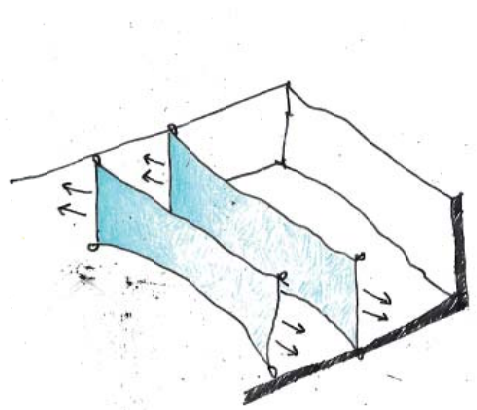


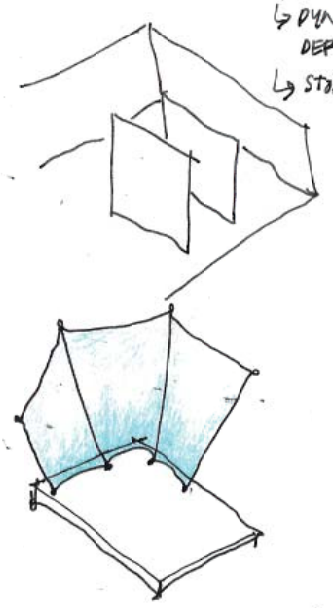


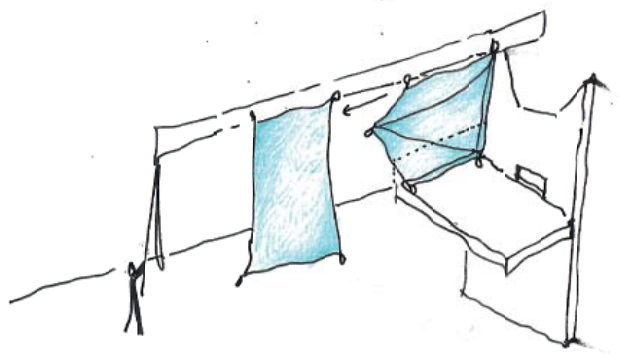
SECTION.

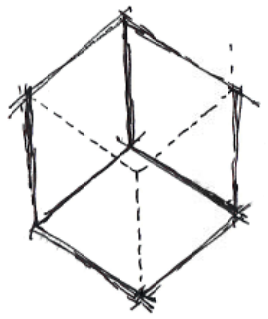
+ RETRACTABLE. EXPANDABLE
- PULLEY + SCREEN SYSTEM.
- COLOUR COORDINATED HOOKS + ANCHOR POINTS

RETRACTABLE + EXPANDABLE SCREEN AND PULLEY SYSTEM
↳ DYNAMIC SPATIAL DEFINITION.
↳ STORAGE.









FIXING OF TEXTILE ELEMENT PRIMARY CORD.

⊛ INVESTIGATION BETWEEN TEST 13 + 14.

07-06
04-06

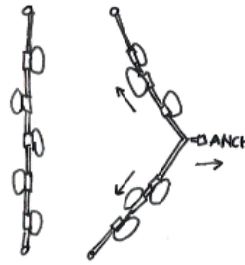
- GEBRUIKSFUNKSIE - ASSOCIATION
  VS.

REALISE THE POTENTIAL.

ONTGIN.

TEST 15

* EXISTING TEXTILE SAMPLE 2.



P FILLER CORD + PC PARALLEL.
→ PLANAR IRREGULARITIES.

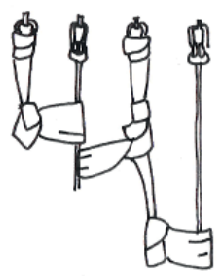
→

OBSERVATIONS:

- WHEN PULLING ON PC (3) CENTER THE TEXTILE FORMS A ROUNDED SHAPE (CONVEX).
- FILLER CORD COMPRESSES TOWARD EACH OTHER FORMING AN OPENING AT THE ANCHOR POINT.
- PRIMARY CORD (3) SLIDES THROUGH LOOPS IN FC.
- WHEN RELEASING PC (3) TEXTILE SAMPLE APPEARS UNEVEN.
  ↳ FORCE NEEDS TO BE APPLIED ON PULLING PC(3) DOWN TO CORRECT SAMPLE PATTERN.

- PC THAT ASSISTS WITH PLANAR IRREGULARITY NEEDS TO BE LONGER THAN OTHER PC'S.
- PC NEEDS TO BE WEIGHTED OR FIXED TO A PULLEY SYSTEM IN ORDER TO RETURN TO PREVIOUS FORM.

TEST 16

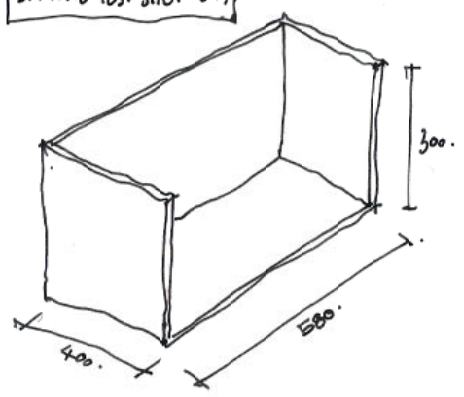


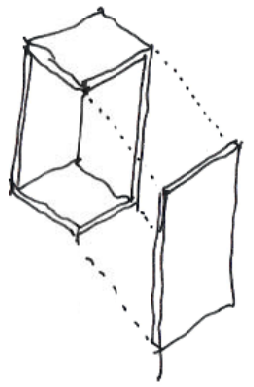
→ ELONGATED NOOSE KNOT.
→ TIE THE KNOT LOOSER THAN SAMPLE 2.

* OBSERVATIONS

- WHEN PULLING ON PC CENTER A LARGE WHOLE IS FORMED AT THE POINT OF PULL.
→ KNOTS SLIDE EASILY ON PC BUT DOES NOT LOOK GOOD, AND IS NOT STRONG.
→ TEXTILE APPEARS VERY LOOSE + FRAGILE.

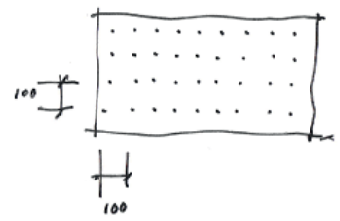
→ SITE 2.
SPATIAL TEST SITE. (BOX)



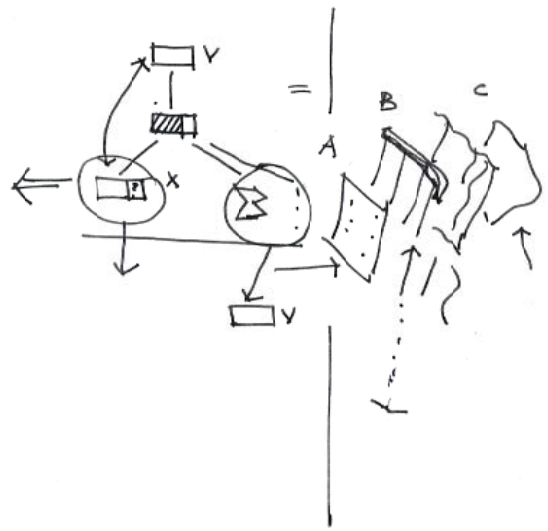


PANEL WITH HINGE + CLIP IN ORDER TO ENCLOSE 'CUBE'

GRID WITH HOLES FOR FIXING.



EVEN SPACING, CORRELATION BETWEEN BASE + SIDE PANELS. IN ORDER TO ENSURE FIXING SPACE THAT CORRESPONDS.

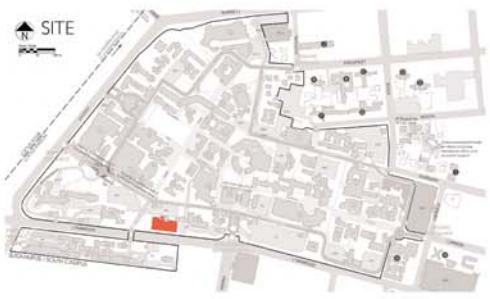


08_06.

appendix D

Initial design charrette

TEXTILE SPACE MAKING AND THE ISSUE OF DECORATION:
a digital presentation lounge for boukunde



THEORETICAL ISSUE

Within the discipline of interior design, the act of decoration is more often than not observed as inferior and superfluous. The dissertation investigates how designing with textiles (alternative construction and design) could challenge the negative associations that interior designers have with the act of decorating. It aims to create decoration with aesthetic and use functions. In so doing, emphasizing the importance of decoration within interior design, to celebrate the differences between architecture and interior design. This aims to diminish the interior design's inferiority complex.

REAL WORLD ISSUE

Within the department of Architecture, Interior architecture and Landscape architecture at the University of Pretoria, much emphasis is placed on environmentally sustainable design. Although these principles are often present in the final design product, it is not reflected in the manner of presentation, as this is still largely paper-based. Currently digital presentations are structured in a more formal manner, typically in locations such as lecture halls, whereas paper-based presentations and critiques usually take on a more organic structure.

It is proposed that a digital presentation space be created for the department of Architecture, within the main atrium of the Boukunde building. This location within the building allows for the organic structure present in paper-based presentation.

PROPOSED INTERVENTION

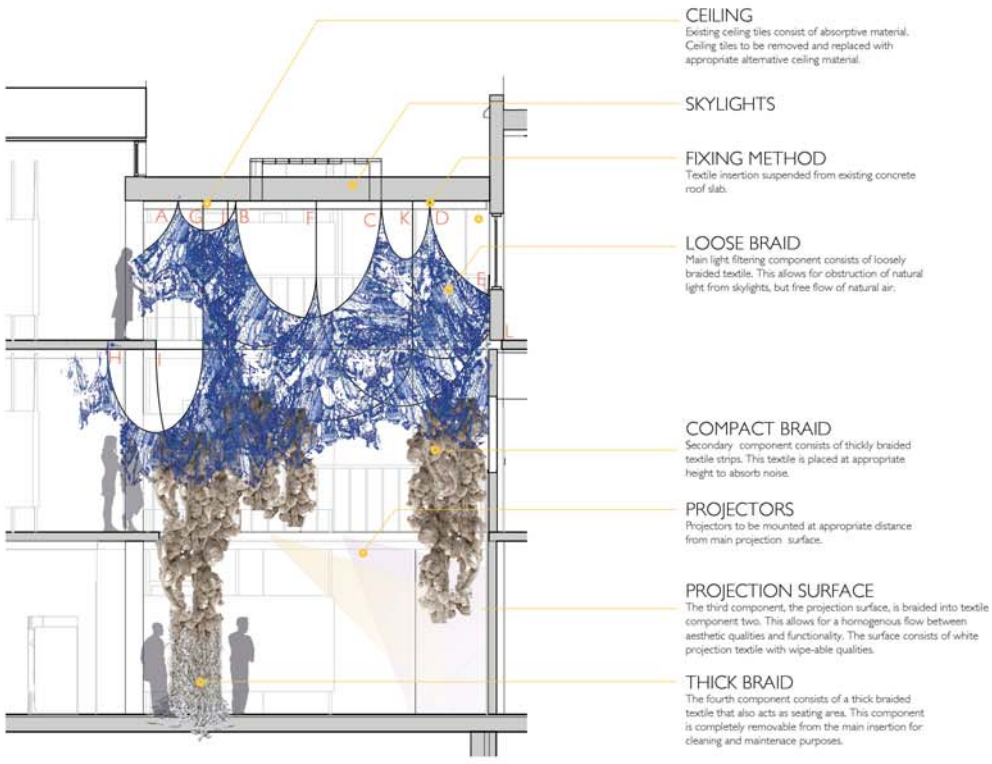
The proposed intervention consist of a series of textile components that create the digital lounge. The word lounge in the title signifies the organic nature of the presentation space, as apposed to the structured nature of conventional lecture halls.

Each layer of textile component is composed in a unique way and ensures textural quality as well as functionality and an aesthetically appealing environment. Each textile component, as in the list, is indicated on the section below.

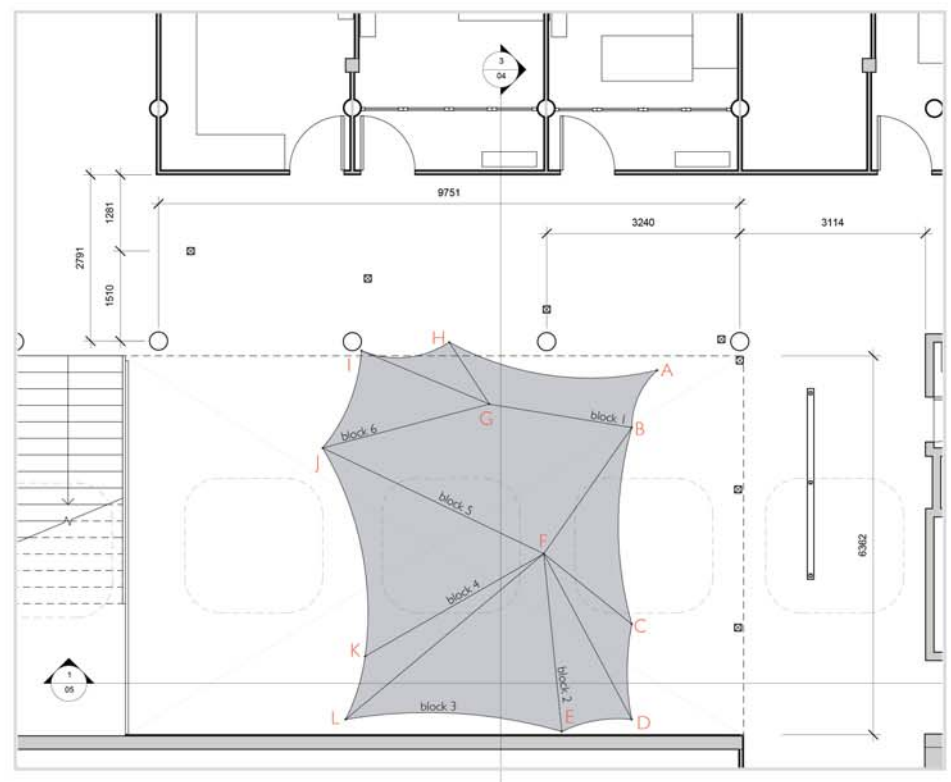
Textile components:
1. Loose braid
2. Compact braid
3. Projection surface
4. Thick braid

CONCEPTUAL APPROACH

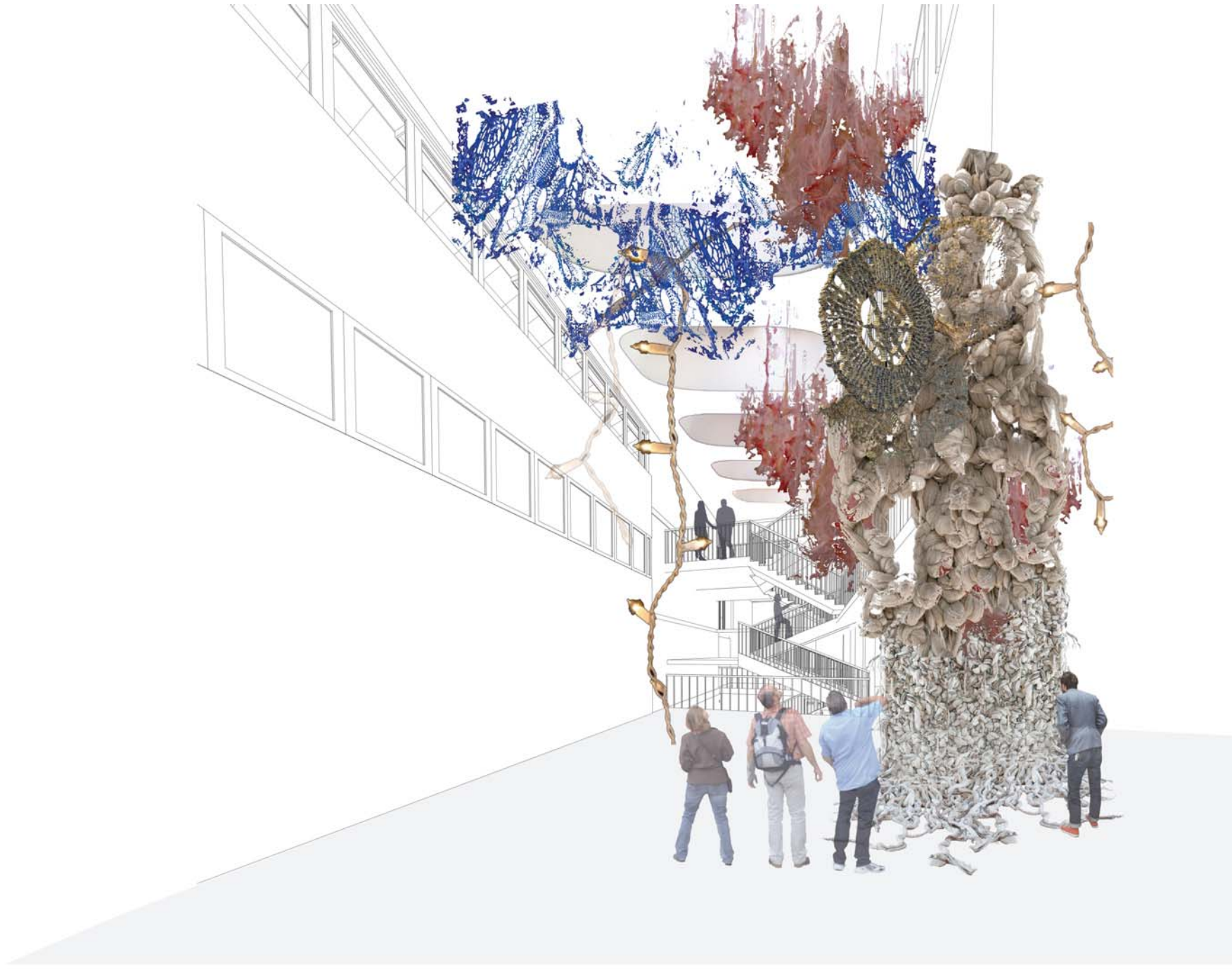
The proposed design incorporates ideas such as the traditional versus the alternative. These elements are found within the design in the following ways:

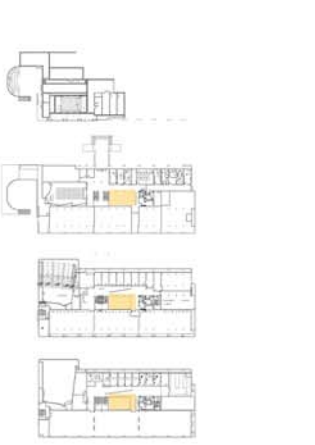


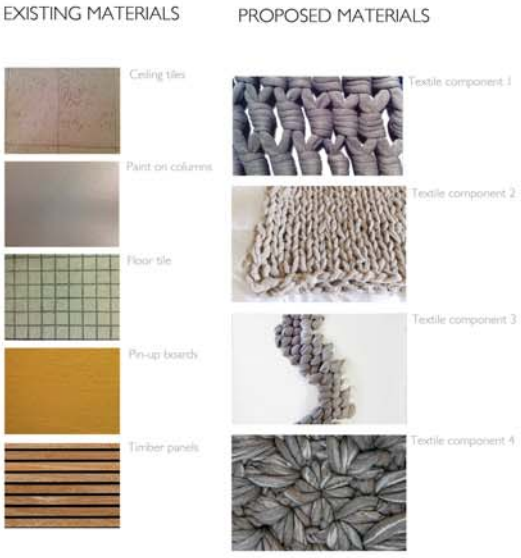
SECTION SCALE 1:50
Section indicating placement and scale of textile intervention. Points A-L indicate fixing points.

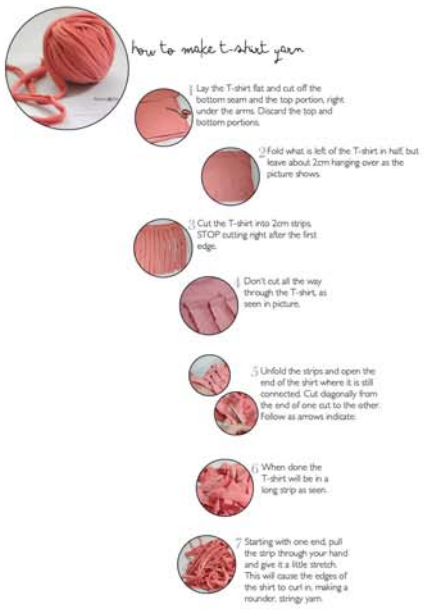


PLAN SCALE 1:50
Layout plan indicating placement and scale of textile intervention. Points A-L indicate fixing points.

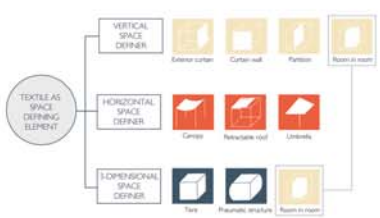








THEORETICAL APPROACH

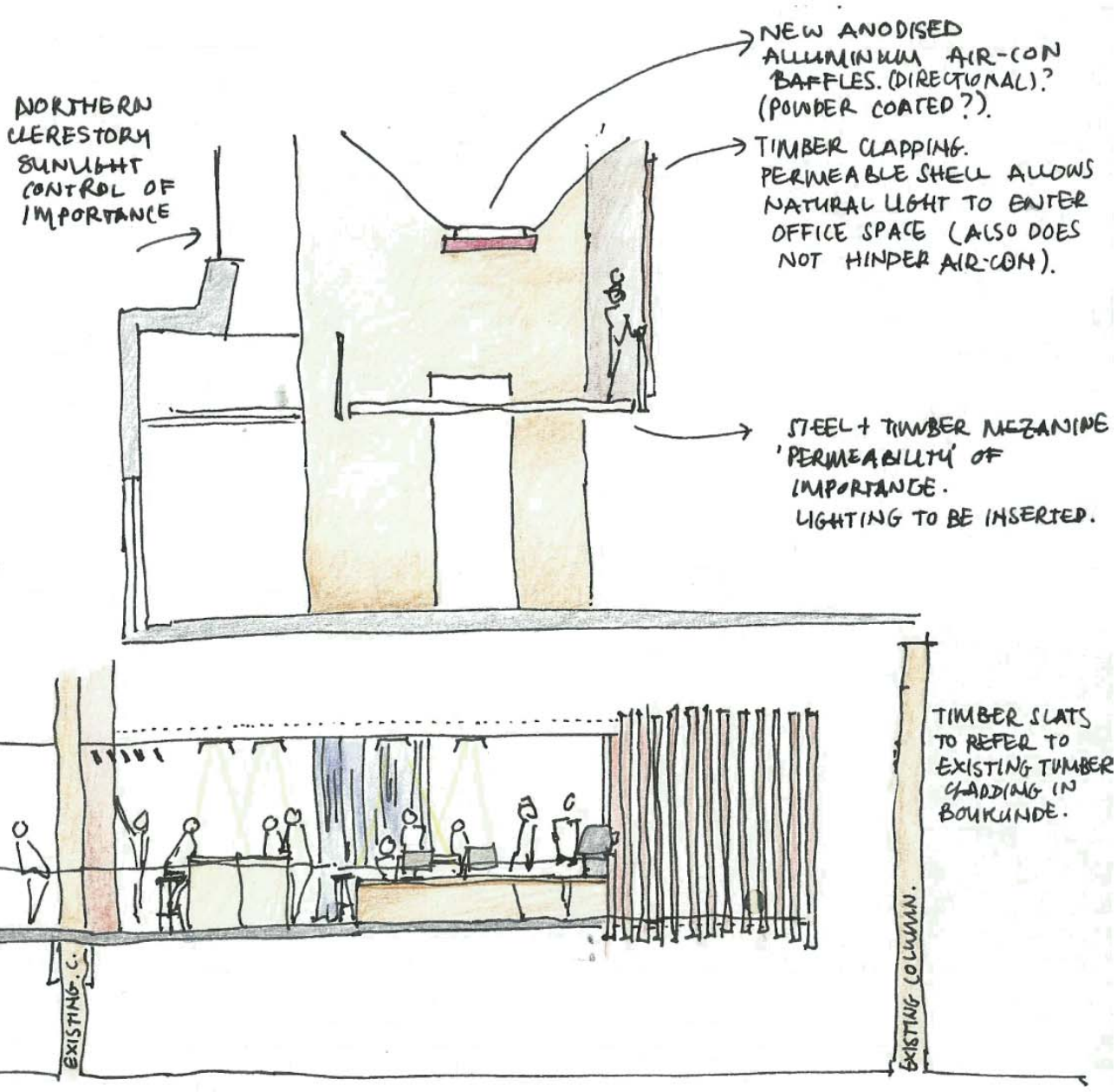


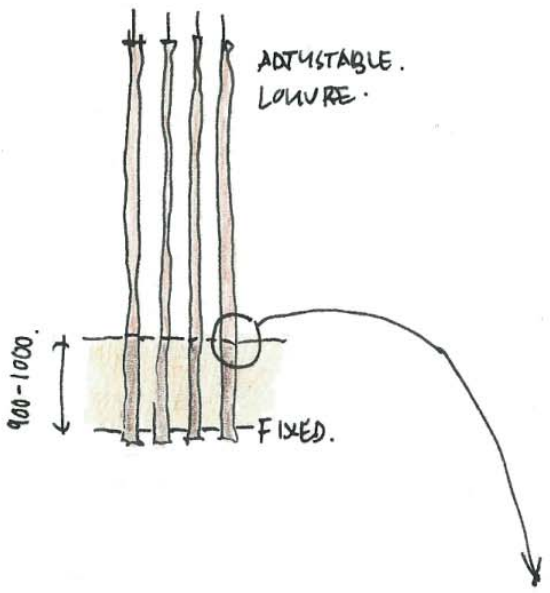
appendix E

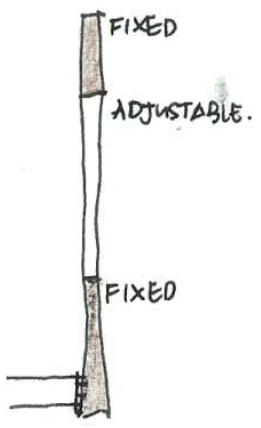
Design charrette

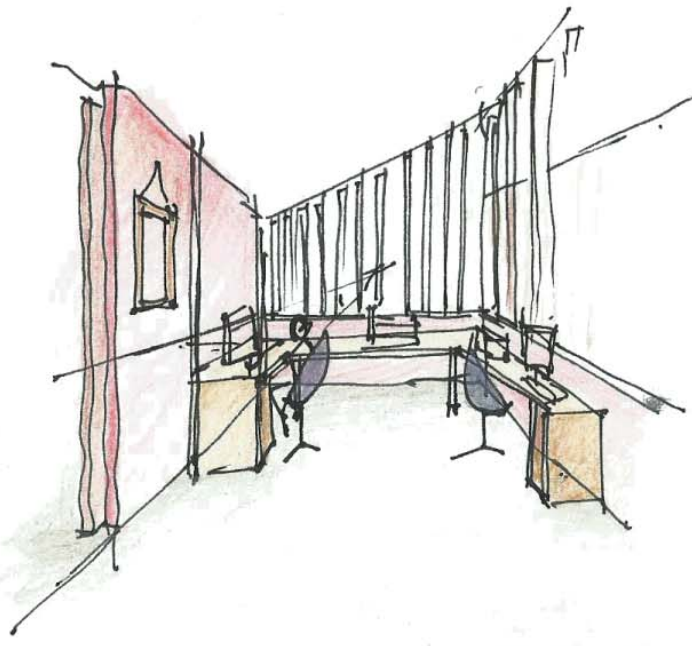
NOTES:

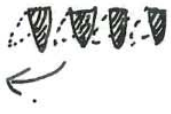
- 'ANALYSIS' OF EXISTING BOUKUNDE MATERIALS/ COLOUR PALETTE.
- SUGGESTIONS FOR PAINTING OF COLUMNS.
- PROMINENT/ICONIC ELEMENTS PRESENT WITHIN BOUKUNDE?
- REQUIRED LUX LEVEL FOR STUDIO?

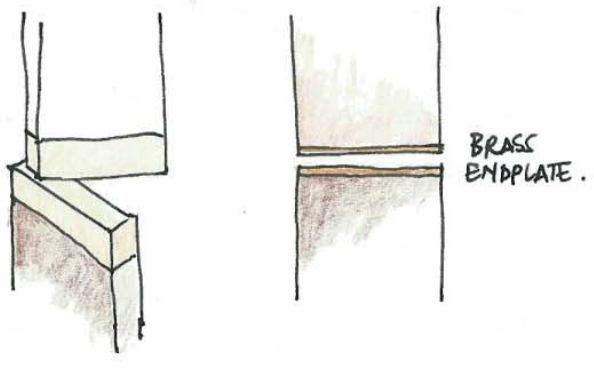


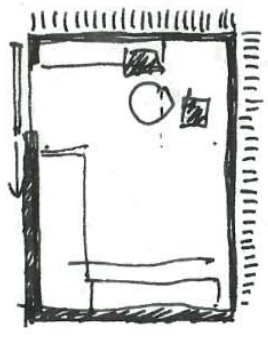












“We are the Borg. Lower your shields and surrender your ships. We will add your biological and technological distinctiveness to our own. Your culture will adapt to service us.
Resistance is futile.”

Star trek – First contact (1996)