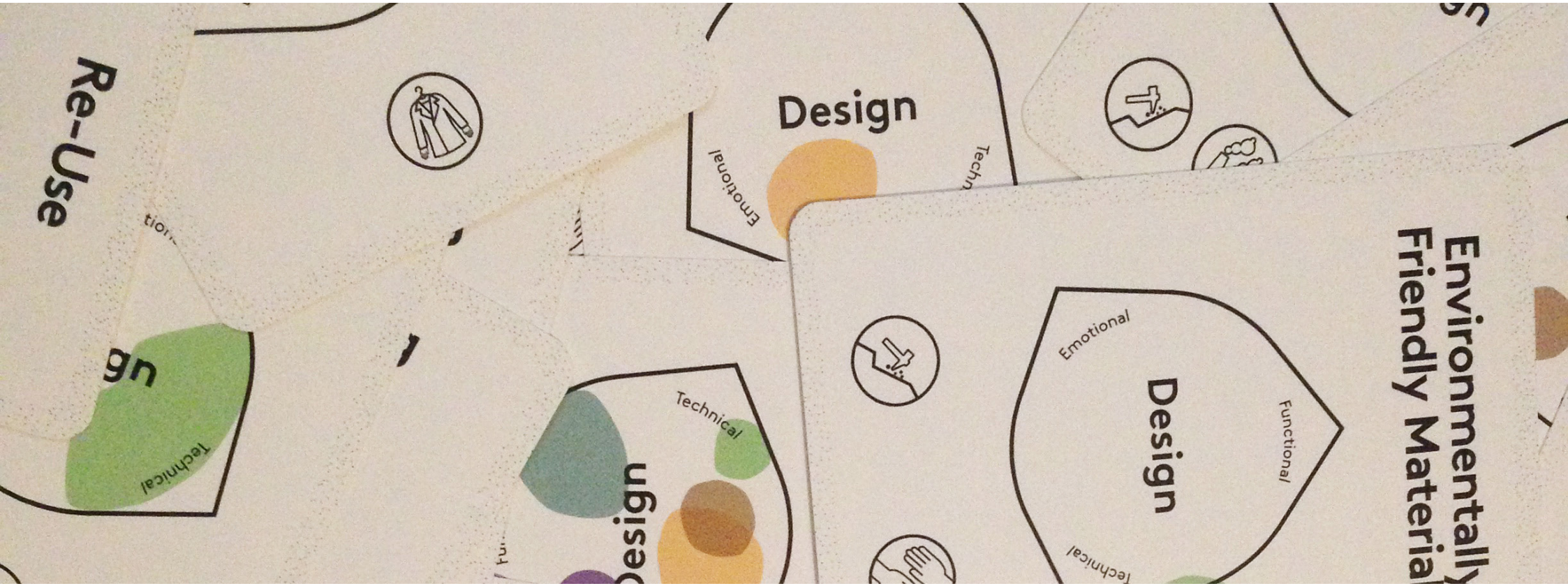
Contextualizing sustainable textile product design
- using Sustainable Design Cards and Material Pathways



Open educational resource developed by:

design school kolding

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Introduction

This resource considers ways to actively engage with sustainability in the context of design using the card decks Sustainable Design Cards and Material Pathways. While the specific content of the cards will be described in the section 'Sustainable Design Cards and Material Pathways', the outset of the development of the resources was a need to strengthen discussion on:

- What sustainability is or can be (?)
- How sustainability can be approached (?)

This points towards creating awareness for and among multifarious actors, in academia, industry and in politics, to whom this is core and offering a joint framework for discussing issues of the impact but also potentials of design in relation to this. In the context of DESTEX, here this will be in the framing of textile product design.

The purpose of the following OER is to introduce a learning tool developed to inform on and activate approaches to sustainable design. In the OER, participants use the Sustainable Design Cards and Material Pathways to unfold potentials and challenges in existing business models. The output, in addition to knowledge on a concrete tool, is building awareness, reflection and critical faculty on the topic.

Structure of the OER

- Goals and learning outcomes
- Background
- Activities
- Template

Keywords
Sustainable Textile Product Design, Design Cards, Design for Sustainability

Goals

The OER aims to develop students' ability to navigate in the intersecting fields of design and sustainability based on looking into one or more existing businesses.
This aims to prepare students' ability to use sustainability as a guideline and framing when working on projects and developing their own design and sustainability concepts.

Learning outcomes

Based on the above goals, with this OER, students are expected to:

Knowledge

- Obtain knowledge on notions and concepts used within sustainable textile product design, including product lifecycles and product lifetimes
- Obtain knowledge on concrete approaches to sustainable textile product design using the Sustainable Design Cards and Material Pathways

Skills

- Be able to identify a company's approaches to sustainable textile product design
- Be able to map approaches in a product lifecycle

Competences

- Be able to reflect on, discuss and critique a company's efforts within sustainable textile product design
- Be able to propose alternative approaches to a company's business strategy

Background
Design and Sustainability

Considering the impact of a product by means of sustainability is increasingly becoming a fundamental aspect when arguing for or against developing new products but also allowing already existing products on the market. The following will provide a condensation of ways to understand sustainability in design and an introduction to the contents and the structure of the Sustainable Design Cards and Material Pathways.

When we, in design practice and education, discuss and work with design and sustainability, it is fundamental to take a step back and consider what we lean on. The design and sustainability field can therefore be understood as the field created when sustainability and design meet, overlap and interact.
This means when design practice has to adjust to the surrounding societal, economic or political agenda and is what is called 'sustainable design' – design that becomes 'more sustainable'. However it also, and more importantly means, when design tools, methods and ways of thinking can be used to understand, create structures with and of sustainability and operationalise the multiplicity of directions taken in the sustainability discourse.

What is sustainability?
Even though, it is more than 30 years old, the Our Common Future report commissioned by UN is still used to describe the core of Sustainable Development as:

> *"(...) development that meets the needs of the present without compromising the ability of future generations to meet their own needs." [1]*

Nevertheless, combining 'sustainability' – the ability to sustaining – in this case the eco-

[1] United Nations, "Our Common Future - Report of the World Commission on Environment and Development," United Nations World Commission on Environment and Development, 1987.

system, we are all part of, the Earth and 'development' have from the beginning been critiqued. It is possible to have (economic) growth, while still caring for and respecting the limitations of the eco-system?
The definition of Sustainable Development has also been critiqued for being vague and illdefined and questions such as "What are the needs?, "Who decides which needs that are more important?", "How are needs and solutions on these measured?"

In 2015, The United Nations launched The Sustainable Development Goals as a way to concretise and operationalise sustainable development. Since the goals were introduced, they have gained momentum, especially in corporate, organisational and political spheres as a way to enhance, frame and highlight collaboration across scale and field [2]. Nevertheless, the goals that include 17 goals and subgoals have also been criticised for potentially embracing everything and not taking enough into account, how the individual goals and sub-goals influence and interact with each other.

Resources and diversity
If we take a step back and consider, why sustainability is fundamental to consider, multiple interrelated issues related to 'resource over-use' can be identified such as 'climate change' and 'loss of diversity' [3]. These can be further expanded into the nine 'planetary boundaries' proposed by Stockholm Resilience Centre. [4] To acknowledge the human impact on and interference with the planetary boundaries, a doughnut model has been introduced as a way to balance these in an 'environmental ceiling' with a 'social foundation' containing ten social boundaries into what has been called 'a safe and just space for humanity (...) with inclusive and sustainable economic development [5].

[2] United Nations, "Transforming our world: The 2030 agenda for sustainable development," 2015.
[3] K. Richardson, Hvordan kan vi skabe bæredygtig udvikling for alle? Informations Forlag, 2020.
[4] W. Steffen et al., "Planetary boundaries: Guiding human development on a changing planet," Science, vol. 347, no. 6223, p. 1259855, Feb. 2015,
[5] K. Raworth, Doughnut Economics. Chelsea Green Publishing Company, 2017.

This model among others can be used to describe, how sustainable product design is much more than considering environmental issues, that there has long been a tension between technology development versus human involvement [6] and that the latter may be more complex to understand and thus implement or influence, but overall holds a stronger potential when it comes to sustainability potential [7].

Product circularity and product longevity

In design, especially two perspectives are used to illustrate a product's (potential) sustainable impact: 'product circularity': to circulate resources, in theory indefinitely, which allows for unchanged consumption and use of resources [8] and 'product longevity': to prolong the use of products as long and efficient as possible through understanding the dynamics and variations of product lifetime [9].

Even though there is a tendency that the two are seen as conflicting, if acknowledging that multiple approaches and positions can be taken simultaneously, for example in different stages of a product life cycle, the presented learning tool builds on a common frame combining the two. This is also something that has been discussed by [10] in what can be called a 'multiple loops approach.'

Product circularity

Product circularity (hereunder all resources that have informed the product) challenges the linear production system that has been dominant since the industrial revolution

[6] J. Chapman, "Design for (Emotional) Durability," Des. Issues, vol. 25, no. 4, pp. 29–35, 2009.

[7] F. Ceschin and I. Gaziulusoy, "Evolution of design for sustainability: From product design to design for system innovations and transitions," Des. Stud., vol. 47, pp. 118–163, Nov. 2016.

[8] Ellen MacArthur Foundation, "Towards the Circular Economy vol. 1," Ellen MacArthur Foundation, 1, 2012.

[9] T. Cooper, "Slower Consumption - Reflections on Product Life Spans and the 'Throwaway Society,'" J. Ind. Ecol., vol. 9, no. 1–2, pp. 51–68, 2005.

[10] A. Mestre and T. Cooper, "Circular Product Design. A Multiple Loops Life Cycle Design Approach for the Circular Economy," Des. J., vol. 20, no. sup1, pp. S1620–S1635, Jul. 2017

going from a ‘Cradle to Grave’ to a ‘Cradle to ‘Cradle’ approach [11], [12], where instead of disposing products and regarding this as waste, these should be recovered through sharing and maintenance, re-use and re-distribution, re-furbishing and re-manufacturing of components and recycling of materials as exemplified with the Butterfly diagram [8].

Product longevity

Product lifetimes can be described through a product’s [13], [14]:

- The physical life, meaning the time in which the product breaks down beyond economic repair;
- The functional life, meaning the time when the need for it ceases to exist;
- The technical life, meaning the time at which advances in technology have made the product unacceptably obsolete;
- The economical life, meaning the time at which advances in design and technology offer the same functionality at significantly lower operating cost;
- The legal life, meaning the time at which new standards, directives, legislation, or restrictions make the use of the product illegal;
- The desirability life, meaning the time at which changes in taste, fashion, or aesthetic preference render the product unattractive.

[11] W. McDonough and M. Braungart, Cradle to Cradle: Remaking the Way We Make Things. North Point Press, 2002.

[12] C. A. Bakker, R. Wever, C. Teoh, and S. de Clercq, “Designing cradle-to-cradle products: A reality check,” Int. J. Sustain. Eng., vol. 3, no. 1, pp. 2–8, 2010

[13] D. G. Woodward, “Life cycle costing - Theory, formation, acquisition and application,” Int. J. Proj. Manag., vol. 15, pp. 335–344, 1997.

[14] M. F. Ashby and K. Johnson, Materials and Design: The Art and Science of Material Selection in Product Design, 3rd ed. Butterworth-Heinemann, 2014.

Sustainable Design Cards and Material Pathways

Sustainable Design Cards is a navigation tool to inspire designers to work strategically with approaches to sustainability in design. The tool is based on a deck of 28 cards that each describe and position an approach to sustainability in product-related design. The description of the cards here is based on [15] and [16].

The card deck has since been extended with the Material Pathways [17] that specifically looks into positions to take when considering material roles in sustainability and design.

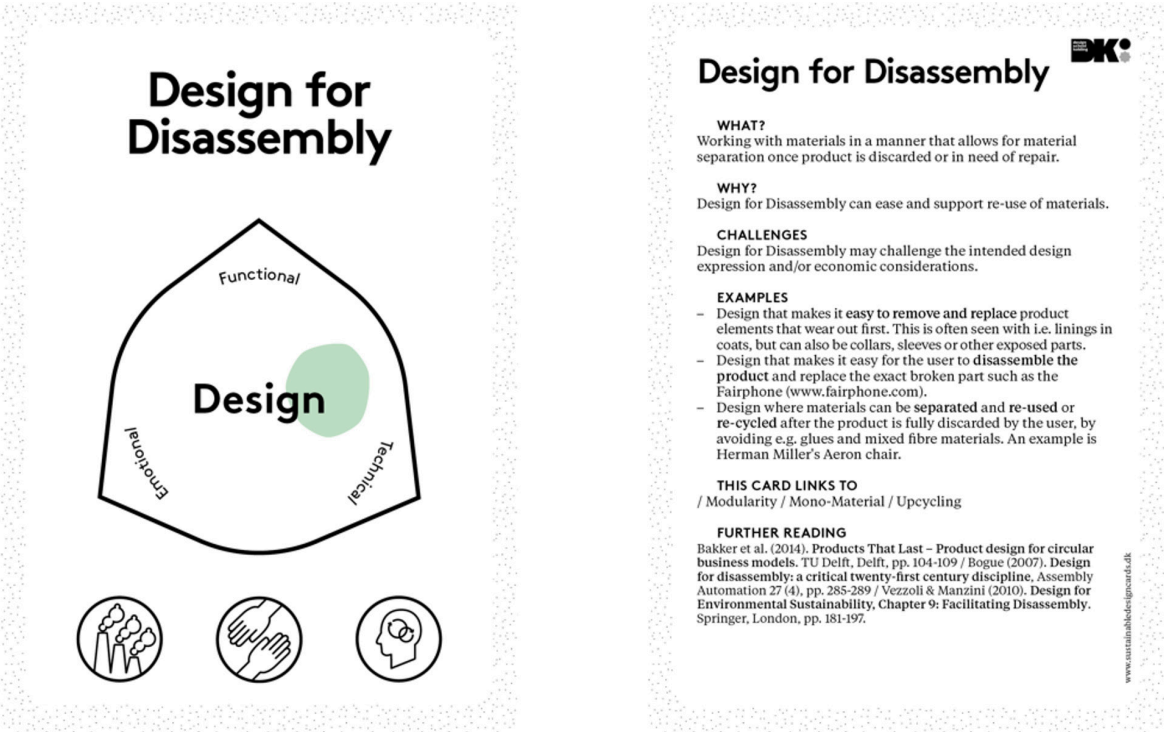


Figure: Example of the card, Design for Disassembly: the graphics side (left) and information side (right).

[15] K. M. Hasling, U. Ræbild, and L. Kofoed, Sustainable Design Cards. Design School Kolding, 2017.

[16] K. M. Hasling and U. Ræbild, "Sustainability Cards: Design for Longevity," in Proceedings of PLATE 2017 – Product Lifetimes and the Environment, Delft, the Netherlands, 2017, pp. 166–170.

[17] K. M. Hasling, U. Ræbild, A. Patel, and I. Herrtua, Material Pathways. Design School Kolding, 2020.

The two decks have similar format and structure of content so consequently, and dependent on the wished-for focus and complexity the two decks can be used separately or together.

Examples of cards in the Sustainable Design Cards deck are:

- Multi-Functionality
- Environmentally-Friendly Materials
- Informal Sharing and Heritage
- Embedded Storytelling

Examples of cards in the Material Pathways deck are:

- Material Crafting
- Material Geography
- Living Materials
- Material Plurality

Product Lifetime

On the graphics side of each card, there is a visual compass showing how the card relates to 'technical', 'functional' or 'emotional' lifetime aspects. These can be further described as:

- Technical aspects refer to the length of time a product stays in use before it breaks or wears out;
- Functional aspects refer to the length of time a product stays in use before its

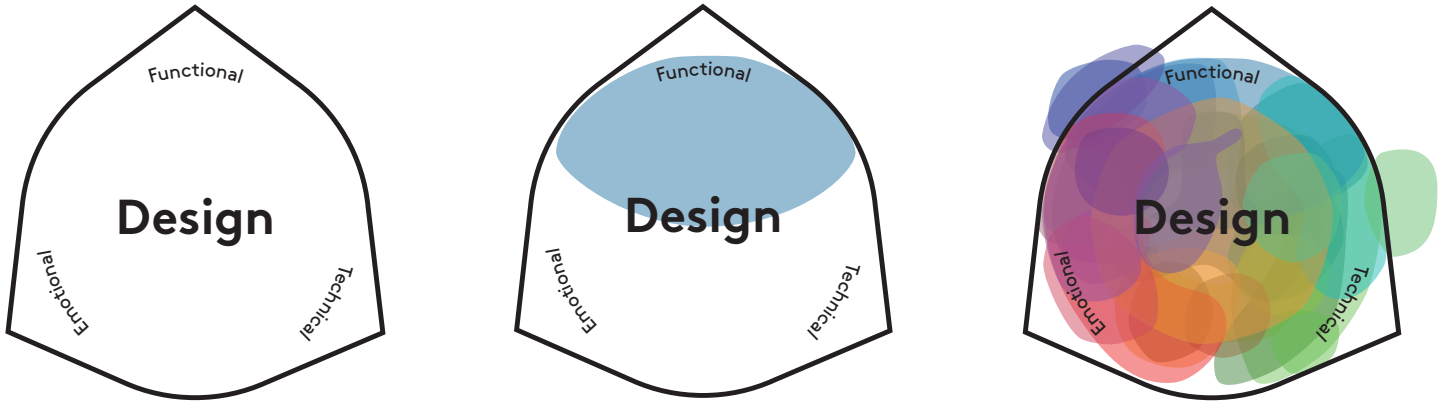


Figure: The focus compass from the Sustainable Design Cards, clean (left), with the approach Modularity (middle) and with all approaches (right) [15].

functionality no longer meets the user's expectations or needs.
- Emotional aspects refer to the length of time a product stays in use before the user stops having any emotional attachment to it.

Product lifecycle

On the graphics side, each card is also linked to two to four phases in a product lifecycle, here being:

- Material relates to aspects concerning raw materials.
- Production relates to aspects concerning production.
- Transport and Retail relate to logistic and handling aspects.
- User and Practice relate to aspects in use.
- Recovery relates to the recovery, reuse or recycling of a product in post-use.
- Design and Concept relate to aspects in the design.

Figure: The product lifecycle used for the Sustainable Design Cards [15] and Material Pathways [17].

[17] K. M. Hasling, U. Ræbild, A. Patel, and I. Herrtua, Material Pathways. Design School Kolding, 2020.

Informaton on approaches and positions
In addition to the lifetime compass and product lifecycle, the cards have an informative fact side that describes ‘What’ the approach is about, ‘Why’ it is relevant in a sustainability context’, ‘Challenges’ involved with working with and integrating the approach, ‘Examples’ of cases where the approach has been activated, ‘Other cards’ in the deck to which the approach can be linked and related to and ‘Further reading’ if wanting to read more in depth with the topic.

Figure: Example of the two card decks in use.

Activity

Identifying approaches to sustainability in design

Inquiry
The following activity serves to explore and identify approaches to sustainability in design using the Sustainable Design Cards and Material Pathways as a methodical framing for looking into companies' business models using the overall questions:

- Which approaches does a company work with??
- Which approaches are or should be core to the company's business?
- Which approaches could be further developed to support the comany's business?

Preparation
To perform the activity, you need:

- Access to Sustainable Design Cards and Material Pathways, either as printed decks, as PDFs or on the webpage
- Printed Product Lifecycle templates

Procedure

- Duration: 1-2 hours

Organisation

- We propose to work in smaller groups (2-3 students)

Activity a.

How does your own clothing relate to any sustainable approach from the Sustainable Design Cards?

Use 20-30 minutes to get to know the cards by discussing these individually and together in groups.

- Choose a textile product in your proximity. This can be a garment, furniture or other. The activity is easier if you know the company behind.
- Go through the deck and identify relevant approaches. You can do this based on physical examination of the textle product, prior knowledge on the company and desktop research

- Which approaches (max. 3) are the most important? – which ones are secondary?
- Where in the product lifecycle are the approaches positioned?

Activity b.

How do companies within textile product design work with sustainability through design?

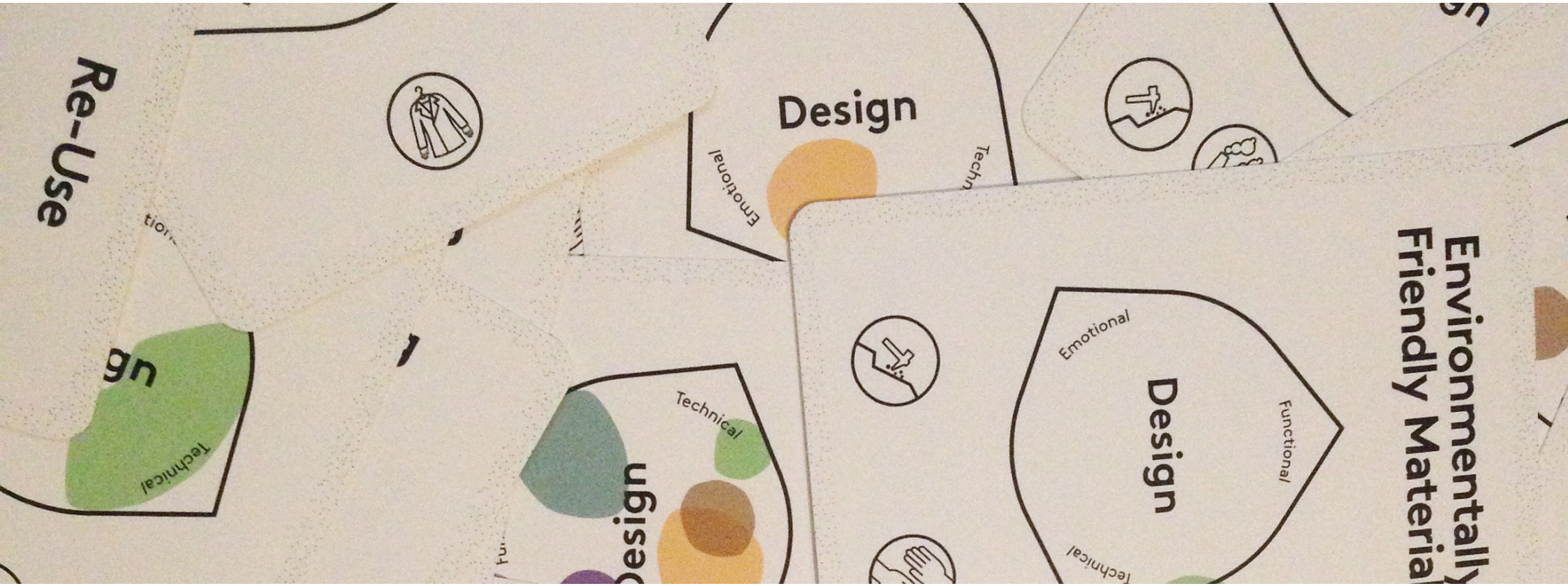
Use 60 minutes to identify and describe approaches for a chosen company

- Identify a company that makes textile products of your own liking. This can be a company known for working with sustainability or a company that is not.
- Go through the deck and identify relevant approaches for the company?
- Which approaches (max. 3) are the most important? – which ones are secondary?
- Where in the product lifecycle are the approaches positioned?
- If the company was to further develop their sustainability endeavours, identify relevant approaches and elaborate why these are relevant and how they could be implemented.
- Prepare a short presentation (app. 5 minutes) of the company and their sustainability efforts based on the above questions.

Example of Sustainable Design Cards used to highlight approaches in a fashion design company

Template: Product lifecycle

Visit http://destexproject.eu/ to see the rest of the intellectual outputs of the project



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