

ToolKit



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Photo: Eileen Blackmore

ToolKit

January 2024

On the Way to a
(Micro) **Plastic-free**
Wadden Region

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1. Introduction




This is the toolkit that helps you to tackle societal challenges integrally and to make people enthusiastic to participate through showing visible, tangible results. We wrote it for you, the entrepreneur, designer, producer, farmer, student, teacher, researcher or civil servant, so we don't need to keep reinventing the wheel.

In this toolkit you will find all 'lessons learned' from the program Wad van Waarde (translation: Wad of Value). Within Wad van Waarde a broad and varied network is utilizing the local biobased economy in order to develop environmentally friendly and healthy alternatives for polluting plastic products. In this way Wad van Waarde contributes to a (micro) plastic-free Wadden Region.

This Wadden Region is a special place, where many things come together. Here, nature, culture, economy and a tourist industry meet. We believe that the region can serve as a canary in the coal mine. The societal issues and urgent problems that are encountered here, can also be found in other areas, both at a national and an international level. We gladly share our way of working to (inter-)nationally further reduce the pollution of (micro) plastics. But even if your societal challenge is of a completely different nature, our approach can also be useful to you.

In an organized way we tell about our journey and how we developed our approach to tackle current urgent contemporary issues within a unique region. Here you will find concrete tools for realizing the necessary change in your region as well, and its further development.



On the following pages you can read more about **why** we started with Wad van Waarde and what our vision entails. **How** we have set up our approach and **what** we have done and what our approach has **delivered**. This is our recipe for realizing a (micro) plastic-free Wadden Region within one generation.

We hope that this toolkit, our approach and experience will inspire others and give them tools for developing similar systematic approaches for the challenges within their own region.

Warm regards,

Eileen Blackmore (Project Leader Wad van Waarde),
Willemien Veele (Researcher - Ecoras),
Simone Larabi (Designer - House of Design).

2. Back to the Core

*"We aim for a
(micro) plastic-free
Wadden Region
in one generation"*





In the North of the Netherlands you will find a unique area. Here, salt and sweet water mix, the horizon is fading into the distance and sometimes the sea is land. Here, all kinds of things grow, swim, fly and live. Here, your head is in the clouds, and your feet are in the clay. Here, a rich history goes hand in hand with smart innovations. But here also micro plastics flow into the sea, container ships carry new plastic goods, there is a high concentration of CO₂, the biodiversity is diminishing and the economy is groaning. The Wadden Coast is the world in a nutshell, or the canary in the coal mine.

Here is where Wad van Waarde is working

With a solid network, anchored in this Northern clay, Wad van Waarde works on the future of this special piece of World Cultural Heritage. For if it were up to Wad van Waarde, the future of the Wadden Region is (micro) plastic-free. We are continuously increasing our knowledge about the consequences of (micro) plastic on everything that is living in and around the Wadden Sea, including ourselves. Fortunately, this knowledge is also increasing the attention to the impact of plastic-pollution on this unique natural reserve.



Wad van Waarde works together with a broad, local network to protect and preserve the Wadden Region. Together we take action to reduce the damage to humans and nature and to ensure that residents and visitors can safely stay here, dwell here and... live here. We are committed to drastically reduce pollution from (micro) plastics in the Wadden Region by starting at the source. Together we develop biobased products, from local resources that should replace the plastic variants.



3. The Local Value Chain Model

WvW: Is your goal for your societal challenge already on the list?

Many societal tasks are complex and require the cooperation with many different parties. The value chain model offers practical tools.

In order to prevent (micro) plastics from ending up in the Wadden Region in the future, a system change is needed. The goal is specific, but also ambitious, the road towards it is complex and touches upon many areas. Many parties, and many steps, are needed to bring about this desired change. To achieve this, Wad van Waarde has implemented the Local Value Chain Model by House of Design. In this way the road to the ambitious goal becomes a passable road.

Local Value Chain Model

The Local Value Chain Model shows at a glimpse which links we need to connect and which goals are related to them. In this way the model helps you to get started and to involve the right parties from each link.

The model is used to actively tackle societal challenges. By means of a local circular economy the model supports the development of tangible circular products and it aids in closing the corresponding chains. This way of working helps you:

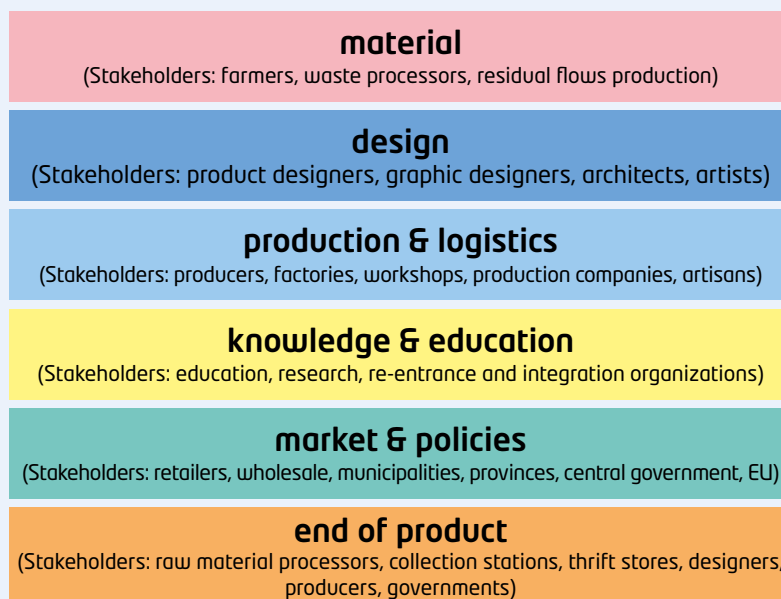
- to speed up the process;
- to tell the story;
- to inspire people.

On page 9 you will find a schematic view of the Local Value Chain Model. The model was introduced by Eileen Blackmore, Founder of House of Design and partner of Wad van Waarde. It is a methodology to tackle societal tasks through circular design and to arrive at visible and tangible results.

The goals are presented in the outer ring:

- no waste (goal Wad van Waarde: reducing (micro) plastics in nature)
- more biodiversity
- less CO₂-emissions
- enhancing pride and self-respect in the region
- more meaningful work
- connection between policies and circular entrepreneurship
- new business models
- a closed recycling loop

In order to achieve this, in each stage we will connect the links and the respective stakeholders:

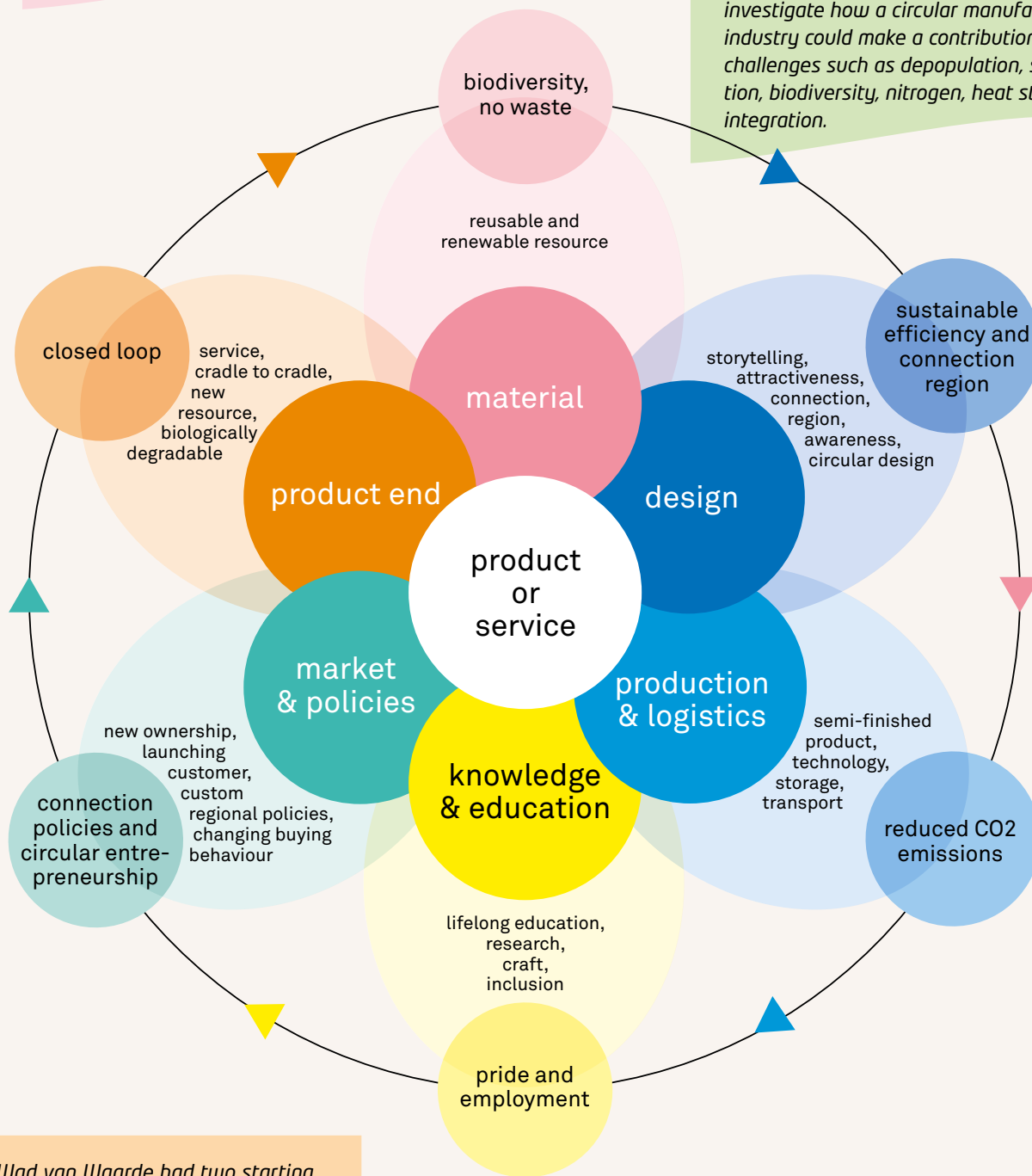


Each link is equally important and is located, where possible, within a 200 km radius, and preferably within a one day's drive. In this way we will keep the value as local as possible.

In order to connect the various links and stakeholders within the chain, you can organize Design Pressure Cookers and Value Chain Discussions. For more information about this way of working, or on how to organize it yourself, see chapter "Design Pressure Cookers and Value Chain Discussions".

NECESSITY. In order to keep the world liveable for everyone in the future as well, we will have to go green and become more sustainable. The future isn't far away, it is approaching at lightning speed. Already in 2050 the Dutch economy must be fully circular. Products will increasingly be made from local materials by local producers. When they are broken, they will be repaired or the material will be re-used. How do we get there?

DO: Choose a challenge in your region and investigate how a circular manufacturing industry could make a contribution. Consider challenges such as depopulation, salinisation, biodiversity, nitrogen, heat stress, integration.

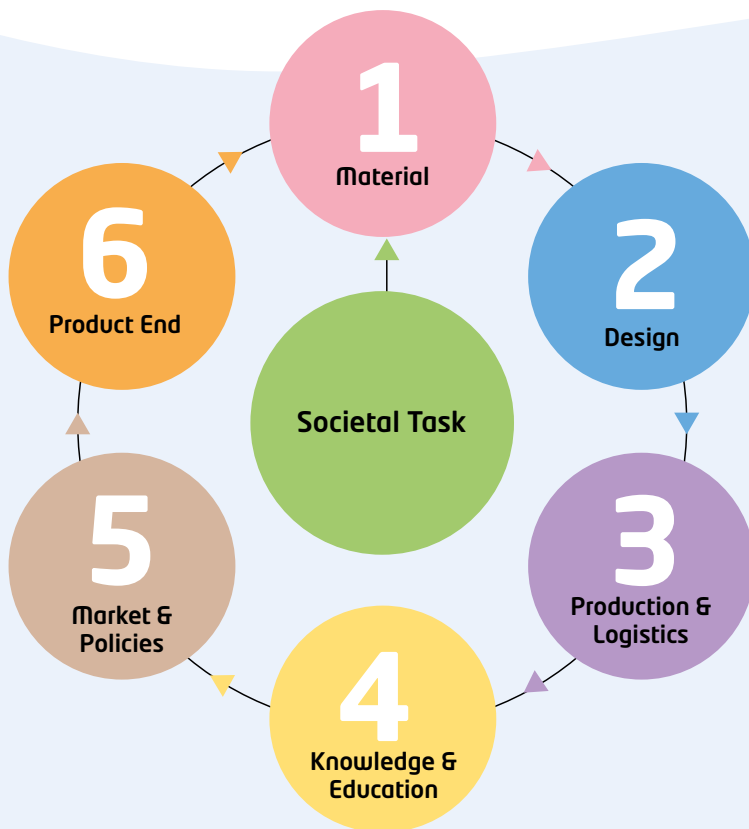


The Local Value Chain Model: Eileen Blackmore 2018

WvW: Wad van Waarde had two starting points: reducing (micro) plastics in the Wadden Region and fostering biodiversity in the area. In order to achieve this, Wad van Waarde is developing biobased alternatives from crops that contribute to the region, in turn contributing to more biodiversity.

Circular Design

The Links in the Chain



1. Material

For a local value chain model it is important to look for material that is fitting for the region. Which crops are already being cultivated in the region? Which useful plants thrive and can be grown here successfully? What can we process in products or buildings that contribute to biodiversity and/or capture CO₂?

Within the local value chain we are looking at what is already there (or was) and we are looking for materials that are renewable or reusable and do not produce any waste. The focus is on local, organic resources. Renewable organic resources are the basis for e.g. bioplastics, building materials or textiles. In this way, reusable material or residual material is put to new use. This not only reduces the amount of waste, but it also provides an additional or new business model for farmers, for example.

In order to determine the right choice of material, you measure the environmental impact. For this purpose an LCA (Life Cycle Assessment) is used. We will go into this in more detail in the chapter 'The Tools'.

2. Design

In a product design various elements are combined; aesthetics, function and technology.

The role of the design and the designer is important. At least 80 percent of the costs and environmental load of a product are determined by its design. So it can be a great asset for a company and the environment when a designer is involved with the process at an early stage. Both with assignments and their own products, designers often choose the material and the technique used for making the product. Therefore it is important that in the Design Brief (see chapter 4 'The Tools', p. 23) the conditions for the material are listed. That also applies for the design of the product. For example, you may indicate that elements will be added to the design, typical for the region in which the product is made.

Local production is usually more expensive than mass production. Therefore it is important that the product is durable, has an appropriate look and can be easily repaired. The designer will implement this in the design process and in this way determines the value of the product and the residual resources. Local value for your money.

Simone Larabi:
"By meeting with the inhabitants and visitors of the Wadden Region, we were able to capture in text and image the Values of the Wadden Region. Values such as space, dynamic and seasons".



DO: In your region, which crops were grown before 1960 for making products that also contributed to biodiversity? Identify whether there are farmers who still have experience with the cultivation of these crops. See also chapter The Tools on how we implemented LCA's (Life Cycle Analysis methodology) for optimizing and mapping the impact on the environment from our designs and the chain.

WvW: Until the Sixties flax was cultivated in large amounts in the Northern Netherlands. Because of the emergence of cotton and synthetic fibres, flax and the accompanying chain has completely disappeared. Wad van Waarde has set up this chain again. By cooperating with four different farmers, the cultivation of flax in the Northern Netherlands has grown from 2 ha to 11 ha in 2023 (5 acres to 27 acres). It is Wad van Waarde's ambition to, together with a Northern flax cooperation, expand this number in the coming years to 150 ha (370 acres) per year.

DO: Involve local product designers in a session and give them an assignment to develop consumer products from the materials of local crops. In doing so, let them use elements from the region. Think of colors, lines and shapes in the landscape or cultural-historical elements.

WvW: The design determines the value of a product. Appearance and quality are important for locally manufactured products. The hourly rate in the West is higher than elsewhere. Therefore, quite often locally manufactured products also have a higher price. For our design we chose to take the values of the Wadden Region as a starting point. House of Design met with the 'users' of the Wad for the design: inhabitants, visitors, entrepreneurs and governments, to retrieve the values. From this a palette of colors, lines, shapes, and even words, has emerged that is applied in the designs.

Local Hands, Local Knowledge

DO: Investigate which manufacturing businesses are present in the region and involve them in producing the designed products. Even if they are small and artisanal, it is a first step, and you will learn a lot!

WvW: Wad van Waarde's objective was that every step necessary to get from resource to finished product, could be taken in a one day's drive. For the production of linen from flax, this was successful. At the moment of writing (2023) the PHA chain is not yet completed. For the flax we first mapped all the necessary production steps and then we investigated which businesses were present within a 600 km radius. Since the cultivation and processing of flax in Friesland and Groningen has completely disappeared, knowledge is scarce and the material is no longer available. Therefore the flax museum It Braakhok in Ee was our starting point. There we met people with knowledge of flax. We also came in contact with a contract worker (70+) who has worked with flax since he was 10 years old. And he still is! For harvesting flax special machines are needed. Thanks to the cooperation with Van de Bilt Zaden en Vlas we were able to rent these machines, so the plots could be harvested. They own a factory in Sluiskil, Zeeland, where they are able to process the flax to hackling sliver. The nearest flax spinning mill is Safilin in Béthune in Northern France. The linen yarn is transported to Enschede Textielstad, to be woven into cloth, from which ultimately products can be sewn by Vanhulley in Groningen, and in the future at Dokwerk in Dokkum as well.

DO: Involve local secondary schools, vocational and higher education institutions and invite them to create a student project concerning the local crops, to design products, develop business models and to do research. Facilitate them where you can! This will inspire both pupils, students and the institutions themselves.

WvW: For the courses *Modevormgeving* (Fashion Design) and *Docent beeldende kunst & vormgeving* (Teacher of Visual arts and Design) at Firda (vocational) and NHL Stenden (higher education), we developed an elective course, 'Van 'Vlas tot Lap (From Flax to Fabric)'. The curriculum comprizes all the steps from flax seed, the production of a cloth to a garment. See chapter 'The Tools'. We gave an internship assignment to various third- and fourth-year students at the Hanzehogeschool Industrieel Product Ontwerpen (Industrial Product Design) to create various products using linen and a small flax spinning machine. In the coming year, a number of students will also start working with PHA.



3. Production & Logistics

No things without makers. Local production saves transport and thus CO₂-emissions. Moreover, it is beneficial to the local economy and the employment. In order to get from resource to semi-finished products and manufacture products from these semi-finished products, we need a local manufacturing industry and local production capacity. Local hands who can simply make something beautiful. Unfortunately, the manufacturing industry has almost completely disappeared from the Netherlands: the major part of the production takes place in other continents.

How do we make this part of the chain, the manufacturing industry, local again? We do this step by step. Some processes will still be taking place abroad at first, but the more demand is increasing, the more attractive it will become to invest and to scale up. So we will bring know-how and production back to our region again.



4. Knowledge & Education

The demand for craftspeople who are able to think and work in a circular fashion, will continue to grow. What do these thinkers and makers have to know and be able to do? On the one hand, we should not let the ancient knowledge, that artisans are still possessing, become lost. The same goes for knowledge on the use of local resources. On the other hand, we need new knowledge in the field of sustainable processes, digital production and recently developed renewable materials.

Therefore, the cooperation with knowledge institutions is very important. They play a key role in educating the inventors and skilled makers of the future. Moreover, knowledge institutions are able to do research into various materials and their applications.

The mix of old and new knowledge will be a vibrant one. The interaction provides life, energy and progress. And that is a good thing, because working in a circular economy will soon no longer be the sole domain of a small group of green dreamers; it is lighting fast becoming mainstream.

Local Government

DO: *Involve a local government in the creation of the value chain, let them become part of it. As an organisation, formulate an assignment in order to start up the chain as a launching customer. Research how, as a government, you can create local, circular activity or let it grow, by amending the procurement and think, together with all partners involved in the chain, about how to turn a business model into a distribution model*.*

***)** *In order to attribute various parties an honest and fair value, a distribution model is used within Wad van Waarde, instead of a business model. This distribution model is aimed at attributing value to activities performed within a project / product development.*

WvW: *We already have so much 'stuff', so how do you put a new product on the market? In order to select the right products, we looked at who are benefiting from the products, and who are open to it. We first considered supermarkets, but that entails so much more. In the end, we focussed on the farm shops and local shops associated with Waddengoud, market stands with organic products and speciality shops or delicatessen shops. We are also focussing on governments and major companies that purchase the products to give away as a promotional gift or Christmas present, thus fulfilling their own circular exemplary role. We worked out our strategy for the various products in the Sustainable Business Model Canvas, see chapter 'The Tools'. We also investigate how we will be able to apply a distribution model among the value chain partners, so we will all benefit from a good harvest and sales, and we can share the risk when the harvest has failed.*

5. Market & Policies

A product can be beautifully and circularly designed; yet it has little reason for existence when nobody wants it. How do you ensure demand for your product? The fact that a circular product is more expensive than we are used to, is not helping. Yet the higher cost can be explained: for local production Dutch wages are paid, and often it is not mass production. It is useful to mention this explanation about how the price was calculated. This can be done on the product label, for example.

And yet, consumers will only read this explanation when they are already familiar with the product. For this you need ambassadors, organisations, companies or individuals who are willing to take the lead. In a very practical sense this can be the launching customer, the first major buyer of a circular product. Consider, for example, municipalities or provinces. Additionally, tenders are a choice opportunity for governments to boost circularity. In this way organisations lead by example and they can drive the local value chain.



DO: Research who may be owner of the resource. How might the resource return to this owner, so it will be reused? Is the right stakeholder for this process already involved? How and with what party is the material being collected?

6. Product End

Actually, the end is the beginning. For the reduction of waste is often the reason for looking for a more circular process. What happens to a product when it is broken, or when its owner wants to replace it? In a circular system discarded products or resources can be reused, or put back into the soil. Additionally, it turns out we are more careful with our things when the resource itself has value. Consider, for example, the effect of deposits on bottles. Would we be able to apply this circular loop to other materials as well? This requires time and commitment. Step by step we will have to grow towards a true circular loop. For resources are becoming increasingly scarce. And maybe even more important: it is of vital importance for our environment.

WvW: For our linen products we cooperate with thrift shops in the region to retrieve linen by means of special collection boxes. This linen is consequently sorted and evaluated whether it still can be turned into little bags. If not, the linen is shredded and mixed with recycled cotton, so new yarns can be spun in the local spinning mill owned by 'Groningen werkt Circulair' (Groningen Works in a Circular Fashion) (of which House of Design is also a partner). For the PHA products collection boxes will be placed as well at various locations. When the PHA is recycled, it is no longer 'food proof' and it is no longer allowed to be a product that comes in contact with food. The ring of the WadKop, however, can still be made from recycled PHA. Other products for which we would like to develop an alternative for plastic products that might end up in the environment, are, for example, clothes pins or sunglasses and spectacle cases, but also buttons or zippers of the yet to develop linen outdoor coats - the Wad Parka.

***)** No one can successfully tackle complex challenges by themselves; intensive cooperation between actors is a requirement. Equal relationships, responsibilities and strategic choices are required in order to realize innovation.

****)** The circular economy assumes there are two streams. The biological cycle, focussed on organic, renewable resources and the technical cycle, consisting of fossil fuels, plastics and metals.



The End is the Beginning

4. The Tools

There are various models you can leverage when working on your societal task. *For Wad van Waarde we used existing models, and where the appropriate tools were missing, we developed them ourselves.* Below you will find the models we leveraged in our process and that might be of great value to you as well.

Tool 1: Societal Task Identified

Tool 2: Design Thinking as a Method of Co-creation

Tool 3: Value Chain Discussions

Tool 4: From Current to Desired Situation

Tool 5: Design Pressure Cooker

Tool 6: Design Brief Designers

Tool 7: Life Cycle Assessment

Tool 8: Developing a Lesson Plan

Tool 9: Sustainable Business Model Canvas



Tool 1

Societal Task Identified

When do you use it?

This is the start of an initiative or a project. Here you describe the 'why' you want to do something.

What is it?

Here you start formulating your task. What is the reason for the system change you want to tackle?

How do you use it?

Next, you link the assignment to a current, societal task. For example: from depopulation, plastic pollution, ageing, tension between economy and nature, circular challenges, contributions biodiversity, heat stress in the urban area, energy transition, salinisation, and so on.

Review also implementation agendas from municipalities, provinces or other organizations in order to see whether a connection can be made.

How might developing a product be able to contribute to this task?

Organize a brainstorm with a number of product designers, and together investigate which product could be developed that can be leveraged as a catalyst (or butterfly). In order to map the impact, you can create a mood board of headlines of regional papers or survey inhabitants and entrepreneurs to find out what's on their minds.

WvW: *Within Wad van Waarde, as an alternative for plastic products we created among other things small and large bags, boat cushions and fisherman's gloves from linen. The linen was made from the local flax that we are growing in the North. By developing these tangible products, we put flax on the map as a promising crop for product, textile and construction. The cultivation of flax provides biodiversity, it improves the soil, absorbs CO₂ and offers a perspective for the future for the farmers. In 2021, we cultivated 4 ha of flax, in 2022 9 ha and in 2023 11 ha. There are now several initiatives in the Northern Netherlands that would like to grow flax as well, because they have seen that it is possible. It looks like next year there will be 60 ha of flax. The goal is an average of 150 ha each year. This is an example of how we chose flax as a material for creating more biodiversity and producing plastic-free products.*



Tool 2

Design Thinking as a Method of Co-creation

When do you use it?

You use this method to involve all parties that have an interest in solving the societal problem you are working on, in the process.

What is it?

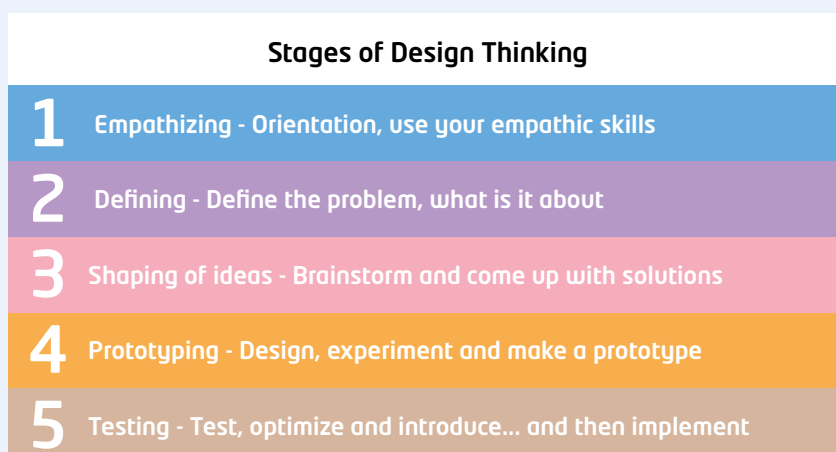
By means of the co-creation method, you ensure a shared responsibility. All parties involved consider themselves to be the owner of the problem and feel the urgency to solve it together. Stakeholders are actively involved and experience the process as valuable.

Co-creation is described as a business trend which, in collaboration with experts and / or stakeholders (such as customers, suppliers, etc.) look for opportunities for the joint development of new values (concepts, solutions, products and services).

In order to think outside the box and to arrive at refreshing solutions, you use Design Thinking. This is a methodology that, as the name suggests, is based on the ways of thinking and working of designers. The purpose is to apply the principles and tools of the design environment, so innovative solutions can be found.

How do you use it?

Design Thinking is a structured approach, that can be divided into five different stages. These steps aid you in channelling the creative thinking process. From formulating the question, through searching for a solution to its elaboration. See the diagram below:



Tool 3

Value Chain Discussions

When do you use it?

The value chain discussion is used when involved parties have little insight in the complete chain in which they work, while this knowledge could lead to added value. By visualizing all the links, their value becomes clear for all users.

What is it?

The value chain discussion is a form for creating a bridge between all links, to connect them all, and to close the circle. Usually the people know the nearby links in the chain, but not the other links. The role of the designer is not always clear for all links as well.

The process below visualizes processes, often offers new insights while doing so and leads to new activities. It provides insight into the potential bottlenecks between links and the issues for each link, so stakeholders will be able to go along more easily.

How do you use it?

In order to start, define the local value chain around a certain product, material or subject. Next, invite one representative for each link to participate in the discussion. Apart from the representative, also invite a few stakeholders. Depending on the dimensions of the room, this may vary from 2 to 10 individuals per link.

To prepare the discussion, organize your own team. This consists of a number of facilitators (of which you are one), a camera person or photographer, and someone who will take notes.



Before the discussion, the facilitator(s) interview(s) the stakeholders in order to collect questions that will be asked during the event. To be able to ask adequate questions, it is important to thoroughly investigate the respective subjects.

During the session, all representatives of the links take place in a circle around the facilitator. The other stakeholders and the audience take place outside the circle. In order to determine the starting point, the facilitator starts with interviewing the problem owner. The problem owner is the one who wants to create a Value Chain project.

Subsequently, the facilitator interviews the representatives, starting with the one who provides the resource (the material). An example question is: how is the material 'harvested' and which possibilities does the representative have for passing it on to the next link in the chain? This might be, for example, a party producing a semi-finished product (such as granulate, fibre, board, etc.).

Next, interview the individual from this corresponding link 'Material'. Keep asking questions to the designer to retrieve all the design requirements about 'Material'. Next, go to the representative of the link 'Production': the maker or producer.

Continue in this fashion, interviewing each representative and the designer in between as well.

Having interviewed everyone, research with all participants whether there are any stakeholders missing and how you could transform the value chain to a local value chain.

Subsequently, process the information you retrieved into a plan to get things started. This plan could serve as a project- or business plan.

WvW: For the flax chain we organized a Value Chain Discussion. We invited: three farmers (material), four policy officers from four different municipalities (policies), a project upholsterer (market), an employee of an HBO (higher education)-institution (knowledge & education), two designers (design) and the producer (production & logistics). The goal was to turn potential buyers of the finished product into participants in the chain. And this has succeeded. The municipalities would like to purchase linen curtains and flax insulation, in order to guarantee the purchase of flax from the North.

Link	Current situation	Desired situation	Empathizing	Defining	Designing/ Collecting ideas	Prototyping	Testing	Implementing
Material	synthetic, single-use, waste, fossil	organic, multi-use, circular, bio-degradable	which resources are/were present in the region that contribute to the area	selecting a crop: flax	conversations with farmers for starting a pilot	1st year cultivating 2 ha of flax on four plots to test the climate	2nd and 3rd year 6 ha/11 ha	150 ha of flax
Design	mass product	connection with region	conversations with inhabitants and visitors about experiencing the Wadden	collecting elements as a basis for design	designing products based on all the input from 'Defining'	developing prototype product	having prototypes tested by target group. Adjusting and re-testing	WvW brand with standards for design and use of materials
Production of linen	Asia	North-West Europe	which production companies are (still) around and what is their capacity	spinning in Northern-France, weaving in Enschede, sewing in Groningen	purchasing linen from Belgium or Lithuania for prototype products	products from Baltic linen	spinning in Northern France.	products from own linen
Production of flax	no cultivation of fibre flax in the Northern Netherlands	minimum 150 ha per year in the Northern Netherlands	conversations with farmers and flax processor	determining steps for scaling up	1st year 2 ha with local semi-artisanal machines	turning machine rented	pulling- and rippling machine and turning machine rented for harvesting Fibre processing in Zeeland	leasing/purchasing harvesting machines Processing in Zeeland. Loom (straw) returned to North for insulation
Logistics	many links, much CO ₂	short lines, less CO ₂	steps logistics transport and processing machines mapped	optimizing transport between Zeeland and Friesland	when the bales of flax are picked up from Zeeland and Friesland, loom (straw) returned for construction and insulation	national transport is mapped in on-line system (externally)	cooperation with transport company tested	cooperation with transport company
Knowledge & Education	education and research not involved	education and research have joined	for which education programs can this approach make a connection with the work field	linking up with local MBO (Vocational) and HBO (Higher Education) knowledge institutions	how does it fit in the regular curriculum? developing an elective course	1st year elective course developed, reviewed and tested with teachers and external parties	tested and adjusted after evaluation first lessons	lesson plan 'Van Vlas tot Lap' (From Flax to Fabric) incorporated in standard curriculum since 2018 with MBO (Vocational) and HBO (Higher Education)
Market	throwaway society, fast fashion, linear, capitalist	valuable, long-term, circular, distribution model	which business model fits in with distribution model	organizing business model canvas sessions with chain partners	working out and exploring various models and forms of cooperation (starting a cooperation) and determining agreements	proposal for distribution model presented to partners		distribution model is applied and tested interim
Policies	short-term, cheapest supplier wins the tender	long-term, supplier with the best impact on the region wins the tender	which challenges are there where this approach is applicable	launching customership by purchasing first products	taking the Wad-Tas or linen bags as promotional gifts or in Christmas presents. Linen curtains for municipalities	policies for purchase of plastic-free example products is reviewed.		law and regulation fits circular vision
Product End	because of low quality difficult to re-use and recycle	high quality, so preserves its value and long-term re-use (vintage).	map current and desired end of life (or use) processing	link design material selection to processing options for end of life. Instigating proprietary collection- and processing chain	collection boxes old linen placed with thrift shops	collection boxes old linen placed with thrift shops	monthly contact about the amount of products being handed in. Aligning logistics	chain is closed
Conclusion	Cheap mass production of synthetic textile produced outside of Europe in poor societal circumstances and with a high environmental impact, where the maximization of profits takes a central place. Users do not know where and how their textile is made. End product is hardly or not re-used and difficult to recycle.	Sustainable local (regional and European) production of linen by short local flax chains, where value is distributed and preserved within the chain. The environmental impact of the chain is low and societal circumstances are good. Users know where their products come from, where and how they are made. Products are high-quality, preserving their value and being re-used long-term.						

WvW: Completed example table:
From Current to Desired Situation.

Tool 4

From Current to Desired Situation

When do you use it?

In order to make things concrete and tangible and to achieve change, you can use a combination of the models described above. In this tool you connect the Value Chain Discussion with the Design Thinking methodology. In this way you have the right people on board to make the necessary steps for getting from an existing situation to a desired situation.

What is it?

With this methodology you will provide visibility into the whole process in which a resource is processed to a finished products. To do this, you can use the matrix below.

How do you use it?

The table below can be used to map the challenge and to arrive at a roadmap. It is the easiest to start with a description of the current situation for each link in the chain. Next, fill in the desired situation (more locally, less waste, etc.).

When the existing situation and the desired situation are clear, apply the method of co-creation mentioned in this Toolkit in which Design Thinking is used.



Matrix:

Link	Current situation	Desired situation	Empathizing	Defining	Collecting ideas	Prototyping	Testing	Evaluating
Material								
Design								
Production								
Logistics								
Education								
Research								
Market								
Policies								
Conclusion								

Tool 5

Design Pressure Cooker

When do you use it?

It's best to use a Design Pressure Cooker when you're working on sustainable innovation and during the process you encounter multiple questions about the product or the process related to the design. With this methodology you will tackle these 'design questions' simultaneously, at the same time in the process.

What is it?

The Design Pressure Cooker (DPC) is an accessible way to get acquainted with working with a designer and to familiarize yourself with the Design Thinking method. During a DPC, several couples, consisting of a designer and an entrepreneur (or someone else with a 'design question'), work in one single day from question to solution / innovation. Or: from idea to concrete design propositions.

In a morning- and afternoon session the couples arrive from a clear task, via a brainstorm, at a concrete result. The participants complete the day with plenary presentations and provide feedback to each other. The DPC forces its participants to focus and to work intuitively. At the end of this session there is a concrete plan or design, that is instantly usable.

It is advisable to meet up again after a few weeks and to discuss the progress. Where in the process are the participants and what is still needed to arrive at the end result that was formulated in the DPC?

How does it work?

Start with collecting a number of questions and challenges that fit the societal challenge you defined.

For example:

- Which products can we make from agricultural residual streams in our region? And what would these products be? What is needed?
- How can I replace single-use products with biobased multi-use products?
- We are now selling plastic curtains that release micro plastics, how can we change this?
- We now give customers cardboard mugs-to-go, is this also possible through multi-use and deposits? If so, how and with what?
- As a municipality we want to purchase more biobased things, what do we need to pay attention to?

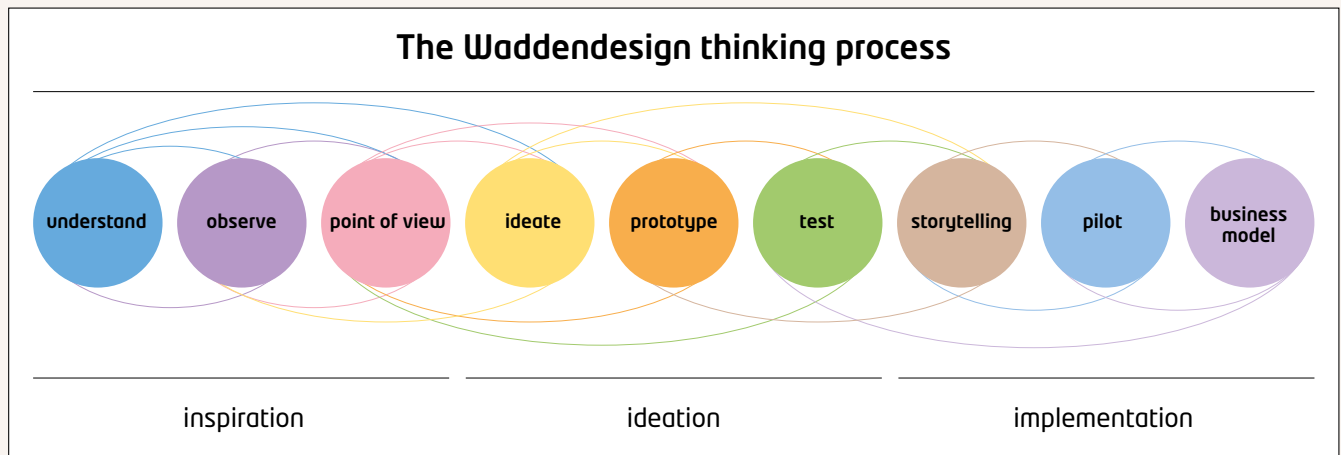
Asking the right question turns out to be essential. Additionally, it is important that all representatives of the question, the problem owners, are present, as well as the product, graphic or interior designers, architects, landscape architects or artists. This depends on the question.

Next, organize an inspiring large room or multiple small rooms where the couples can work together quietly, as well as a moment for evaluation and adjustment.



Tool 6

Design Brief



When do you use it?

You leverage the design brief to invite product designers to make an offer and to use it as an accompanying letter for the assignment itself.

What is it?

In a design brief, the conditions, or the set of specifications that the designer should meet, take a central role. The design brief contains at least the planning, budget, set of specifications and a description of the target group. For a complete design brief, we leverage the above mentioned Design Thinking methodology. In this way we have arrived at the correct example products in which all links within the Value Chain were involved in order to attain the ideal design. By means of this Design Thinking methodology you split up the whole process in three stages: Inspiration, Ideation and Implementation.

Set of specifications of Wad van Waarde:

- A product that can provide an alternative for a product that leaves (micro) plastics behind in the Wadden Region.
- Suited for multiple use (long-term)
- The product is made from local, renewable resources
- There is a clear link with the region, design wise
- All material being used is degradable in the sea and nature
- The product should be ready for production, preferably within a 500 km radius
- Produced as sustainable as possible (production / transport)

- Repairable by preferably parties from the region
- Recyclable

The end user is unique and determinative. The design is aimed at users of the Wadden Region. The users of the Wad: inhabitants, day tourists, families, (hospitality) entrepreneurs, fishermen, mudflat hikers, sailing boat tourists, motorboat tourists, excursion boats, shipping companies, terrace visitors, cyclists, pedestrians, or a combination of the above.

In order to receive feedback from the users of the Wad, we organized Pressure Cookers. The material and prototypes can subsequently be presented to the stakeholders, so the final product and its functionality can be evaluated.

WvW: The products that were designed and developed for Wad van Waarde are leveraged as an example of alternatives for mass produced, often single-used, polluting plastic products. Within Wad van Waarde we work with various designers on products from the biobased and bio-degradable natural plastic PHA and the locally grown flax (linen).

Tool 7

Life Cycle Assessment

When do you use it?

When you want to map the environmental impacts of a product or service over its complete lifespan (from the mining of resources until its end of life), it's best to leverage the Life Cycle Assessment (LCA). This instrument is also useful for comparing various products or materials and thus indicate that your choice is a better one.

What is it?

A Life Cycle Assessment (LCA) is a systematic approach for mapping and evaluating the environmental impacts of a product, process or service during its full life cycle and subsequently optimizing it. The life cycle is comprised of among other things the production, the usage and the end of the product, including the mining of resources, production, distribution and waste processing.

LCA's are used to quantify and review the environmental load (or -impact) of a product or process. It is often leveraged as a tool to support the identification of opportunities for the improvement of the environmental performance throughout the complete value chain and for the optimization of the product design.

The impact is calculated using impact indicators, such as CO₂-equivalents, acidification, toxicity and the depletion of fossil resources. Therefore, an LCA provides a broader view of the impact on the environment than merely the effect on climate change due to CO₂. Should it be more useful to paint a less expansive image, you might also use 'intermediate models'. For example a CO₂-footprint (in which the focus is solely on CO₂, and other impact indicators are not taken into account) or a quick-scan LCA (the shorter version of the regular LCA).

How do you use it?

The designer will implement this in the design process and in this way determines the value of the product and the residual resource. Next, you collect available data on energy, water, transport distances and the usage of resources.

You use these data as the basis for drawing up an LCA. For example, you can turn the LCA into a graduation assignment, or leverage an expert agency to execute an LCA. LCA-software is available, such as Simapro or Gabi, that can be used.

Keep in mind when executing the LCA's that it a means, and not a goal. Use it as a tool for optimizing your product or chain. Work together to ensure that you determine a clear goal and scope. A good functional unity is essential for a good LCA. Finally; Start with simple steps in your process, and then fill in the further details.

WvW: *Within Wad van Waarde we applied the LCA methodology for both the WadKop and the linen products. For the WadKop our partner Ecoras developed a value chain optimization tool. With this tool we visualized the complete PHA value chain. In this way we gained insight in the various 'environmental impacts' of the chain. Using scenarios we looked at how we might reduce the impact on the environment. So we were able to shorten the resources chain and were able to use more self generated energy.*

For our linen value chain we created our own LCA dataset in order to visualize this chain. Very concretely, we were able to indicate the impact of one square meter of linen cloth with a specific thickness on the environment. In the future we will try to enhance these data with even more data from our own chains. By using these data we will be able to develop a comparative LCA in which the environmental impact of a local linen cloth is compared with for example a polyester cloth or a cotton cloth.

Tool 8

Developing a Lesson Plan

WvW: In 2016, House of Design entered a partnership with the MBO Firda (then: Friesland College), with the department D'Drive, in which a.o. the subjects Creatief Vakmanschap (Creative Craftsmanship) and Mode Design (Fashion Design) are part of the program, to involve them with the chain around a circular manufacturing industry. Firda indicated they would like to apply the Local Value Chain Model in their own organisation as well.

As a result, House of Design and It Erfskip co-developed with Firda the elective course 'Van Vlas tot Lap' (From Flax to Fabric). Firda was appointed an active role as a stakeholder within the chain 'knowledge and education', part of the value chain. During the elective course, during the lessons all facets of the value chain are discussed; from resource (flax seed) to finished product (linen textile product). The students learned the impact of plastic products and of the production in low wage countries. As a solution they designed biobased alternatives made of flax and linen.

An elective course consists of 12 lesson weeks with one half-day session each week. The lesson material was designed by the three collaborating parties, House of Design, It Erfskip and Firda. Since 2020, the elective course is a fixed part of Firda (MBO, Vocational) and NHL-Stenden (HBO, Higher Education).

WvW: For 'Van Vlas tot Lap' various crafts were covered, such as flax rippling, breaking, scutching, crocheting, knitting, spinning, silk printing and dyeing with natural dyes. But the dark side of the textile industry was also discussed. Students watched the documentary 'The True Costs' that shows the polluting textile industry and makes visible the conditions of the people in low wage countries. The message from the film made a huge impact on the students. In this way, the elective course contributed to the students' awareness. This had a major impact on the choices they made when designing a product, following the steps in the Local Value Chain. Students were challenged to experiment with various materials en 'ancient' crafts, and to translate all this to the 'present'.

When do you use it?

You will use this tool when you want to involve education in your societal challenge. The reason is that with education as a societal partner, you will involve young people with societal, urgent issues, you will leverage knowledge that is already available and you will strengthen the chain in the societal playing field. For by developing a lesson plan and lesson material collectively, you provide education with a role in the chain and the societal challenge a place in the (educational) institutions. Students can be linked as an intern or researcher as stakeholders within the local Value Chain Model with entrepreneurs and organisations.

What is it?

An elaboration of a series of lessons that can be taught to MBO (Vocational)- and HBO (Higher Education)-students.

How do you use it?

After clearly formulating your societal task and your (design) question, explore your regional Vocational schools and Higher Education institutes regarding their curriculum on offer and whether there are knowledge gaps in which an additional lesson plan or elective course is of added value. Subsequently you initiate the collaboration on a substantive level and put together a custom curriculum.

Student:
"I didn't know all this, actually, everyone in school should be required to take this elective course."

Tool 9

Sustainable Business Model Canvas

When do you use it?

When you can profit from a business model in tackling your societal question, but would like to look further than just the economic costs and benefits. A business model can provide an overview and clarity in the steps to take, but does not fit with the new economy of meaning in its old shape. Therefore, it is advisable to use the Sustainable Business Model Canvas.

What is it?

A business model canvas is an organized format in which you can work out the business model of your organisation at a glance. Within the Sustainable Business Model Canvas (SBMC), the ecological and societal costs and benefits are taken into account. These soft factors are as important a factor as the purely economical input.

How do you use it?

Below, you will find the Sustainable Business Model. Along with the key chain partners, experienced entrepreneurs and an experienced process facilitator, you complete this model. You do this by means of a meeting or a workshop. Ensure clear instructions and explanation of the material. Next, work out the business model into a business case. Creating an SBMC is a creative process. Work together to do this.

WvW: More information on the Sustainable Business Model can be found here:

<https://www.case-ka.eu/index.html%3Fp=2174.html>

For more information on CIRCO methodologies, see: www.circonl.nl












The Sustainable Business Model Canvas

Designed for:

Designed by:

On:

Version:

<p>Key Partners</p> <p>Who are our Key Partners? Who are our Key Suppliers? Which Key Resources are we acquiring from partners? Which Key Activities do our Partners perform?</p> <p>Motivations for partnerships: Optimization and economy Reduction of risk and uncertainty Acquisition of particular resources and activities</p> 	<p>Key Activities</p> <p>What Key Activities do our Value Propositions require? Our Distribution Channels? Customer Relationships? Revenue Streams?</p> <p>Categories: Production Problem Solving Platform/Network</p>  <p>Key Resources</p> <p>What Key Activities do our Value Propositions require? Our Distribution Channels? Customer Relationships? Revenue Streams?</p> <p>Types of Resources: Physical Intellectual (brand patents, Copyrights, data) Human Financial</p> 	<p>Value Propositions</p> <p>What value do we deliver to the customer? Which one of our customer's problems are we helping to solve? What bundles of products and services are we offering to each Customer Segment? Which customer needs are we satisfying?</p> <p>Characteristics: Newness Performance Customization „Getting the Job Done“ Design Brand/Status Price Cost Reduction Risk Reduction Accessibility Convenience/Usability</p> 	<p>Customer Relationships</p> <p>What type of relationship does each of our Customer Segments expect us to establish and maintain with them? Which ones have we established? How are they integrated with the rest of our business model? How costly are they?</p> <p>Examples: Personal Assistance Dedicated Personal Assistance Self Service Automated Services Communities Co-Creation</p> 	<p>Customer Segments</p> <p>For whom are we creating value? Who are our most important customers?</p> <p>Possibilities: Mass Market Niche Market Segmented Diversified Multi-sided Platform</p> 
<p>Cost Structure</p> <p>What are the most important costs inherent in our business model? Which Key Resources are most expensive? Which Key Activities are most expensive?</p> <p>Is your business more: Cost Driven (leanest cost structure, low price value proposition, maximum automation, expensive outsourcing) Value Driven (focussed on value creation, premium value proposition)</p> <p>Sample Characteristics: Fixed Costs (salaries, rents, utilities) Variable Costs Economies of Scale Economies of Scope</p> 	<p>Revenue Streams</p> <p>For what value are our customers really willing to pay? For what do they currently pay? How would they prefer to pay? How much does each Revenue Stream contribute to overall revenues?</p> <p>Types: Asset Sale Usage Fee Subscription Fees Lending/Renting/Leasing Licensing Brokerage Fees</p> <p>Fixed Pricing: List Price Product feature dependent Customer segment dependent Volume dependent</p> <p>Dynamic Pricing: Negotiation (bargaining) Yield management Real-time Market</p> 	<p>Eco-Social Costs</p> <p>What ecological or social costs is our business model causing? Which Key Resources are non-renewable? Which Key Activities use a lot of resources?</p> <p>Evaluation Instruments: Life-Cycle Assessment (of products and services) Common Good Balance Sheet</p> 	<p>Channels</p> <p>Through which Channels do our Customer Segments want to be reached? How are we reaching them now? How are our Channels integrated? Which ones work best? Which ones are most cost-efficient? How are we integrating with customer routines?</p> <p>Channel Phases: 1. Awareness 2. Evaluation 3. Purchase 4. Delivery 5. After Sales (post-purchase customer support) ... of products & services and Value Proposition</p> 	<p>Eco-Social Benefits</p> <p>What ecological or social benefits is our business model generating? Who are the beneficiaries? Are they potential customers? Can we transform the benefits into Value Proposition? If yes, for whom?</p> <p>Instruments: Social Reporting Standard Common Good Balance Sheet</p> 

Based on: www.businessmodelgeneration.com



wad van waarde

Our Actions

In the next pages you will find an explanation of the steps we have taken to provide you with an example of how to get started.

1

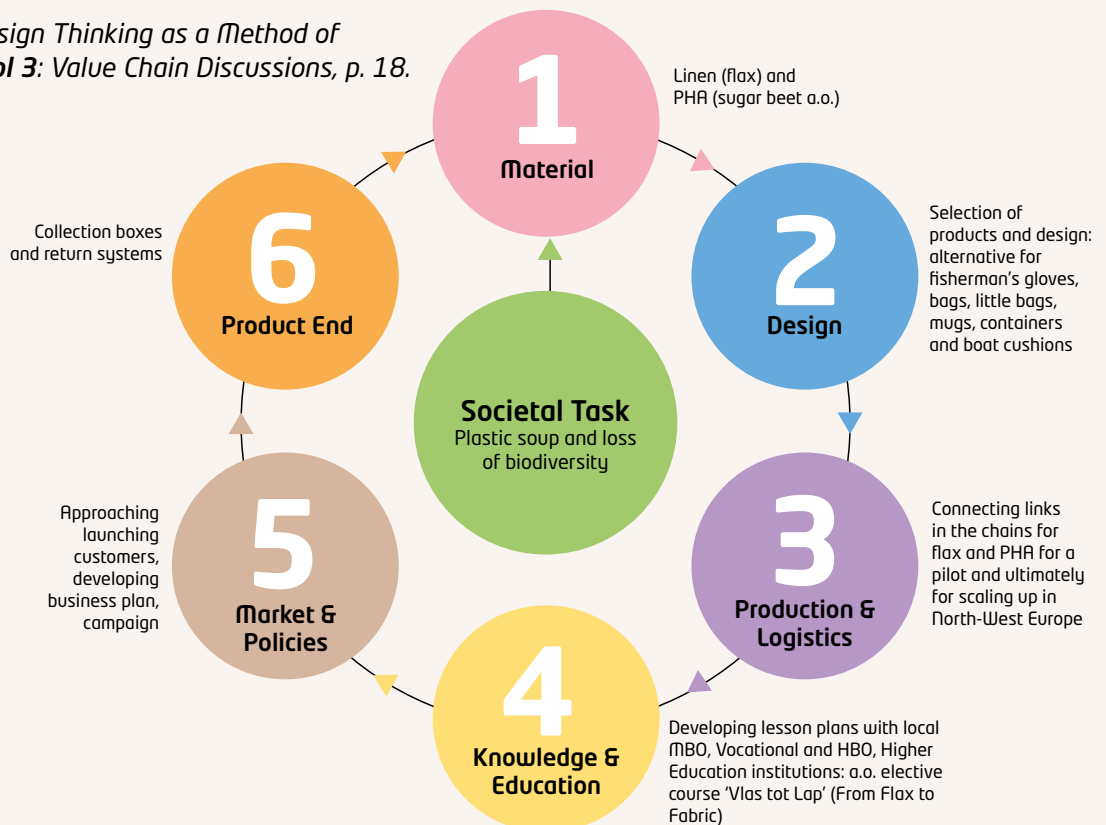
What is the Societal Task (the Cause)?

While developing the bidbook for the European Cultural Capital 2018 Leeuwarden / Friesland, one of the themes was 'Biodiversity'. The theme was instigated by the large green fields filled with rye grass in Friesland and the realization how this has contributed to the reduced number of insects and migrating birds in the province. From 2016 up to 2018, It Erfskip and House of Design developed sustainable souvenirs for the Cultural Capital, made from among other things, flax. The main theme was stimulating biodiversity. We also noticed that the necessity of a circular economy is becoming more and more noticeable, and we increasingly came across messages about the negative impact of micro plastics on ourselves and the environment.



- From this, we filtered two societal tasks:
1. stimulating biodiversity
 2. reduction of micro plastics

See also **Tool 2: Design Thinking as a Method of Co-creation** and **Tool 3: Value Chain Discussions**, p. 18.



*Pyt Sipma, farmer,
Timpelsteed in Engwierum:
"Cultivating flax is a
party for the soil."*

2

What is the Right Material and the Right Source?

We looked at which crops are being, and were, grown that contribute to biodiversity, and are also economically interesting for the farmer. What can be used to make plastic-free material? Flax emerged as a potential crop. Flax is a crop that thrives on the clay soil in the Northern Netherlands and that was already cultivated extensively in the area before the arrival of cotton and synthetic textiles.

Flax provides fibres, straw and linseed, from which linen, linoleum, linseed oil and insulation / board materials can be made. For Wad van Waarde we developed a linen collection.

For another material we made our choice based on the application, namely an alternative for single-use plastic products, such as plastic cups, plates, cutlery and drinking straws. Since going back to glass or ceramic tableware is not applicable everywhere, we looked for something that is lightweight and less breakable. We ended up with PHA (polyhydroxyalkanoate), a natural plastic. In the Northern Netherlands there are various initiatives for scaling up the development of PHA. When we started the preparations for this project (2017), the demand was not yet sufficient to give the offer a boost. We leveraged Wad van Waarde to put PHA on the map as an alternative and in this way contribute to scaling up demand.

The PHA can be made from anything that contains carbon, such as, for example, residual streams from sugar beets.

The first product we developed is the WadKop.



We chose to run the two different processes, creating the chains around resources and developing products, in a parallel fashion. For it is not possible to start making products right away from the local material, when the chain still has to be developed. The products are necessary to bring the 'new' material to the attention of people, and in this way boost demand. This interaction in order to boost demand, is crucial.

In order to already be able to make products, we first purchased material from non-local sources. As soon as the material will be available from local sources, we hope that the interaction we started between demand and supply is already developed to an extent that the market is rearing to go.

See also **Tool 1: Societal Task Identified**, p. 17



3

Design

The design determines the value of a product. Appearance and quality are important for locally manufactured products. The price is often substantially higher than of products manufactured in other continents, since we pay a Western hourly rate. In the design, we chose to take the values of the Wadden Region as a starting point. For the design House of Design met with the 'users' of the Wad: residents, visitors, entrepreneurs and governments to retrieve the values. From this a palette of colors, lines, shapes, and even words, has emerged that is applied in the designs.

See also **Tool 2: Design Pressure Cooker**, p. 22 and **Tool 3: Design Brief**, p. 23.



mounds / terps



salt marsh



fyke net



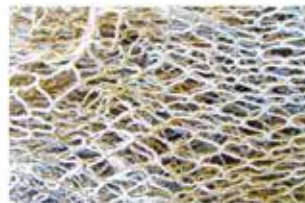
sea salt



birds



space / sky



fishing net



clay



lauwerszee



field



fisherman's jumper



shrimp



flax



sand



wind



tides

4

Production and Logistics

Wad van Waarde's objective was that every step necessary to get from resource to finished product, could be taken in a one day's drive. For the production of linen from flax, this was successful. At the moment of writing (2023) the PHA chain is not yet completed.

For linen it looks like this:

1. cultivation and harvesting - Friesland
2. processing - Zeeland
3. spinning - Northern France
4. weaving - Overijssel
5. sewing - Groningen and Friesland

First, we mapped all the necessary product steps and then we researched which businesses were present within a 600 km radius.

The cultivation and processing of flax to fabric to linen product

This process comprises of the following steps:

- soil preparation
- sowing
- pulling or picking flax
- retting, turning and pressing
- rippling, breaking, scutching and processing into hackling sliver
- spinning into yarns
- weaving into cloth
- sewing into product

Since the cultivation and processing of flax in Friesland and Groningen has completely disappeared, knowledge is scarce and the material is no longer available. For harvesting flax special machines are needed. Thanks to the cooperation with Van de Bilt Zaden en Vlas we were able to rent these machines, so the plots could be harvested.

They own a factory in Sluiskil, Zeeland, where they are able to process the flax to hackling sliver. The nearest flax spinning mill is Safilin in Béthune in Northern France. The linen yarn is transported to Enschede Textielstad so it can be woven into cloth from which ultimately products can be sewn by Vanhulley in Groningen.

See also **Tool 3: Value Chain Discussions**, p. 18.



5

Knowledge and Education

Since the manufacturing industry has almost completely disappeared from the Netherlands by outsourcing the production to other continents, the 'manufacturing knowledge' has disappeared. Added to that, since the rise of computers in the Eighties, many craft rooms in colleges have been replaced with computer rooms. Craft or handicraft has a bad image: dirty work, with lousy pay. People younger than 45 often do not know how to make a stool or shorten a trouser leg. Together we have become a lot less handy and a great deal more dependent. In order to achieve a local circular economy we need those hands again, and the education to train people for this.

As part of Wad van Waarde, House of Design and It Erfskip created a curriculum, *Vlas tot Lap* (From Flax to Fabric), suitable for secondary and vocational schools and Higher Institutes. By means of research and design questions, various students and teachers of Van Hall Larenstein, NHL-Stenden and Hanzehogeschool were involved, and we were able to inspire them on how a local circular economy is truly possible!

See also **Tool 8**: *Developing a Lesson Plan*, p. 25.

6

Market and Policies

We already have so much 'stuff', so how do you put a new product on the market? In order to select the right products, we looked at who are benefiting from the products, and who are open to it. We first considered super markets, but that entails so much more. In the end we focussed on the farm shops and local shops associated with Waddengoud, market stands with organic products and speciality shops or delicatessen shops. We also focus on governments and major companies who purchase the products to give away as a promotional gift or Christmas gift. The latter group is also willing to pay more for the products than the private buyer. This means we will be able to scale up sooner, and the price will eventually decrease. We worked out our strategy for the various products in the Sustainable Business Model Canvas, see chapter 'The Tools'. We also investigate how we will be able to apply a distribution model among the chain partners, so we will all benefit from a good harvest and sales, and we can share the risk when the harvest has failed.

See also **Tool 9**: *Sustainable Business Model Canvas*, p. 26.

7

Product End

When the products have been worn down, the products become a resource. In order to close the chain, there needs to be a resource owner.

For the linen products we developed collection boxes that are placed at various locations, such as thrift stores. The linen we collect from these boxes is sorted and evaluated to see if little bags can still be made from them. If not, the linen is shredded and mixed with recycled cotton, so new yarns can be spun.

For the PHA products collection boxes will also be placed at various locations. When the PHA is recycled, it is no longer 'food proof' and it is no longer allowed to be a product that comes in contact with food. The ring of the WadKop, however, can still be made from recycled PHA. Other products for which we would like to develop of plastic products that could end up in the environment are for example clothes pins or sunglasses and spectacle cases, but also buttons or zippers of the yet to develop linen outdoor coats - the Wad Parka.

See also **Tool 1**: *Societal Task Identified*, p. 17



wad
van waarde

**The Results/The Outcomes -
Tangible Results**

- the products
- the chains for flax and PHA

The Products

Reusable Waddendesign linen products



About linen

The project Wad van Waarde reintroduces the cultivation of flax in the Northern Netherlands as a biobased resource. Flax promotes biodiversity, absorbs CO₂ and improves the soil. Wad van Waarde is creating a value chain around flax, in order to drive the production of linen as an alternative for synthetic textile, of which the micro plastics negatively impact humans and nature.

By purchasing these linen products you will contribute to a litter-free Wadden Region! From the profit we will be able to make new micro plastic-free, reusable, biobased and bio-degradable products.

Sustainability

Flax (from which linen is made) uses much less water and pesticides than for example cotton, and it is extremely durable. Should your bag become damaged, just turn it in. From old linen other products can be made, or new linen can be woven.

Properties

- Biobased (renewable resources)
- For multiple use
- Material: 100% linen
- Cleaning: washable at 30° to 60°
- Antibacterial
- Anti-allergic
- Quick-dry
- Durable
- Locally designed and produced

Wad(Re)Zak

With this linen bag you can shop zero waste. Useful for carrying your vegetables, or to store your loose cables. Without plastics, so good for your health and good for the environment. With a unique Waddendesign. Dimensions: about 25.5 x 20.5 cm.



WadBroodZak

With this linen bread bag you can shop zero waste. Useful for carrying or storing your bread or sandwiches. Without plastics, so good for your health and good for the environment. With a unique Waddendesign. Dimensions: about 27 x 49 cm.





WadZak

With this linen bag you can shop zero waste. Useful for carrying or storing your vegetables or fruit. Without plastics, so good for your health and good for the environment. With a unique Waddendesign. Dimensions: about 24 x 22 and 36 x 34 cm.



WadTas

This linen bag is very durable and sustainable. Useful for carrying your groceries in. Without plastics, so good for your health and good for the environment. With a unique Waddendesign. Dimensions: about 50 x 45 cm and a useful compartment for your wallet and/or mobile phone.

WadKop - the reusable cup

About the WadKop

The WadKop is a reusable cup, biodegradable in the sea and nature, with a ring and a detachable lid. Suited for warm and cold drinks to-go and useful for shopping zero waste. By purchasing this cup you are contributing to a litter-free Wadden Region! From the profits we will make new micro plastic-free, reusable, biobased and bio-degradable products.

Properties

- Renewable natural resources
- For multiple use
- Buying, transporting and storing fresh products leak-free (olives, yoghurt, nuts)
- Lid can be used as a coaster
- Rimless, easy to clean
- Can be attached to bag or coat through a ring for a lanyard or carabiner (not included)
- Locally designed and produced

Technical specifications

- Made from PHA
- Contents 350 millilitres
- Dimensions 11.5 x 9.8 cm
- Food safe
- Dishwasher safe
- Recyclable
- Fully degradable in the sea and nature without leaving behind any micro plastics
- WadKop broken? See website for info



In 2023, 11 ha of flax was sown by 4 farmers. The goal is to expand to 50 hectares in 2024, with the business case being in balance with investments in machines, seed and processing in relation to the yield. The ambition is to expand this in the coming years to 150 ha with a Northern flax cooperation, comprising of 12 farmers.

A Flax-chain in the Northern Netherlands

In order to inspire farmers to start sowing flax, we wanted to show the feasibility of the project. We compared flax, sugar beets and wheat. This comparison showed that cultivating flax had potential, even without taking into account the additional benefits, such as a larger biodiversity, CO₂-storage and soil improvement.

In the first 3 years farmers received support so they could get acquainted with the cultivation of flax by means of reimbursements. These reimbursements are comparable with the reimbursements from nature organisations for sowing wild flower mixes. Currently there is a discussion about adding flax to the cultivation plan, without replacing Agrarisch Natuur- en Landschapsbeheer (Agricultural Nature- and Landscape Management). The intended cultivation plan will then include: carrots, wheat, flax, potatoes, dormant crops and wild flower mixes. The demand for flax is significantly increasing. A number of fashion brands would like to become more sustainable and are adopting linen, but biobased construction is also on the uptake. While we are writing this toolkit, we are talking with parties in the municipalities of De Waadhoeke, Het Hogeland and Oldambt about the possibilities of cultivating flax.

The prospect is that we will be able to grow to 150 ha in 2025. That is... if enough seed is available, because as a farmer said 'the weather determines everything': On the other hand we notice the impact of climate change. In Friesland half of the 2023 harvest, 11 ha, has failed. In spring the land was too wet to sow, and only by the end of April and the beginning of May, the land could be sown. Two extremely dry months followed, and when the flax was retting in August, it kept raining, so it couldn't be brought indoors. This was a problem for a great many farmers, and for many other crops as well.

The aim is to grow in a total of 60 hectares of flax in 2024 where the farmers involved actively approach other farmers to join. Additionally we perform research in collaboration with Van Hall Larenstein, Biosintrum and the RUG, aimed at improving the business model for farmers (for example by means of reimbursements per kilogram CO₂-storage).



PHA-chain

Wad van Waarde works with PHA, the abbreviation of the scientific name PolyHydroxyAlkanoates. These PHA's are not created through chemical processes from fossil resources, but by bacteria that transform biomass and use it for their own energy storage (=PHA). PHA's are a biobased and renewable resource and boast a number of unique properties.

Biologically degradable

PHA's are fully degradable in natural environments, such as soil and water. The material is degraded by means of (micro) biological activity. This makes them environmentally friendly and a sustainable alternative for non-degradable plastics. Yet PHA-products should not just be thrown away, but instead collected, so the resource can be recirculated in the value chain. We are intensively collaborating with the chain to ensure that a solid collection chain is also initiated for, for example, the WadKop.

Biocompatible (safe for humans and animals)

In general, PHA's are biocompatible and rarely cause allergic reactions or toxic effects in humans and animals. Therefore, they can be safely used in medical applications for example, such as tissue and implantation materials. PHA's have been approved and certified by the Food and Drug Administration (FDA) for use in the administration of medication and tissue technology. Therefore, they are most suited to be used as material in reusable cups.

Bioproducibility

PHA's can be produced by means of microbial fermentation, where micro organisms such as bacteria and algae are used to transform organic carbon sources into polymers. As a result, the production of PHA's is renewable and less dependent on fossil fuels.

The degradation of PHA depends on the presence of bacteria. Presently (2023) it is known that there are 23 different types of bacteria that are able to break down PHA. In the human body flora (intestine, skin, mouth and stomach) 89 different bacteria are present! The good news is, that some bacteria in the intestinal flora are able to break down PHA. Yet none of these 23 bacteria are present in your mouth, which means that you can drink from your WadKop without it breaking down (which is quite useful!). Fishes also carry bacteria that break down PHA. This is also true for the soil.

WvW: *Wad van Waarde partner Ecoras developed an optimization tool for Wad van Waarde. With this tool already in the design stage can be explored where there is still room for improvement of the impact of the environment in the value chain. This is based on the LCA-methodology. This method maps all steps in the chain and considers the impact of this chain on various environmental subjects, such as climate change or acidification. With the tool a number of scenarios can be calculated with just a few clicks. In this way, key questions can be taken into account right from the design stage, such as using more local resources, producing PHA more locally or by reducing the transporting distances in the value chain. We then leverage this knowledge to keep the impact throughout the chain as low as possible.*

Various application possibilities

PHA's are used in various industries, including packaging, agriculture, medical science, textile, and more. They can be used for the production of films, coatings, fibres, and even 3D printed objects, making them a versatile material for sustainable solutions. Therefore, we chose to use PHA injection moulding for the WadKop.

Because of its unique properties, PHA could serve as a replacement for traditional fossil plastic materials. On top of that, PHA is broken down faster than fossil plastics, should it accidentally end up in the environment, without the release of harmful micro plastics. When minuscule particles PHA are released from the cup, they will fully break down within a few months (largely dependent on the environment). PHA is broken down into building blocks (water, humus and CO₂) that are directly being used again by the present bacteria and fungi, without producing harmful substances that might be dangerous to humans and the environment. So when a complete WadKop accidentally ends up in the sea or a ditch, it will take a maximum of 5 years before it has broken down completely (as opposed to 100 - 500 years for conventional plastics).

At the moment in Wad van Waarde we are still working with PHA produced in Asia. Our aim, however, is a more local PHA-chain. In the next few years, Paques Biomaterials will realize its production facility in Emmen for locally produced PHA from biological residual streams. The material we are using is injection moulded by a local injection moulder (HGP Moulding) to create the WadKop. In collaboration with a sheltered workshop in Emmen (Emco) the cups are packaged and prepared for shipment to companies or governments who will be purchasing the WadKop. Along with the partners we worked out a model for shared ownership. The profits we are generating will be directly invested again in the further optimization of the local PHA-chain. The creation of a collection and recycling chain are the next steps to be explored.

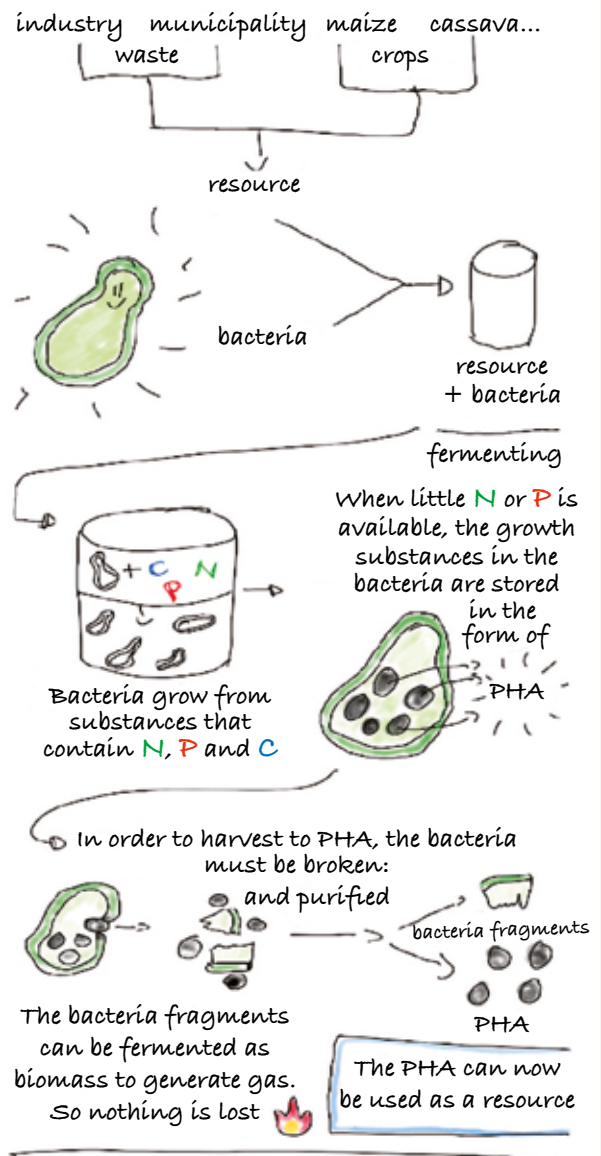
Added to that the partners of Wad van Waarde are involved in the InterregA project EmPHAtie, in which the injection moulding with PHA will be explored to a further extent. A PHA Academy is being developed for businesses as well. Businesses still have insufficient knowledge about the application possibilities of PHA's within their own production chains. In the PHA Academy businesses get acquainted with the opportunities that PHA's have to offer as an alternative for fossil plastics, through a combination of theory and practice. We want to drive demand for PHA's so the material will become increasingly available and the value chain will evolve even further.

Growing the Demand for Alternative Products/Unique Collaborations

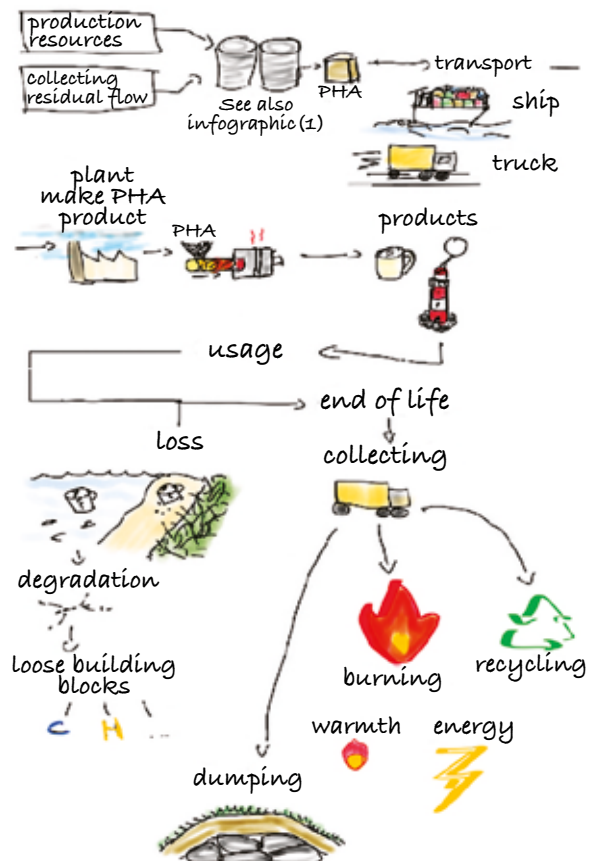
Because of press releases and societal media posts the creation of the flax chain has not gone unnoticed. This has resulted in a number of companies purchasing flax in order to develop a product together. This concerns actual example products:

- Cyclist's poncho: a poncho for cyclists in which they can change their clothes and at the same time dry themselves off.
- Curtains: in collaboration with ledema project upholsterers a collection of micro plastic-free curtains is being developed for the healthcare industry.
- Cooking cloth: an entrepreneur wants a cool cooking cloth from local linen.
- One of the farmers has been approached by a fashion brand to manufacture linen shirts.

1) Bacteria infographic



2) Production chain PHA products



Example Design Brief Wad van Waarde

Planning:

- Apr/May 2023 first tests ready
- Sept/Oct 2023 sneak preview for conference WvW
- Launch of product ready for production, March 2024
- Worked out product ready for production, including production plan July 2024
- Complete project ending December 2024

Financial:

Agree on a fixed budget in advance, both for commitment as material.

- For design, hours, travelling expenses, material and contracting third parties.
- Wad van Waarde is able to supply residual flax streams through the partners involved.
- This goes for PHA as well.
- Wad van Waarde has a budget for product photography, design and communication.
- On request, Wad van Waarde can organize a Pressure Cooker.

Assignment description:

Design a multi-use, biodegradable in the sea and nature, product ready for production, that could form an alternative for a product that leaves (micro) plastic litter behind in the Wadden Region.

We chose a WadKrat, a product that is useful for the users* of the Wad for groceries, to store and preserve stuff, to present products or maybe even to use as a cabinet or sitting object.

The product is made from Dutch flax. Another material could be PHA.

Fastenings, hinges and coatings, if any, naturally also need to be degradable. Through the network of Wad van Waarde ideas can be contributed.

In order to receive feedback from the users of the Wad, a Pressure Cooker can be organized. The semi-finished product can then be presented to the desired stakeholders, so the final product and its functionality can be evaluated.

**) Target group: Users of the Wad: inhabitants, day tourists, families, (hospitality) entrepreneurs, fishermen, mudflat hikers, sailing boat tourists, motorboat tourists, excursion boats, shipping companies, terrace visitors, cyclists, pedestrians, or a combination of the above.*



Curriculum Van Vlas tot Lap (From Flax to Fabric)

Phase 1

What is textile

- various resources
- various processing techniques
- dye and color
- the textile trade, who make money from it and what is true worth, new business models
- textile on the waste belt

Phase 2

From Flax to Fabric

- What is flax, what was flax: history.
- Cultivating the flax and herbs (because of natural pigments): learning about the soil, biodiversity, resources, seasons.
- The process from flax to semi-finished product: ancient techniques, new techniques, knowledge of machines.
- Processing the semi-finished product: spinning, weaving, knitting, crocheting, lace making.
- Coloring the textile: natural and synthetic dyes.

Phase 3

Design and show

- Design an applied product with various raw materials, among which flax, that is telling the story.
- Fill in all the steps of the local value chain and explain which parties are involved for each link and the role they have.
- What does the production process look like?
- How do you approach the market (storytelling)?
- What is your business concept?



A Glimpse into the Future

wad

van waarde

The Non-Tangible
Results





Wad gaat Om

A glimpse into a program in which a system change in the Wadden Region is taking place.

The activities of Wad van Waarde have led to the development of an even bigger program for reducing the threat of plastic litter in the Wadden Region, called Wad gaat Om (Wad Turns Around). A major task in the Investeringskader Waddengebied (Framework of Investment Wadden Region) that will run from 2024 through 2028.

Wad gaat Om is a systematic approach for tackling plastic pollution both curatively and preventively. In this way the clean-up of plastic litter is becoming more structured and expanded, and the further processing of the cleaned up plastic optimized. This takes place both on the islands and along the Wadden Coast, as well as the influents towards the Wadden Sea. The cleaned up material provides an insight into which products and materials often end up in nature. They might be deduced to their sources (the industry or the area of origin). Preventively we look at how single-use of plastics can be prevented and in any case reduced, by informing entrepreneurs and governments and facilitating other buying strategies. Additionally, an improvement round about the collection and processing of waste can be added.

Meanwhile various biobased, reusable and recyclable alternatives are being developed for the types of plastics we now find in nature. In doing so, the experience and knowledge of Wad van Waarde is used to build on from which a 'Waddenstandaard' (Wadden Standard) will be developed. We are identifying bottlenecks in the system and mapping possibilities for a solution. The goal is to ensure that the developed systemic approach can be copied, so the approach can be globally adopted. The Wadden Sea, UNESCO World Heritage, is a canary in the coal mine and could, by means of the systemic approach as described in this toolkit to reduce the threat of plastics, become an example region for the rest of the world..



Flax Gives a Taste For More

The best way is to just go ahead. After having grown flax on a small scale for three years, other Northern farmers are starting to take an interest. Slowly we are scaling up! Most probably in 2024, we will be cultivating approximately 60 ha of fibre flax, spread across the municipalities Waadhoeke, Noardeast-Fryslân, Het Hogeland and the Oldambt. And in 2025 we will be scaling up to approximately 150 ha (370 acres).

Various municipalities have indicated they want to help by guaranteeing an order. For example, they will purchase linen curtains for their own properties and insulation materials for new construction projects.

This is exactly what we need to make the chain cost-effective, so the chain can stand on its own! This will leave you wanting more.

Colophon

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*"We aim for a
(micro) plastic-free
Wadden Region
in one generation"*

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