



GUIDED CHOICES

TOWARDS A CIRCULAR BUSINESS MODEL

COLOPHON

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A new economy is dawning. An economy that creates new values. An economy that produces products today, which will become the resources of the future. An economy based on renewable sources of energy. An economy that connects responsibilities for people, planet and economy. An economy that is profitable.

The Circular Economy

The Circular Economy is an economy that enables producers to show the value and quality of the performance of their products to the customer. Products are designed for performance and also for re-use of all materials in different phases of sharing parts up to recycling of (almost pristine) resources. The Circular Economy is the logical descendant of the linear economy that dominated since the start of the industrial revolution. In a sense, it seems as if we are about to enter a revolution, but in practicality it is evolving from existing business models.

The introduction of the Circular Economy provided a new vision on the treatment of resources, energy and primarily for new ways of value creation and entrepreneurship. It is based on the principles and ideas of Cradle to Cradle, introduced by William McDonough and Michael Braungart. The Circular Economy is the trending topic in business and policies. But how can you benefit?

Publication: source of inspiration and support

This publication is meant to be a source of inspiration and support for small- and medium enterprises (SME's) to enter the Circular Economy. The title is also a promise; it provides Guided Choices Towards a circular Business Model.

C2C BIZZ the initiator

The project C2C BIZZ wants to give companies and entrepreneurs specific guidance on the Circular Economy topic to show how the Cradle to Cradle philosophy can lead to profits. They have initiated this publication. The content was made based on questions; the questions that were asked during interviews and roundtable discussions with various businesses. We are using these questions to cover several subjects related to the Circular Economy.

Your choices

Do not expect to be provided all the answers. That is quite impossible. The ultimate direction you and your company will traverse is your decision. Our goal is to provide some guidance for the subjects critical to consider when developing a circular business model. Guided Choices are to be made which will affect your existing business, new product - service combinations, product design, customer relations and all financial aspects of your organization.

This document has been made for the entrepreneur who is looking for chances to participate in the Circular Economy. It will help to define opportunities with an open eye for the pitfalls that may appear along the road. A common pitfall facing companies at the initial stages of engaging circular economic business models is the thought that one has to respond to every aspect of the project at the same time. You don't. First of all your regular day to day business needs your continued attention. Secondly, you need to give your customers time to respond to changes in your offerings. Thirdly your product-service model needs some reshaping and being in a hurry is a guarantee for failure or at least no guarantee for success.

The focus

The focus is on the choices that you need to make in your search for a circular Business model. Note that there will be multiple solutions for the same problem; you are free to create the solution that suits you best. Enjoy the journey, and be prepared to re-visit some of these choices in the near future as the innovations related to a Circular Economy have just begun.

HOW TO USE THIS DOCUMENT?



The section names refer to the questions asked by your colleague entrepreneurs.

There are many books and reports around the Circular Economy, remanufacturing and service based product development. How is this document different?

This document can be read as a workbook: start at the beginning and read on to the end.

But, the purpose of this document is to inspire you and funnel your thoughts through the 5 step approach you see below.

Each section contains a number of questions presented as puzzle pieces. By the end of each section you have completed part of the puzzle.

The Mindmap that you will find after each section reminds you where you are in the process. After the last section you have completed the puzzle.

Legend:



Questions you should ask (and answer) yourself are formatted in a green box such as this one.

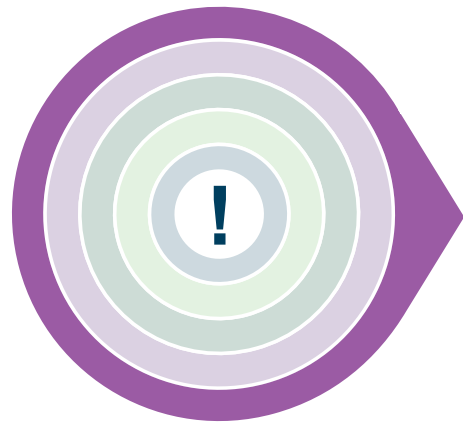


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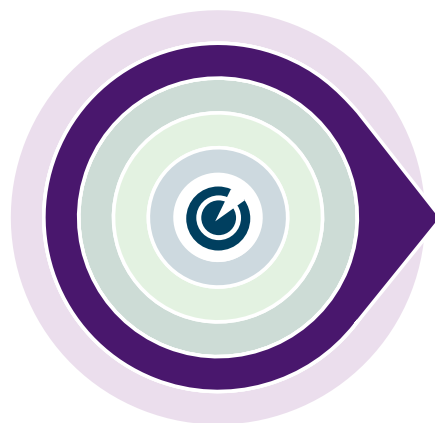
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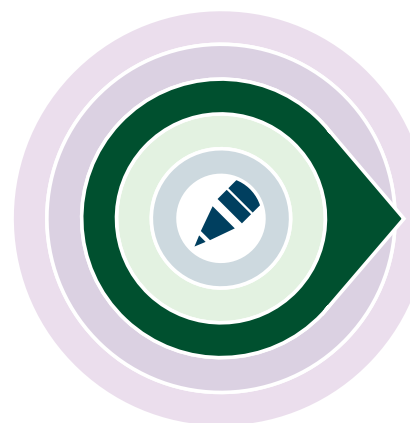
READ

about the Circular Economy



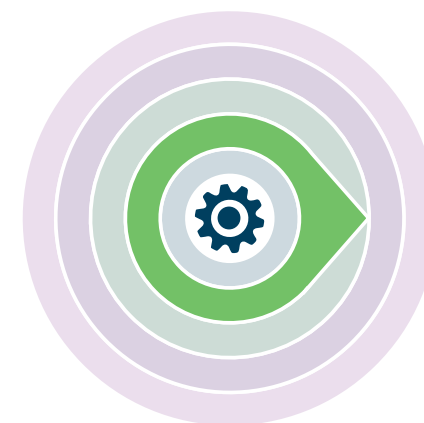
LEARN

about your company and partners awareness



TALK

about product redesign



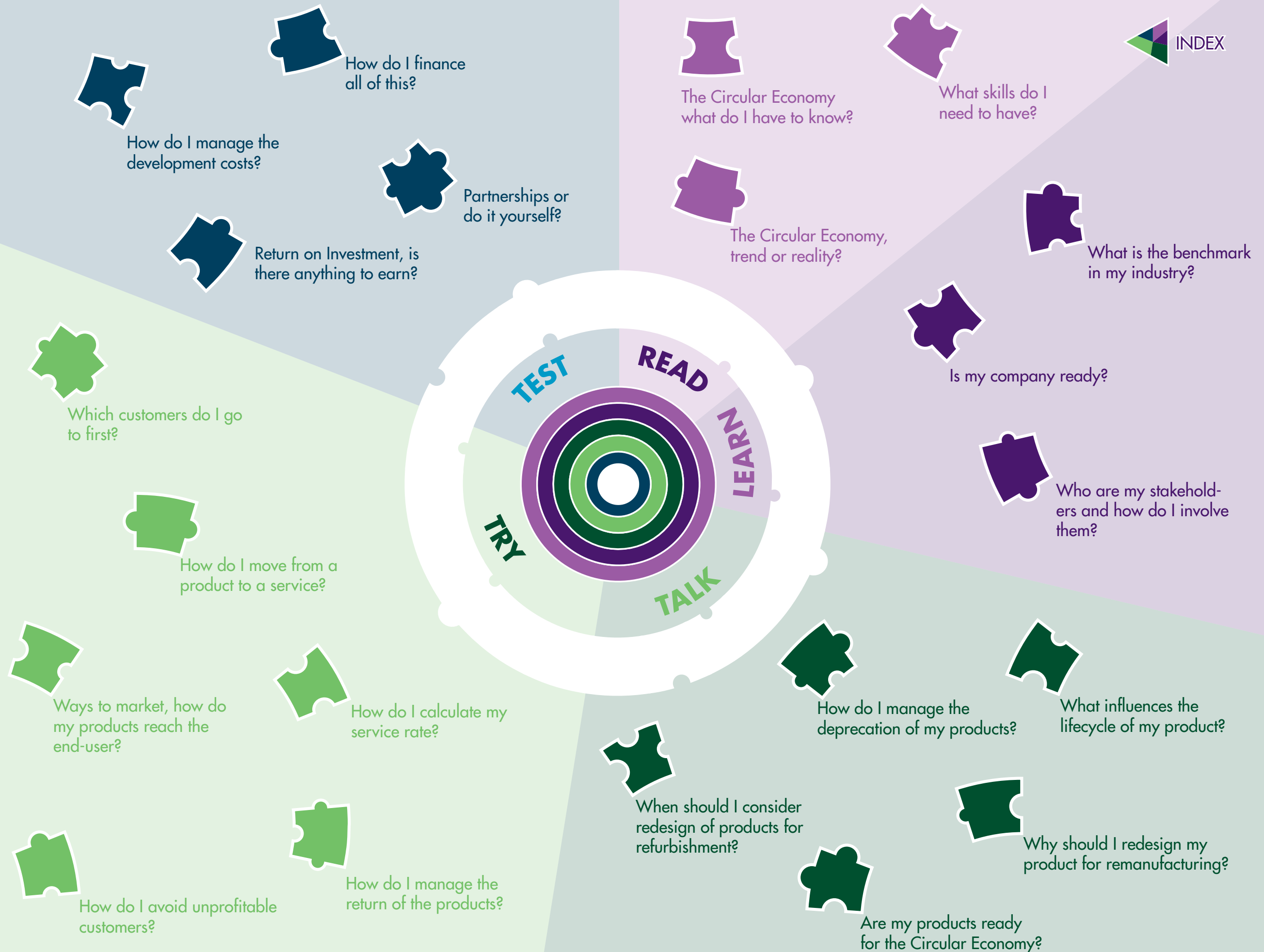
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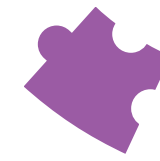
to come to a service model redesign



TEST

how you can make this a profitable business model.





READ

1. about the Circular Economy



This section is about the basics of the Circular Economy. When you are finished working through this section you will understand the theory behind the Circular Economy. It provides you insight in the differences in the economics of the Linear and Circular Economy. You will know where to find key literature, movies and discussions and you will be up to date with most of the concepts and show cases.

1.1 THE CIRCULAR ECONOMY WHAT DO I HAVE TO KNOW?

The Circular Economy is an answer to the problems that vex the current linear economy.

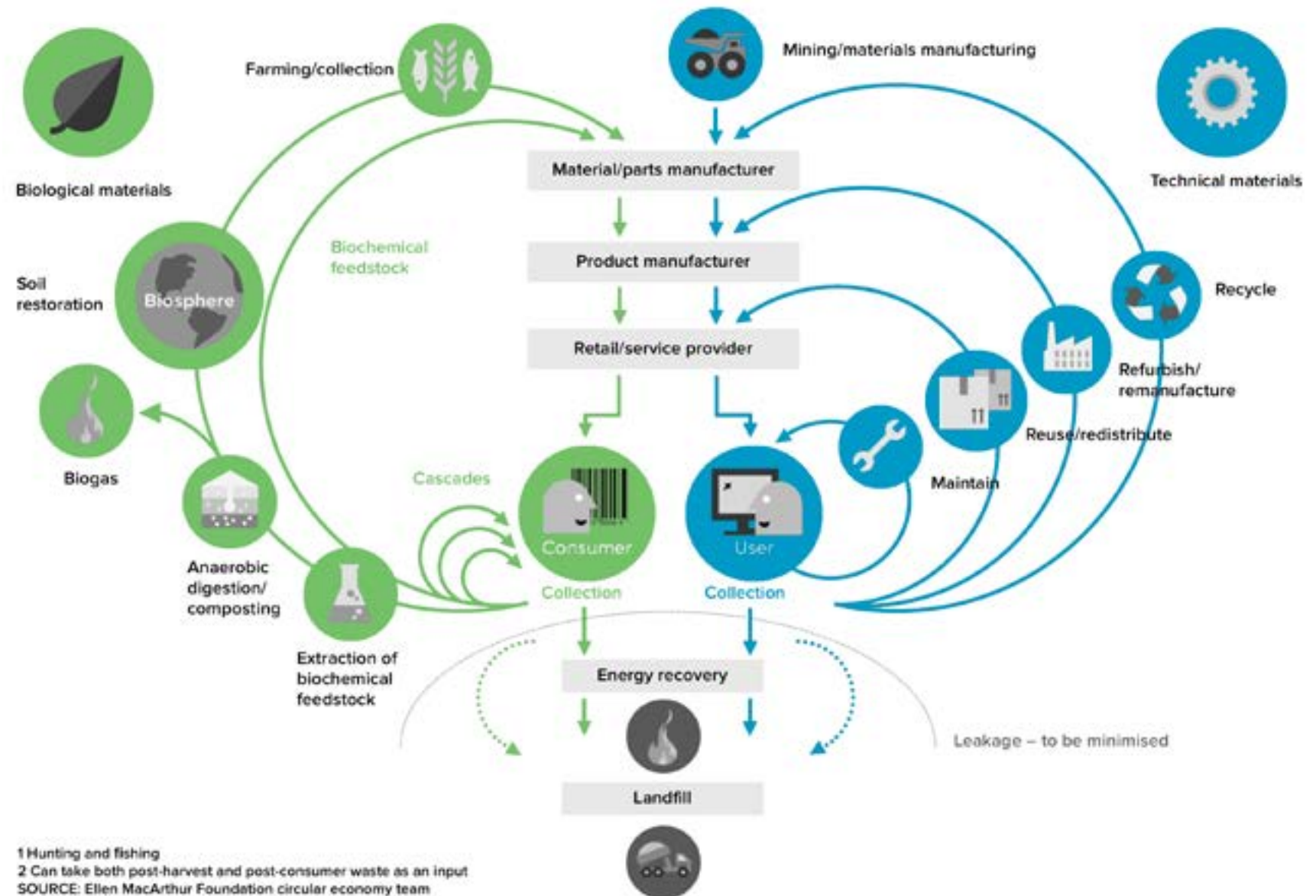
The Circular Economy has continuous loops of (raw) materials, and also sheds light on how new business models will change the current models. In contrast, the current linear economy provides one way tickets for precious resources.

These one-way tickets are responsible for a scarcity of resources, waste and pollution which cause enormous costs in the public domain such as: the restoration of ecosystems and measurements systems needed to create an adaptive society that is able to handle the consequences of this one-way-system.

The Circular Economy promotes a systemic change that creates continues loops of materials: resources are only temporary part of a product and at the end of life or end of use (of the product), the resources will be available again for re-use in new products..

This model of the Circular Economy is based on the Cradle to Cradle philosophy. Cradle to cradle distinguishes two circles: the biological nutrients and the technological nutrients. Both kinds of nutrients can be used in production.

The Ellen MacArthur Foundation¹, in cooperation with McKinsey, created a focussed analysis of the economics of a Circular Economy. In the illustration on the right you find the basics of the Circular Economy.



1) Towards a Circular Economy' part 1 & 2, Ellen MacArthur's Foundation, 2012 & 2013 [interactive system diagram](#)



Get up to speed with the following accessible video's and websites on this subject:

Youtube

- ▶ [The story of stuff](#)
- ▶ [The story of solutions](#)
- ▶ [Re-thinking progress](#)
- ▶ [From Customer to user](#)
- ▶ [Cradle to Cradle by Reggs](#)

Websites

- [Ellen MacArthur Foundation](#)
- [Wikipedia Circular Economy](#)
- [Cradle to Cradle / EPEA](#)

TED talks

- ▶ [TED Talks on Circular Economy](#)

The biological nutrients are used in cascades in order to gain as much value as possible from them. In the end these materials can add value to the soil after composting or digestion. Quality of the soil is the key factor in this circle, because we need fertile soils for future food and feedstock.

Technical ingredients can also be in closed loops. After the first phase of production, products can be maintained, re-used, remanufactured or recycled. Through the process of recycling, the Circular Economy re-emphasizes the quality of all resources; it is up-cycling as opposed to current strategies which are in effect down-cycling.

Although the waste processing sector sees potential positive uses for down cycled materials, it is a non-sustainable leakage that can and should be minimized and ultimately eliminated.

Throughout this new approach of material loops there is a new economic model that helps on a systems level to facilitate these changes. It was developed by prof. dr. Walter Stahel². He introduced the concept of 'performance based contracting' in which there is no ownership for the user of a product, the producers keep ownership and the user pays a fee for the performance of a product. This is fundamental in the new economic arrangements of the Circular Economy. It implies better possibilities for producers to have control over their resources; it will bring focus on maintenance, reuse, refurbishment, remanufacturing and mining for existing minerals in their own products.

From a systems perspective the change in ownership, from customer to producer, brings some major changes:

- 1. The producer is responsible for the performance;**
- 2. The customer becomes user of this performance;**
- 3. There is a feedback-loop for the producer.**

Ultimately, the producer receives incentives, for refurbishment or mining of raw materials and components in the end-of-life products.

2) "The Product-Life Factor", prof. dr. Walter Stahel, Product Life Institute, Geneva, 1982

1.2 THE CIRCULAR ECONOMY, TREND OR REALITY?

The Circular Economy is a 'new' perspective on the economic system, but does it have a fundamental basis in reality?

The Circular Economy is an answer to the current linear economic system that can best be characterized as “take-make-dispose” and often referred to as a “Cradle to Grave”. The circular approach is: “take-make-use-reuse-remake-reuse-...”. It is based on continuity in the use of materials and business models that support a new system of value creation.

A Circular Economy is an industrial system that is restorative or regenerative by intention and design. It replaces the ‘end-of-life’ or cradle to grave concepts with restoration, incorporates and promotes the use of renewable energy, eliminates the use of toxic chemicals (which impair re-use), and aims toward the elimination of waste through the superior design of materials, products, systems, and business models. This is based on the conceptual work of “Cradle to Cradle”³ and the most elementary aspect of which is product innovation.

A Circular Economy focuses on the combination of products and services incorporated into a business model that facilitates a company's ambition to gain value and manage resources in the short and long term thereby adding value to living ecological and societal systems.

In theory the Circular Economy is based on ecology, thermodynamics and biology. It is about ecology because there are all kinds of loops in which different forms of life are interdependent. This interdependency is essential in ecology and in a Circular Economic model. It is also about the basics of thermo-dynamics. The second Law of thermodynamics is commonly attributed to Rudolf Clausius who stated “The entropy of an isolated system not in equilibrium, will tend to increase over time, approaching a maximum value at equilibrium.” In other words the quality of all materials used in the production of products is often compromised by entropy. This means that it will require extra energy to retain the quality of materials; real energy, labor or both. In biology solutions have developed through evolution; a sharks skin helps the swimming speed of the shark.

These solutions can be the basis of new product development. In ‘Bio mimicry’ technicians look for natural solutions in order to mimic them for better products.

Circular Economy is about closing the loops, using energy and creation of smart, good, products.

Such a Circular Economy is based on a few principles:

1. Design for reuse
2. Build resilience through diversity
3. Rely on energy from renewable sources
4. Think in systems
5. Share values

Design for reuse

Every product has a second life. Whether it is performing in a secondary market or through the recycling of its' essential parts or materials. The first step is to ‘design out waste’. Recovery of materials is the least of all possibilities for re-use of the products, parts or elements. From an economical perspective, the embedded value of a product needs to be carefully accounted for.

Resilience through diversity

The capability of ecosystems to be restorative and resilient to change is based on (bio) diversity, and for business systems this resilience is based on different kinds of diversity: connections, customer relations, supplier relations, resources, and innovations.

Energy from renewable sources

Circular businesses will need energy. The recovery and remanufacturing of materials all depend on the availability of energy in two forms; physical energy and labor. The Sun provides 9000 times the amount of energy the whole human system requires every second of every day: it will be the primary purpose of the next few decades to harness that power and utilize it for all of our energy needs.

Think in systems

The Circular Economy is aimed at continuous loops. This is a systems approach. These are loops of materials and nutrients, but also they are loops of responsibility. This implies ‘feedback loops’; providing the producers information on the quality of re-use or recycling of high quality products and resources. The loops of responsibility provides the producer with a higher level of responsibility for the care of not only the products, but also for parts and materials required for this care.

Share values

Economy is about business, creating products and making profits. In living systems this is known as ‘Symbiosis’. In the Circular Economy it is about creating values through performance and cooperative entrepreneurship. Creating shared values for all participants helps a long term business perspective become a reality.

3) Cradle to Cradle, Remaking the way we make things, Micheal Braungart and William McDonough, North Point Press, 2002

These are real concepts for an entrepreneur to consider. One can see what it implies for the existing business model: a company is linear when it produces a product based on technical or biological resources and after production sells it to a customer (a person or organization) with limited guarantees and the customer is owner and responsible for its maintenance and end - of - life treatment. Service and maintenance may or may not be included in this process.

The new business models are based on production and the delivery of product **performance** to the end user. The manufacturer provides not only the product but the maintenance and service required to achieve optimum performance of the product to the end user.

The actual system is becoming more and more of a hybrid solution: utilizing the advantages of both, or focus on diminishing the disadvantages of either system.

One could say it is like the transition in propulsion systems in seagoing ships: steam vessels with sails (new) replaced those with sails only (old) in the late 19th and early 20th century. The hybrid car is an other example of using new technology (electric) with the security of the old (combustion engine). This hybrid evolution appears again and again throughout history. Consider examples in the form of power distribution; in the early 20th century local energy providers created low voltage DC power through multiple generators which were only able to provide power over short distances. Weaknesses in that system spurred innovation such as the switch to high voltage AC which allowed a centralized power grid to transport energy over long distances. Now this is happening again through the prevalence of efficient sustainable local energy solutions such as windmills, geothermal, and solar to name a few.

The hybrid situation is part of the transition: we use the good elements of the old system to compensate the first failures of the new system. It is all about reliability.

So now that the change from linear to Circular Economy is beginning, we will tend to create hybrid solutions first. Perhaps this might take the form of a product based on Cradle to Cradle principals, but still within a sales based business model. This is not bad, but is not a fundamental change. In the long term it will need to evolve and adapt to the new circular system.

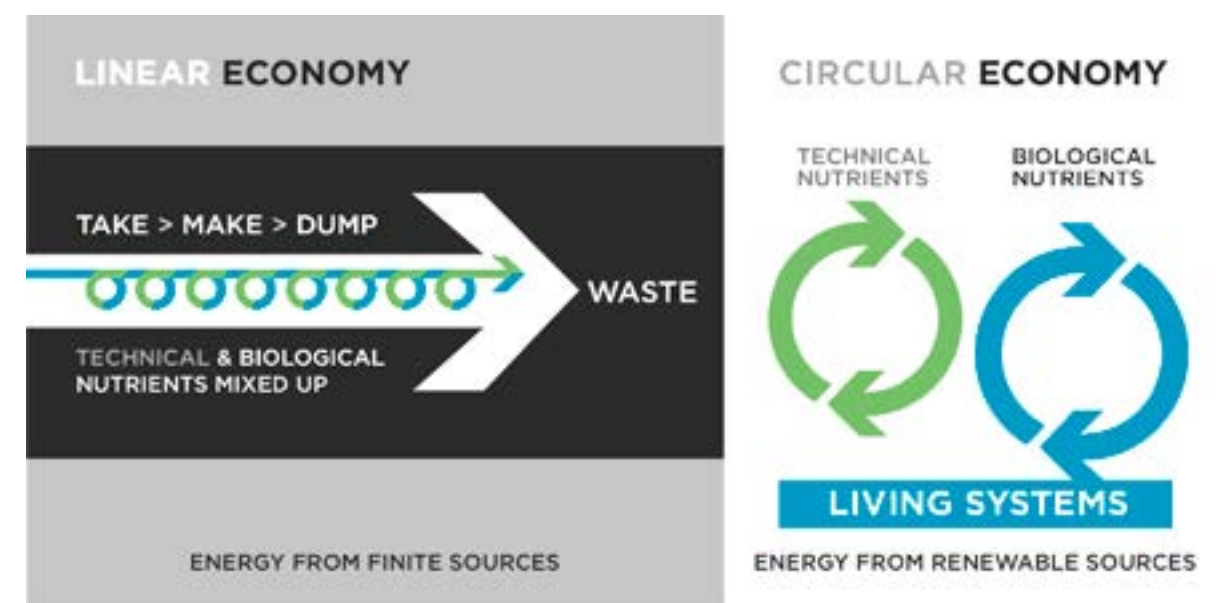
The most difficult part of such a transition, from linear to circular, is how we will find new ways of effectively conducting business. What's new? We have seen initiatives that are bridging the gap, taking the form of hybrid models: pay per use and pay for performance agreements, collective ownership and sharing of resources, growing focus and attention to services etc.

We will continue to find more and more fundamental solutions in the new circular system: new business models, value creation, system solutions and methods of implementation in businesses, organizations and institutes.

For the moment we see a lot of hybrid solutions. Don't worry, that's a good thing: because the existing solutions still have relevance and value. But to be sustainable in the long term, new values need to be introduced. Such a transition need not be a revolution; the evolutionary hybrid road is the best way to begin this journey. Working in a hybrid model coordinates the qualities of the new and the old together, but is ultimately not the desired end state. The heightened focus and speed of innovation, development

of new business models, economic values, contracts and other aspects of these initial hybrid models will all contribute to the evolution of a Circular Economy.

Few existing corporations producing products today can afford to follow the alternative to a hybrid; a revolutionary change in the business model. Those that can afford to do so, start a new business or business line separate from the existing business in order to fully develop and dedicate the resources needed for success. Innovations in technical specifications and service delivery can then be introduced quickly to these separate divisions without interference to existing operations. When the success of the separate business line is proven, then hybrid models can be introduced to the existing business segments within the organization.



4) Illustration Ellen MacArthur Foundation (after W.McDonough and M. Braungart)

1.3 WHAT SKILLS DO I NEED TO HAVE?

Knowing that I have been educated in a linear way of thinking, which skills do I need to develop in order to be effective in the Circular Economy?

When Herman Miller, the innovative office furniture company utilized Cradle to Cradle methodologies to re-design their famous “Think” chair, they noticed their efforts in design for disassembly brought significant advantages in the actual assembly of the chair. Production went faster, cheaper and was easier for assemblers. This case teaches us that when you start solving linear problems in your supply chain, you might find yourself solving other problems. Circular products, services and business models can be quite complex puzzles. But who cares? It is nice to work on a jigsaw puzzle, so why not see your endeavors as a ‘game of change’?

The following 8 skills⁵ or competences⁶ have been identified as elementary for any Circular Economy project team:

1

Entrepreneurial and developing

Is your team able to create business models with a focus on the future and Circular thinking?

By providing ‘room to move’ for the team, you will easily assess whether one of the group has a tendency to protect the status quo and business as usual. Innovators will step in when they feel there is space for change.

2

Craftsmanship aimed at product/services

Does the team have an eye for the wishes of the end user or is he/she oriented on technical issues?

Recognition of the needs of the customer and responses to these needs leads to initiatives aimed to realize the needed performance.

3

Systems thinking and capable of identifying causal loops

Do the members of the team acknowledge relations and have an open attitude to feedback?

The ability to translate feedback into improved service propositions shows their ability to identify causal feedback loops.

4

Future oriented and out-of-the-box

Is your team future oriented and do they focus on the solutions of tomorrow?

5

Celebrate diversity

Does your team see the value of diversity in social, economic and ecological contexts, and do they know what it means for the stability, resilience and quality of the organization?

6

Address insecurities

Is your staff and management team able to challenge or address insecurities: insecurities, ignorance, denial and create positive action?

7

Design circular systems, products and services

Designing directly or guiding the designers with a focus on the quality of Circular thinking and taking care of innovations is an ability your company can enhance through internal discussion and connections with stakeholders.

8

Creative, innovative and connected

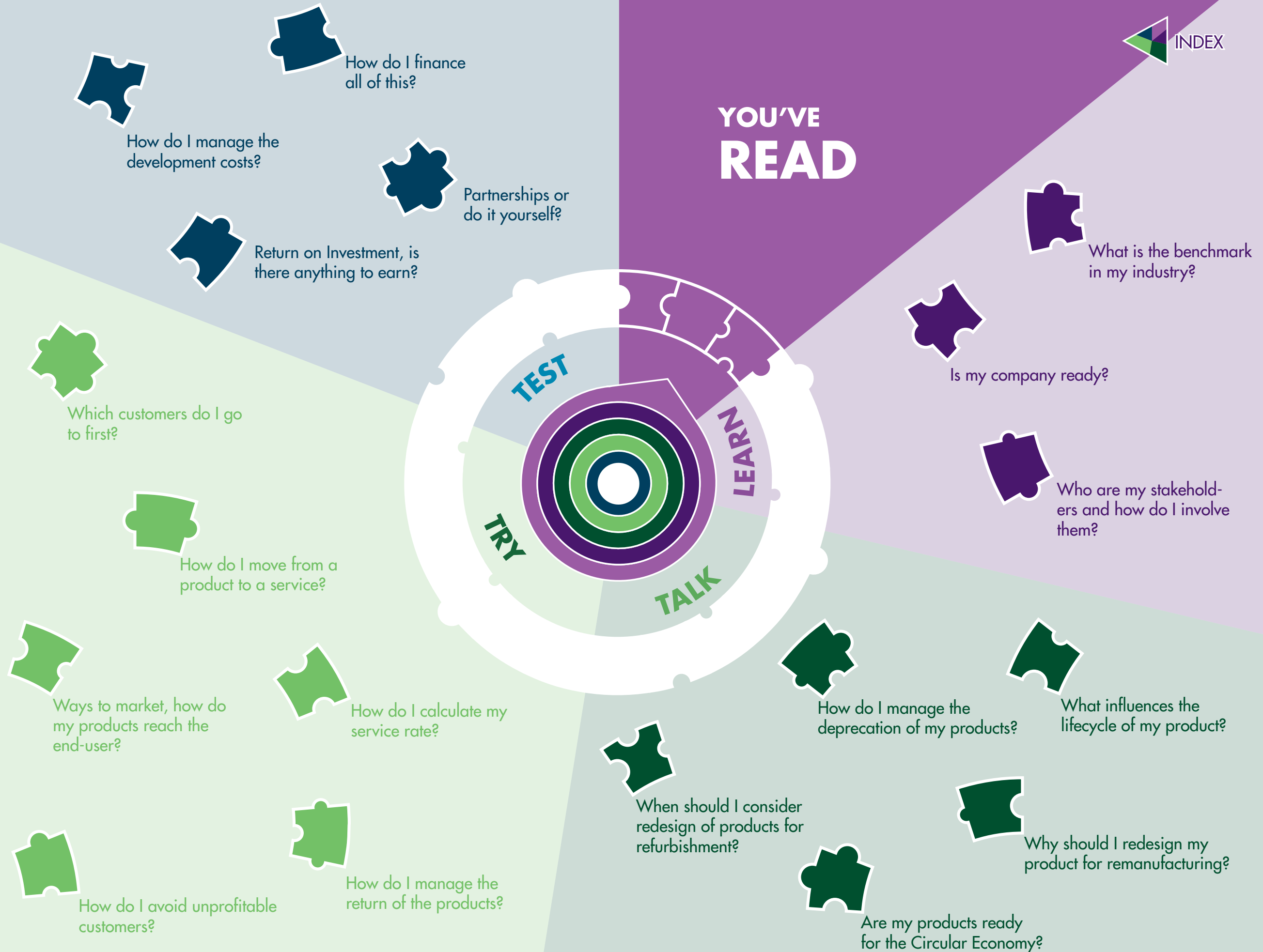
Creating a sense of openness for new solutions and looking for other network arrangements transforms your professionals into cooperative thinkers. That is what you need for management, sales and product/service development.

Investing in these skills will help you to gain new insights into the possibilities of the Circular Economy for your business. These new insights will be translated to your own company immediately. There is a growing number of specific trainings, master classes and business school programs in Europe. Consult a specialist or try Google. On LinkedIn you will find discussion-groups on ‘Circular Economy’.

5) The Aldersgate Group published in 2012 the report ‘Skills for a new economy’ www.aldersgategroup.org.uk

6) In Dutch: ‘Ecologie voor economie’, Douwe Jan Joustra, OPAi, 2013

YOU'VE READ



LEARN

2. about your company and partners awareness



This section is about the readiness of your company, partners and stakeholders in your supply chain for the Circular Economy. When you are finished working through this section you will be able to evaluate existing and new partners and build an effective team of people to start working on a circular product, service, or business model.

2.1 IS MY COMPANY READY?

*What should be my drivers for the Circular Economy?
What are the guiding questions one should critically
review and answer? How do I assess my company?*

The general question is of course ‘*Why should I participate in the Circular Economy?*’.

There are two basic reasons for a transition to a (more) circular business. The first is connected to the long term profile of the company: do you want to be part of the ‘solution’ or part of the ongoing problem: **linear economy**. Of course this is not a very open question, but it is the fundamental societal motivation for change. The second reason has a more practical character: there is a need for change. This need can be that the current business is declining or that there are problems in the continuity of production.

When we focus on the more practical considerations we see two underlying directions to address in an assessment:

1. **the shift from a product oriented business to a product-service based operation and**
2. **the volatility in availability of natural resources.**

In our present economic system some circular business models can be recognized. When you are in the need of a copier, suppliers offer contracts for a number of pages or copies. They bring in the machine and provide you the performance of the copier. The supplier owns the machines and the supplier is responsible for the performance. When the supplier has a newer or better performing machine, he is free to replace it. The supplier uses parts of the old machines in the new ones, but that is not a burden for the customer anymore. The customer pays per copy. A worry free solution. This illustrates the shift from machine-orientation (product) to a product-service combination.



One of the key questions is what do users of my product really need and how can I provide this in a circular way?



Rethink your actual business:

- What is our real core business? Is it the delivery of a product or process? But what do you really provide? Think as Phillips did: are we selling lamps or do we provide our customers with light? So what are you really selling: the lamp or the light?
- First, complete an analysis of the consequences that a transition to a performance based model has for your company.
- Define your context in terms of dependencies with other companies



Organisational Ambitions:

- Glory might be on the horizon, but take a moment for yourself and think: what do you really want? An evolution over the next five years, or a revolution, in just a few years?
- What do you want to innovate?
- Who are the people to trust and give space?
- How can I combine the most creative people in the organization with the most experienced? Or do I give them separate positions?

The need for analysis of existing products and product - service models in support of the Circular Economy is growing.

Ask yourself the question “which combination of product and service performance is needed”. The self-reflecting questions any entrepreneur should ask him or herself before embarking on the Circular Economy adventure are:



Rediscover your business:

- Identify opportunities in the existing day-to-day businesses for pilots to apply circular principles;
- See where the resources go: analyse their use and effectiveness. What seems to be waste could become the basis for new products/ services or a resource for adjacent companies;
- Find out what your real quality is and rediscover its potential for business: new production techniques could offer some new perspectives on old methodologies.
- Rediscovering your business is rediscovering your real quality and that might be the start of a whole new organization.



Redesign products and services :

- Explore the ways you can combine product and services to enhance real performance. Redesign the products if needed for high performance, reuse and mining of materials. design your service around your relationship with customers.
- Redesign your products for reuse with a focus on the ease of disassembly;
- Understand and redesign (if necessary) the process and products needed for the reliable performance of service to your customers.

2.2 WHO ARE MY STAKEHOLDERS AND HOW DO I INVOLVE THEM?

Preparing a new or changing an existing business model requires the participation of several stakeholders. Remember you cannot change a business overnight so these stakeholders are important. Do you know all of these people and do you have 'buy in' from all of them?



Ask yourself the following questions:

- Is circular business an ambition of individuals (you) or is it largely supported by the company?
- Are you and other individuals still in the phase of informing the group on what the subject is all about and searching for the benefits or is that clear to all stakeholders?

Take a number of steps to decide who your stakeholders are. What is their role in the process? How powerful can they be in making the final concept work? Circular business models do require the involvement of many parties in your company. If your products are designed for the re-use of components, but your sales reps are not offering to trade-in any used product, you will never have any components returned for re-use. If you create a pay-per-use model for your customers but your financial director sees issues in recognizing the sale of the complete product from an accounting perspective, you will not get his support.



Complete the table below for your stakeholders:

Decide how you will be communicating with them to get their commitment.

Stakeholders:

In my company (direct influence):

- Management
- Owner/Shareholder/HQ
- Sustainability, Facilities, Marketing, Sales, Production, Research and development, Finance, Service, IT, HR.

Around my company (some influence):

- Suppliers, design companies, customers, service providers, consultants, banks, leasing companies, branch organizations, C2C/CE experts

In the economy (no / very limited influence):

- Government, European and local regulations, tax, accounting rules.

Key stakeholders & resources required

Name	Function	Impact / relation to implementation	Circular Economy awareness

2.3 WHAT IS THE BENCHMARK IN MY INDUSTRY?

What models are already in place and how can I learn from them?

Before deciding on your approach for a circular business model, you want to know what is going on in the world around you. Are there any minimum standards or regulations you need to comply with? At this moment in time, most industries and markets are still developing their circular business models, so few if any have reached maturity. This immature phase creates opportunities for you to set the standards and start creating the benchmark. However before you make any decisions, take some time to investigate what is currently going on in your industry.

Look at following sources of information:

Competitors

What are your competitors doing? Look at their websites to see what they are saying on their sustainability and Circular Economy pages. Since this is a hot topic, many are not shy to publish press releases. There is a lot of exaggeration going on; what is presented, as a real solution is often just an ambition. Check the information that national or European branch organizations have available. A word of advice: make time for some network conversations with key-stakeholders or trend watchers in your line of business. In an informal setting you will hear a lot, literally or in between the lines.

Customers

Are your customers aware of asking for circular business solutions? They might use terms such as sustainability, corporate social responsibility or have questions on product recycling and environmental disposals. Realize that customers are mostly not sure what to expect from you as a supplier. In the B2B market you will continue to find a more formalized approach and find sections included in their tender or request for proposal documents covering these subjects. Ask selected customers what their ideas are on circular business models.



Organize a customer panel discussion. Involve customers at different stages; not only in this investigation phase, but also later to test your newly designed circular business model or offering.

Suppliers

Are your suppliers of raw materials, parts, components or completed products working on designs for re-use? What developments will help with your ambitions? If you have a crucial role to play in the go to market approach of your supplier(s), they might expect you to follow their initiatives. But it also works the other way around; it is very likely that you are going to ask your suppliers to do things differently in order to support your ambitions. For example ask your suppliers to deliver more details on the materials content of their supplies or where they are sourcing the materials.



Advice: question your suppliers on their circular ambitions. A supplier that might have an idea on these developments is your waste-contractor. Since many of them participate in discussions on resource management and their own role “from waste to resources”, they could have valuable information for you.

Channel partners

These are all the partners between your business and the end-user. Investigate what they are doing and what you can learn from them.



When someone else sells your product and/or service you have to invest in properly explaining and training them on the features and benefits of your products.

Service providers

There are a number of providers that deliver services to your customer. These companies are involved in the advisory of purchases, finance or leasing, installation, training, planned maintenance, repairs, logistics, de-installation, refurbishment, remanufacturing, fleet management, etc. Some of these services are delivered or controlled by your company, others hired by the channel partners or end-users directly. Sometimes the services provided play a key role in how the customers perceive the benefits of your products.

Advice: make an inventory of the services that providers offer in the delivery and usage of your product and how they can positively or negatively influence your ambitions. Also think beyond the obvious and consider the the new entrants, or new parties that are trying to get into your market from a different angle.

Government and other legislations

Legislation and regulation are the operational hygiene products that need to be considered in the delivery of your new circular business. Are there any requirements that need to be followed in terms of product liability, product disposal, parts recycling, and materials usage? How will these affect your business now or in the near future? The new IFRS and US GAAP accounting rules are forcing customers to look differently at how to book their capital products on their balance sheet. Also, manufacturers that move from producer to a rental or pay-per-use model can have issues with their sales recognition. Make sure you understand what the impact will be of these changes for your business.

Countries, regions

If you are selling and/or sourcing your products in different countries in Europe or around the globe, you will find different perceptions on the Circular Economy. In Europe this garners a lot more attention than other regions. Also, do not underestimate the ambitious policies on circular economic targets that the Chinese government has employed. Look for information from other companies in your specific market throughout the globe. How will your customers in other regions in Europe look at your new circular business models that are enthusiastically received in countries like the Netherlands and Germany? France and Brittain are working actively on Circular Economic models. In Belgium the work of 'Plan C' is acknowledged as a strong attribution to the Circular Economy. The government of Scotland and the Wallonian Region of Belgium joined the Circular Economy 100⁷ of the Ellen MacArthur Foundation recently.

The specialists

Consider hiring a specialist to help sourcing more information. But be critical on the costs and benefits. Visit a few of the many seminars organized around the subject. Ask a specialist to do a high level seminar at your organization with members of the board of directors, innovators and sales department. This is a small investment but will give you and your organization insights into actual developments and possibilities.

The others

Brand new ideas do not come from the usual players. Watch the (small) and new players in and around your industry. A rich source of information can be Internet sites that give innovators a podium for crowd sourcing or crowd funding⁸ These small or new players might be the niche players with the power of innovation driving their companies from the ground up. Watch them and learn. Finding some way of cooperation with them might be a valuable initiative.

7) Circular Economy 100 <http://www.ellenmacarthurfoundation.org/business/ce100>

8) for instance: <http://www.kickstarter.com>

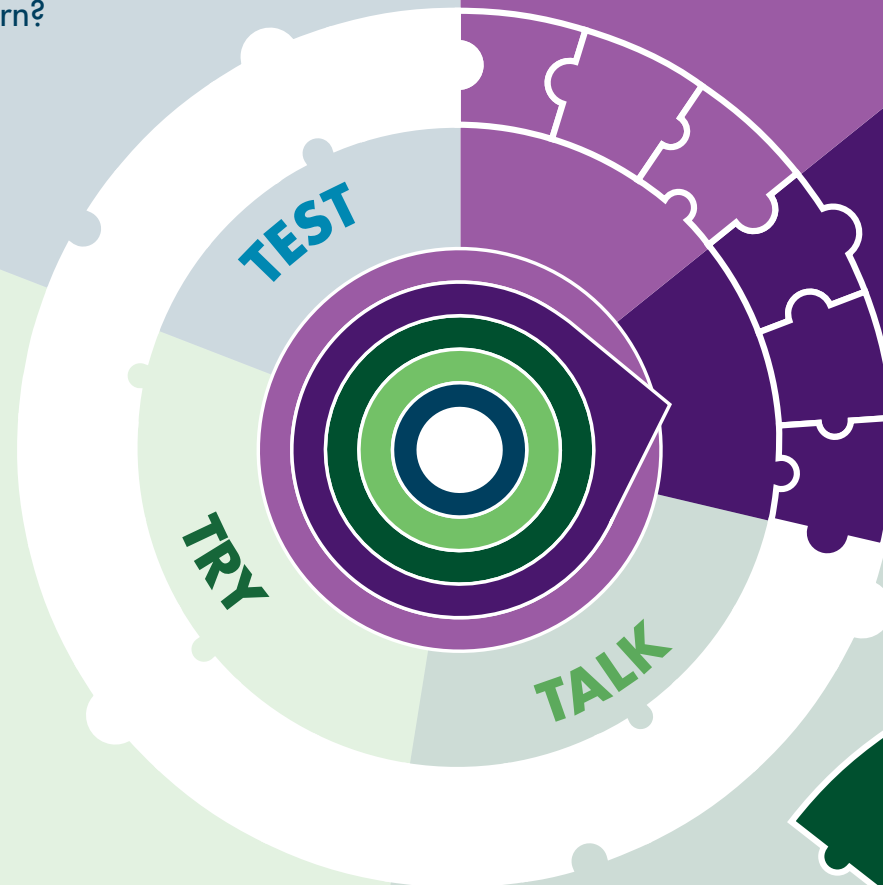
**What do I do with the information collected?**

Document the information you gathered in a chart that lists possible opportunities and threats for your business. This will prove effective later on in the process and preparation of your business model.

What is happening in my industry on Circular Economy	Opportunities	Threats
Competitors		
Customers		
Suppliers		
Channel partners		
Service providers		
Government / legislation		
Countries, regions		
Specialists		
Other		

YOU'VE READ

YOU'VE LEARNED



How do I finance all of this?

How do I manage the development costs?

Partnerships or do it yourself?

Return on Investment, is there anything to earn?

Which customers do I go to first?

How do I move from a product to a service?

Ways to market, how do my products reach the end-user?

How do I calculate my service rate?

How do I avoid unprofitable customers?

How do I manage the return of the products?

When should I consider redesign of products for refurbishment?

How do I manage the depreciation of my products?

What influences the lifecycle of my product?

Why should I redesign my product for remanufacturing?

Are my products ready for the Circular Economy?

TALK

3. about product redesign

This section is about design and redesign. When you are finished working through this section you will be able to have a circular view of the physical products you bring to the market and evaluate different re-design opportunities that might bring this product into a more circular business model.

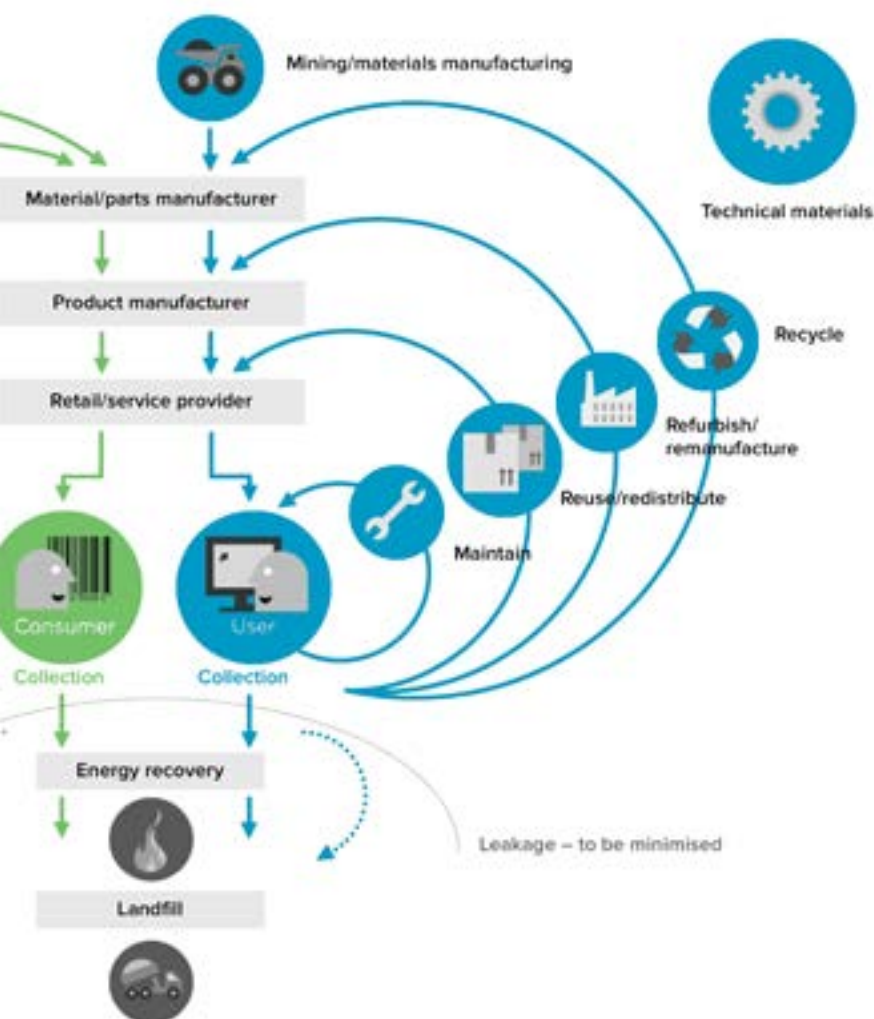
3.1 ARE MY PRODUCTS READY FOR THE CIRCULAR ECONOMY?

*What is the impact of Circular Economy on our products?
How can we (re-)design for re-use?*

The current focus for many companies already engaged in building circular economic models is around how to increase the performance and reliability of their products. But the basic circular economic building blocks for many industries can be found in the products themselves in terms of their price and quality.

The Ellen MacArthur Foundation and McKinsey identified both inner, and outer circles in manufacturing that held different value chains.

Ultimately, all circles⁹ are interconnected and influence the first and next life of products.



Inner circles:

Maintenance is in the “usage” phase of the product life cycle and is a critical activity to prolong the functional life of the product. Maintenance can be seen as the most efficient way to keep products and materials operating at their peak performance. Creation of a proper delivery model for maintenance can be very profitable, as the provision of after sales service, including spare parts, technical support and other services that enhance the performance of your products generate much higher revenues for your company than the original value of the product at the time of sale.

Reuse/redistribution, more and more companies see the value of the 2nd market. Reuse and redistribution can extend a product’s lifetime extensively. Nowadays this can be seen in the proliferations of the second hand market facilitated by shops and on-line services such as Ebay. But the first signs of a major change in this market can be noticed: producers following these companies that service the 2nd life market will understand how the offer a cheaper solution for users, and sometimes the ‘vintage’ quality of the product is a unique selling point. These are often new or different user/Customer groups for companies and therefore a new market.

Refurbishment/Remanufacture as illustrated in the example of the copier, companies use the take back system of machines for reuse of parts in the production of new machines. Many parts have an extended life and usage time and can be part of next generation machinery. These parts can be used in future generations of new machines, partial restorations, or simply an improvement to the aesthetics of the product. This approach will affect the design of future generations of products also as they will become a “design for re-use” product.

Outer circle:

Recycling is the recuperation of materials from end of life products. Classically this is the waste system in which valuables are taken out of the waste: iron, wood, glass, paper, textiles and to some extent electronics. These are potential resources for new phases of production. The recycling quality is growing fast. The traditional down-cycling in which resources lose their purity and quality is being replaced by up-cycling. Up-cycling means that resources of high quality are being generated sometimes for different purposes. After collection of materials with higher values, the rest is shredded and sorted into common types of resources. In this approach waste becomes the new material for the production process. Design for recycling will help to recycle valuable resources and ultimately lower the cost of production for the next generation of product.

9) See the online Circular Economy Toolkit (Institute for Manufacturing, University of Cambridge): www.Circulareconomytoolkit.org

Product and service design

For each of the circles some design challenges can be formulated. In the Circular Economy design is a key issue. First, there are some general choices that need to be approached when building a circular business model. Then directions will be given on each 'circle of business' which address the specific design of products and services.

Specific choices in design

As shown before, there are different circles of performance in the Circular Economy. Some indications will be given below to connect the circles to the design challenges which are partly based on questions that entrepreneurs have on this issue and partly as the specific characteristics connected to the circles of performance.

Maintenance and repair:

In regards to service maintenance can be simplified and improved through careful choices and considerations during the product design phase. Certain product designs inherently lend themselves to circular economic models due to the simplicity of their design. Others need to be re-designed with ease of maintenance and serviceability in mind. During a research project at the Polytechnic University of Delft, a student found that it took 45 minutes in order to access the essential parts of a coffee machine. This makes regular service events costly and difficult to justify from an economic perspective. Essential elements of design for maintenance and repair are¹⁰: easy access, mounting, handling and interchangeability of parts, simple fault diagnostics, technician safety, quick access to diagnostic and lubrication points, reduction in total number of electrical connections, and simplicity of final adjustments.

Reuse and redistribution:

This can initially be difficult from a design perspective. First there must be a demand or a secondary market for products. Ultimately, the customer must see value in the quality and price of second life or refurbished products. Part of this is a cultural issue; quality products in some markets are commonly viewed as "Vintage" which still have value and are actively sought after. Part of this is a technical issue: is the product still performing properly? Many companies understand the differences in the first, second and third markets and derive a benefit from each (from a business perspective). Some producers view their involvement in these extra equipment lifecycles as compromising their new product sales, but someone is currently benefitting from these lifecycles when the one who could benefit most is the original manufacturer when they are actively engaged in the re-harvesting of components for the performance enhancement of their products in the 2nd and 3rd lifecycles of equipment. These markets are becoming more commonplace so why not become a part of them? For example: the producer of ergonomic office chairs, BMA Ergonomics NL, takes the old chairs back for a reasonable price when new chairs are installed. The old chairs will be 'up-cycled' with new parts and BMA found a vintage market for them in Finland: a good business case was born. So, from a design perspective it is important to be able to up-cycle the product without huge costs in labour and materials.

10) Maintainability Engineering by Alex Hammond Babb, David J. Smith (Hardback, 1973)

Refurbishment and remanufacturing:

On refurbishment and remanufacturing¹¹ some general connotations need to be considered:

1. **Technology must be available to extract components without damage;**
2. **The product should be made up (at least partly) of standardized and interchangeable parts;**
3. **Cost of up-cycling is relative low compared to reuse;**
4. **Product technology of parts and their performance is stable over more than one product life cycle;**
5. **Positive cost-revenue balance regarding refurbishment or remanufacturing opposite to disposal options or environmental impact of legislation.**



"If product design permits, and there is an adequate process for return of used products (reverse logistics chain), there can be a strong business model in product remanufacturing."

Nabil Nasr and Michael Thurston, 2006)¹²

Through performance based contracting the product design can be adapted to refurbishment and an adequate return logistics support network will need to be available. To improve remanufacturing and refurbishment, consider the following during the design phase: ease of disassembly, number of connections, tools required for disassembly, ease of re-assembly, potential to upgrade and part modularity.

Recycling

Products that will be part of waste and recycling processes should be free of toxic elements, have the ability to be disassembled in as pure as possible materials, have minimal volume of non-recycleable parts and maximise the use of recyclable materials.

Philips designed one of its LED-lamps in a way that in the shredder the different materials will fall apart easily, since this kind of product will not be returned for reuse or refurbishment. Follow the lead principles and knowledge of Cradle to Cradle is the best advice for the product designer.



- ▶ [Philips movie](#)
- [Abstract recycling](#)



Philips describes their process as follows

Resources for new electronic products as well as the treatment of electronic waste become increasingly critical as we create, design and manufacture increasing volumes of electronic products globally. However, recyclability of electronics is limited and a significant percentage of electronics does not even end up in the appropriate waste stream. In the framework of the ENIAC project GreenElec, Philips cooperates with other manufacturers and recyclers to accomplish alignment between design of products and end-of-life treatment.

The project aims for

- Suitable combinations of materials for recycling
- Design rules for electronics and electronic products taking into account recycling processes
- Identification of recyclable/recoverable electronic devices and components
- Methods and technology for sorting of devices and components into well-defined waste streams
- Optimum waste stream separation for maximal recovery
- Business models and policy support that give an incentive to the recycling/reuse of electronics
- This highlights the Philips effort regarding the development and implementation of design guidelines. This is illustrated by the redesign of a LED lamp.

11) [Roadmap to Remanufacturing](#), Mare Advies, October 2013.

12) Nabil Nasr and Michael Thurston's 2006 paper "Remanufacturing: A Key. Enabler to Sustainable Product Systems", Rochester Institute of Technology, Rochester, NY - USA

3.2 WHAT INFLUENCES THE LIFECYCLE OF MY PRODUCT?

Can you think of products in your industry that are considered worthless and disposed of while their technical state is intact, i.e. they still have intrinsic value?

Making things that last an eternity is not a Circular Economy objective by itself. But if products can be reused this does lower the carbon footprint and the energy required to re-create this product from raw materials. However even perfectly sound products are disposed of for several reasons that have nothing to do with their technical state. A PlayStation 2 is useless and its resale value is close to €0,- because it cannot play the latest games. Clothes older than 5 years of age are generally out of fashion because of changing trends and a '92 Truck has no useful purpose in most European cities because its CO₂ emissions are too high.

When redesigning a product for a Circular Economy it is critical to know what determines its economical and useful life. In the coming chapters three influences are identified to get you started to think in lifecycles: fashion, politics and innovation. These influences seem pretty obvious, however product designers often fail to match these trends. This is understandable because they are often faced with design challenges that aim to maximize profits around a single design parameter. The most successful products in a Circular Economy are those that are designed to be easily refurbished or upgraded when faced with technical decay or challenges as a result of known lifecycles.

How does fashion influence my design?

H&M is generally accused of making “low quality” clothes. One could argue that this is the case when only looking from a technical lifecycle perspective. Generally their products are cheaper than competitive products and indeed do not last as long as other more expensive clothes. However from a Circular Economy perspective the technical lifetime is quite nicely aligned with the time the products are “expected to be in fashion”. The next season the customer is expected to buy different colors and designs so why should the T-shirt or skirt last 3 or 4 years? Most other “high quality clothes” are disposed of when they are technically still okay. This same theory also applies to industrial products.

The look and feel of an airplane, train, forklift or even treadmill in a gym might not be your first thought when you think of design for fashion. However, these products also can appear obsolete when they are in fact still performing optimally. Modular design of “covers” around industrial products be an effective tool to keep its look and feel appealing to the users.

For example, take a look at the Technogym website to see how they extend the lifecycle of their fitness equipment. Not only wear and tear parts are refurbished, also covers can be replaced to fit design changes.¹³

For all examples the Circular Economy stresses the use of pure, healthy and recoverable resources.



Looking at your product or service, does it fit the latest design trends? Ask a panel of current customers how they feel about your product. Does it create added value for them when your product is more or less fashionable?



13) Image and TM courtesy of [Technogym.com](https://www.technogym.com)

How do politics influence my design?

Subsidies, rules, regulations and incentives are used all over the globe to influence the decision making process of users of products. Electric cars in the Netherlands are in more demand than other European countries because of taxation advantages for lease drivers. In the second hand market these incentives are less and these vehicles do not command a premium price. The result is that electric cars depreciate quite fast compared to similar diesel and gas cars. In such a market it would be beneficial if original battery packs could be recycled and replaced with new, thereby enhancing the vehicle's value and longevity in the second life market.

The electric motor could even be refurbished and reused in a new leased car allowing the provider and end user to take maximum advantage of appropriate tax incentives. Another example is from Schmitz Cargobull, a German trailer manufacturer who sees many of its second hand trailers being used by Russian transporters. In Russia different rules and regulations apply which create a need for modifications to the trailer design. Schmitz therefore created a post market upgrade kit, which modifies their standard trailers that readily accommodates cross border transportation¹⁴ and sale of their trailers in the secondary market.



How is your product or service lifecycle influenced by politics? Could you mitigate this risk?

How do I design for innovation?

Designing with future innovation in mind is probably one of the most difficult things to do. Predicting the next technological breakthrough is virtually impossible. However certain production habits of manufacturers could be changed for the better. Modular design enables the upgrade of certain key parts when technologically advanced components are available.

This is especially true relative to products that contain multiple innovations. A milk robot might have a technical life of 20 years. However if the latest software is not compatible with specific components like laser sensors, the machine might become obsolete in 6 years.

When Apple launched the iPad 1 they knew already that there would be a need for a camera and processor upgrade in less than 2 years. The design of the iPad made it impossible for end users to upgrade their devices, which brought many to buy an iPad II in less than two years. The fact that more and more of today's products contain computers, hard disks and software also makes traditionally long lasting products become economically obsolete in shorter lifecycles.



Is your product or service lifecycle influenced by innovation? Can you redesign for upgrades?

An initiative that began in the Netherlands is an adaptation to change this short lifecycle trend in technology: the Phonebloks¹⁵ and it was based on the simple assembly techniques "Lego" blocks utilize.

Whether or not it is possible to make this lifetime device now, the crowd sourcing model has gained a lot of attention these days; the 'Phonebloks' YouTube video garnered over 18 million views. Motorola and others are now very interested in this idea that went viral on the internet in late 2013.

This whole idea was driven by the desire to extend product lifecycles and decrease the effect these devices have on the environment.

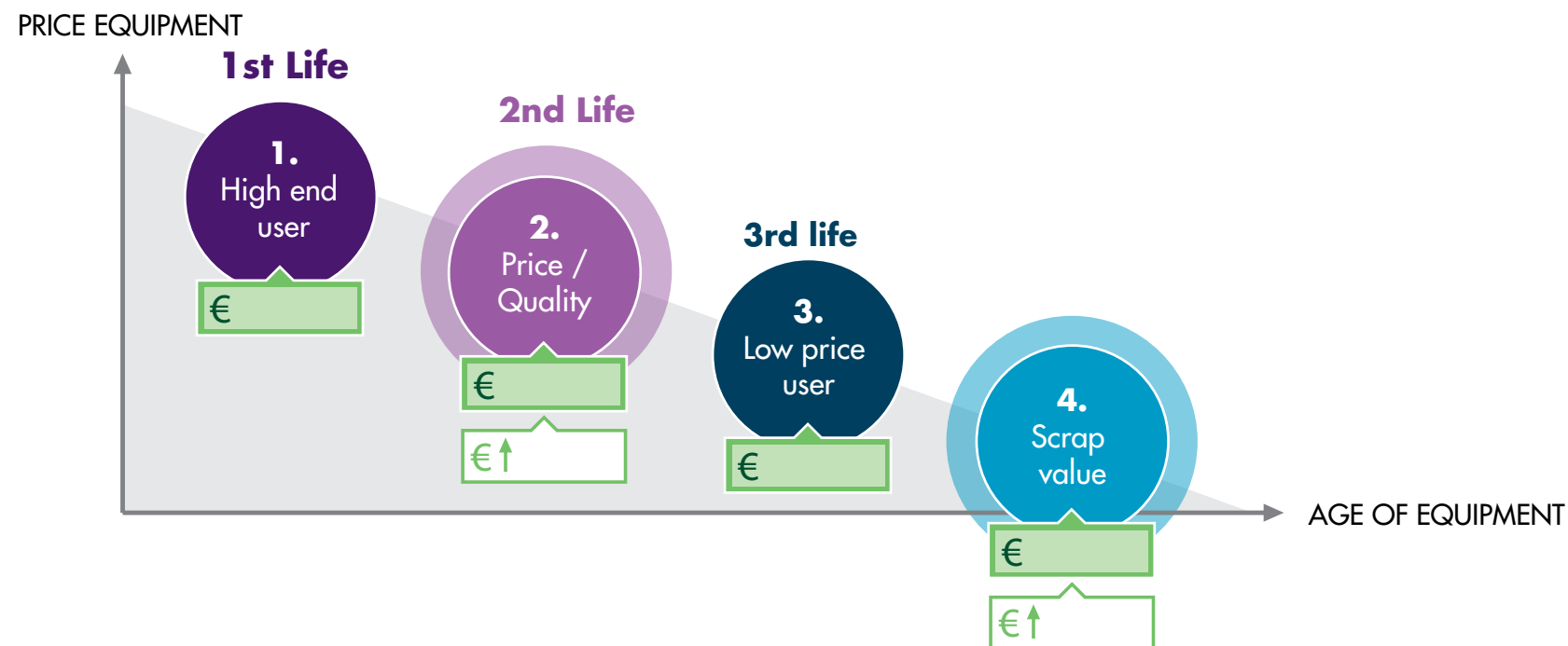
¹⁴) <http://www.cargobull.com/en/>

¹⁵) [Phonebloks](#)

3.3 HOW DO I MANAGE THE DEPRECIATION OF MY PRODUCTS?

Products depreciate in several ways. Some products are worth nothing after you bought them (for example a tailored suit). Other products consistently keep their value for a long time. There are even products that increase in value over time; think of an olive tree, bricks, good wine or classic cars. In order to manage the lifecycle of your products you have to understand their entire economic lifecycle. In chapter 3.2 “What influences the lifecycle of my product?” you learned how politics, fashion and innovation influence the economic lifecycle of products independent from the technical lifecycle. You can slow down the depreciation of your products by creating longer lifecycles and more profitable service based business models.

How does depreciation over lifecycles work and can I influence the depreciation of my products?



Fill in the numbers for your products in the visual

1. Investment price.
2. Second hand value at the point in time most users sell it.
3. Third life value (the lowest value where you find people trading your product for).
4. Scrap value.

How can I influence the second life value of my products? By redesigning my products could I increase the vintage effect or value of my products at the end of the lifecycle?

How can I increase the scrap value of materials in my products?

3.5 WHY SHOULD I REDESIGN MY PRODUCT FOR REMANUFACTURING?

Most products today are (deliberately) not made for repair, upgrading and reuse. This is the result of decades of production optimization where manufacturers were incentivized by the market to produce cheaper products. This model relies on the sale of new products. On top of this, the focus of revenue creation is at the time the new product is sold. Therefore emphasis has been put on cheap and fast assembly and producing a new version of the same product. As such, repair and reuse have been neglected in most design parameters. Redesign of products is of added value for those particular companies who want to:

1. Provide the customer with 'guilt free' products
2. Create the most appealing total cost of usage / ownership offering
3. Optimize repair and maintenance costs over a product lifecycle
4. Provide customers with modular sales and repair options
5. Enable economically viable spare parts and raw material harvesting at a product end of life



For a clear example why and how a mobile phone could be redesigned:

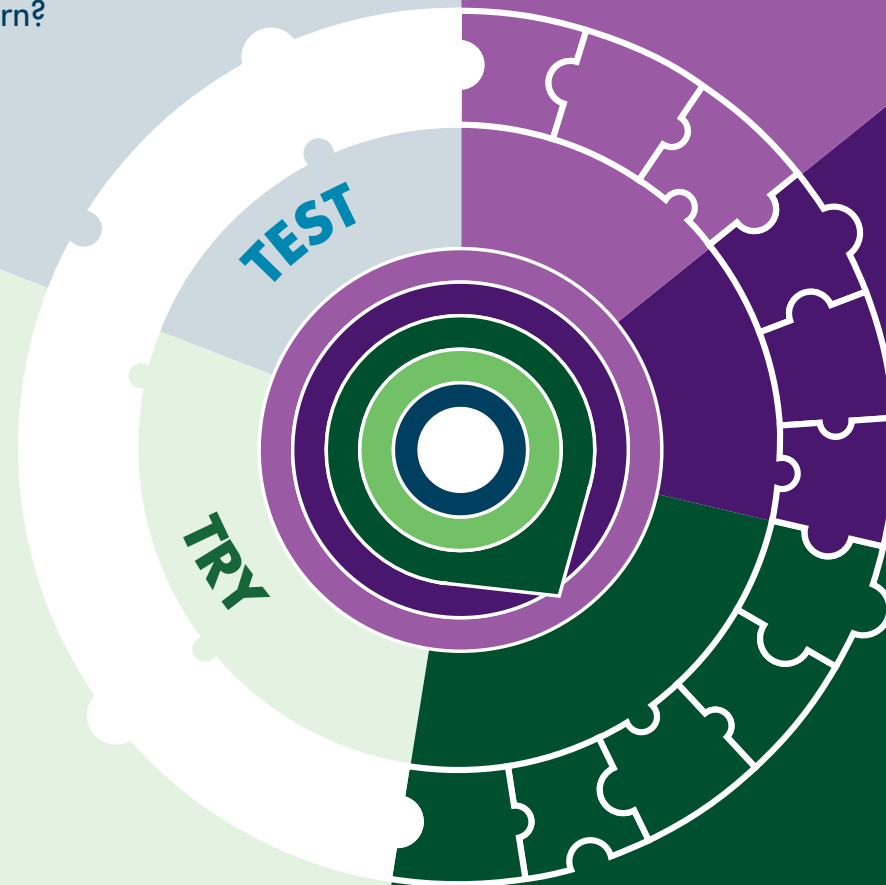
► [Watch the Phonebloks movie](#)



**YOU'VE
READ**

**YOU'VE
LEARNED**

**YOU'VE
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How do I finance
all of this?

How do I manage the
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Partnerships or
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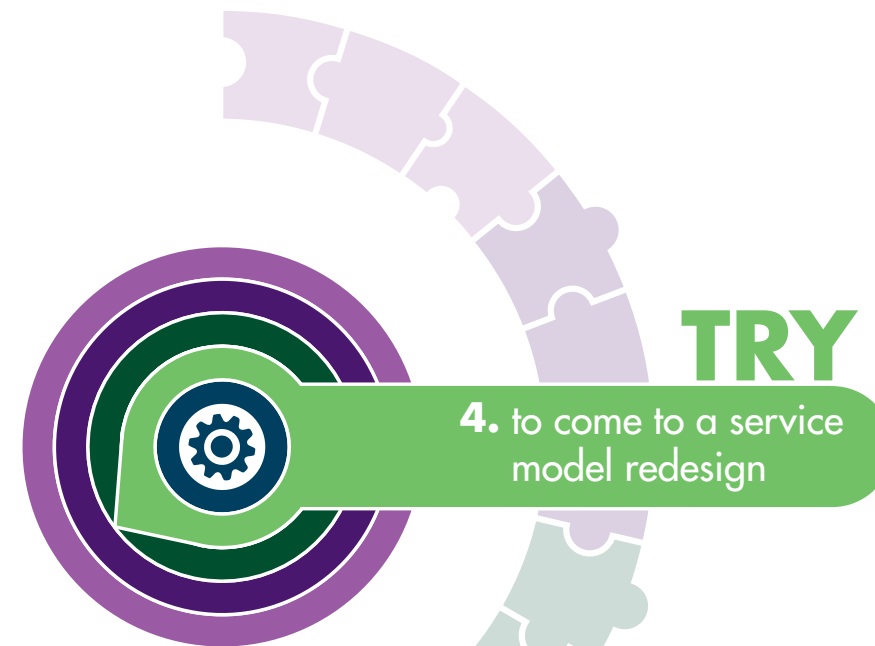
How do I move from a
product to a service?

Ways to market, how do
my products reach the
end-user?

How do I calculate my
service rate?

How do I avoid unprofitable
customers?

How do I manage the
return of the products?



This section is about understanding the service that you could potentially deliver. Moving from lamps to light, cars to kilometers and copier machines to prints. A service rather than a product is something that sounds easy. But how do you make it happen? When you finish working through this section you will have a better understanding of how to cluster usage of products, maintenance and end of life treatment into one single rate. You will also understand the pitfalls in providing services to the wrong customers, as well as how your service will reach your customers.

4.1 HOW DO I MOVE FROM A PRODUCT TO A SERVICE?

In order to determine the performance standard and its corresponding product service combination one should start with assessing the user requirements.

Service based business models are especially attractive when your products are becoming commodities in the marketplace. For example all cell phones are able to provide a connectivity and all café's provide excellent coffee. So what makes a customer choose one for another? It is the overall service. One of the cornerstones of the Circular Economy is performance based contracting. Where the product / service provider takes the responsibility for the performance of the product provided.

5 Choices¹⁷ towards performance based contracting:

1. Product-services should be experienced through the users perspective.

The users needs and the ability of a service provider to meet them, leads their decision to utilize one company over another for performance based contracts. Database information alone cannot be used to identify these needs. In service design the following example is often used; first imagine two customers.

Both were born in 1948 in Great Britain, married, successful and wealthy. Also they both love dogs, enjoy the Alps, have at least two children and are happily married. Suddenly a picture immerses, but does this give you an idea about the habits of these potential customers? It could be prince Charles or Ozzy Osbourne. So data is important but better understanding of the customer comes through analysis of habits, culture, social context and motivation. Gaining authentic customer insights is hard work; you need to incorporate some of your actual and unforeseen customers in the process.



Find the real motives of your customers for their choices. Go out to them to see what they do, what they are looking for and what they really do. Discuss their needs with the customers.



When working on service design, find professionals who can accommodate your innovations²¹. In the field of service design, the use of business canvasses is an effective method that will support your ambitions. Find a service design company or professional that has access to a 'circular business canvas'.

→ Business model generation

18) for example: <http://www.designthinkingnetwork.com>

17) Partly based on: 'This is service design thinking.' BIS Publishers, Amsterdam, 2011

3. Adapt to the rhythm of the user.

Services are not a one-time-action, such as the moment that a sale occurs. It is crucial to consider the service requirements and subsequent changes in the user's needs in relation to the performance that you have contracted to deliver. Every service that is coupled to performance will follow a three step development cycle:

The pre-service period (connecting to the user and his/her needed performance), the actual service period (customers experience the performance) and the subsequent post-service period (where the after use responsibility counts). Just like any good stage play or movie, the performance should keep a sense of expectation without strain for the user. The service events need to be executed with an eye on the expectations of the customer. First of all you will need satisfied current customers as well as references for future business.



Invest in professionals that know the 'feeling' and the 'insecurity' of the customers. Pay close attention to the value of customer behavior changes: the customer is always right or at least has the right to make his/her own choices. Be adaptive!

4. Make services tangible.

The Circular Economy is about performance: it is not about the mechanics of the car, it is about the kilometres it will travel. Customers tend to appreciate the performance more and more when the kilometers or miles driven are trouble free. Car sharing systems, light services, comfortable flooring, seating that improves the health of personnel; these are the product-service combinations that have value, now and in the future. Services are the invisible part of the performance. If the Customer is only made aware of their completion by seeing them identified on the monthly bill, opportunities are missed and something is out of balance. The planning table in the public toilet that is signed by the cleaners is an example of how the user will recognize the efforts of those providing the service in the interests of health and hygiene.

Another example is the mechanic who, after completing the required maintenance, shakes hands with the end user at the Customer's location.

As Phillips did when they began offering contracts based on light performance: by showing the customer how much energy was conserved.

It is all about generation of appreciation and and active engagement. Don't over do it: people do not like junk mail as an example of evidencing. Small indicators are often enough. Think of the folded end of toilet paper representing the attention of housekeeping in hotels.



Find the indicators of your own services or performances for the customer. Can you add more?

5. Be an eagle.

The eagle has a bird's view of the whole situation and has a sharp eye for small details. The customer does see, hear, smell, touch and taste the provided services and performance. You, as the provider, should see, feel, hear, smell, touch and taste even more and earlier. This creates the need for you and your company to become eagles; not to catch your prey, but to perform your services at the right time with an intense eagle like understanding of all that is required of your products and services.



Be an eagle in your work: see, hear and live your concepts!

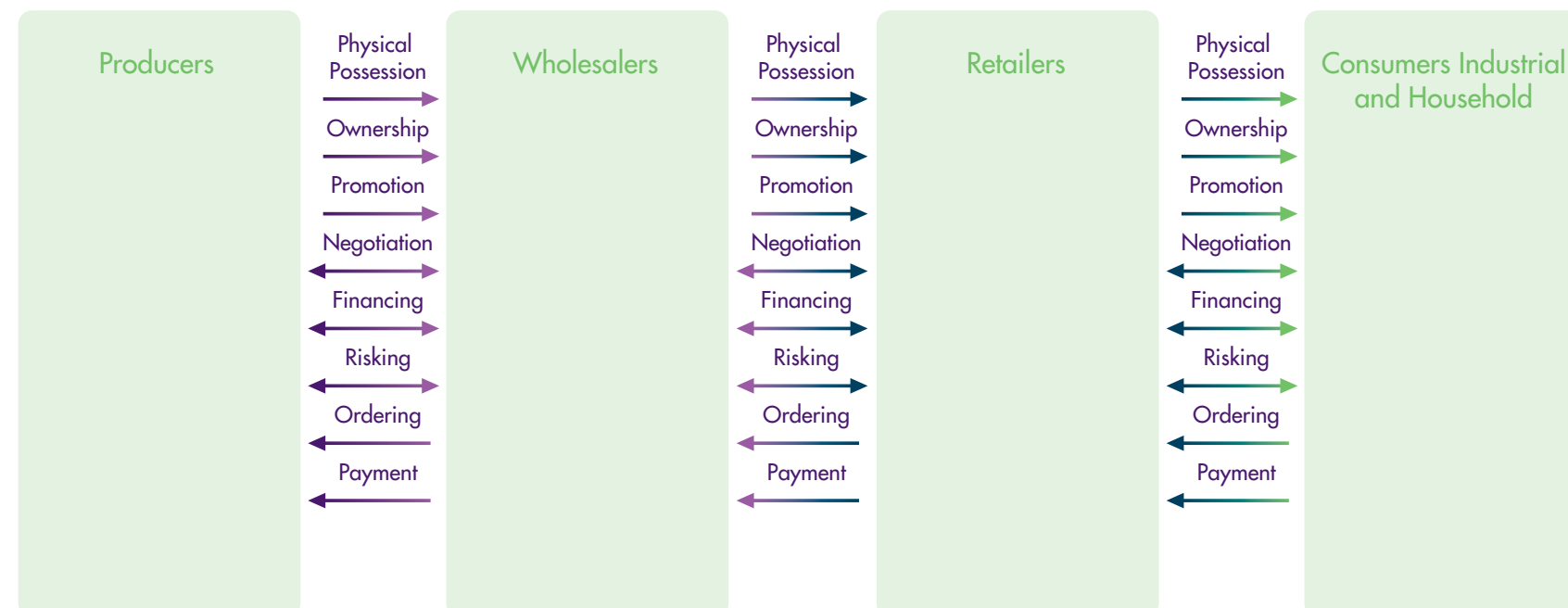
4.2 WAYS TO MARKET, HOW DO MY PRODUCTS REACH THE END-USER?

This section describes the importance of understanding how products reach the end-user. The ways to market have an impact on what and how you can influence with a (new) circular business model.

What is your commercial way to market?

Products and services reach their end-users via direct or indirect channels from producers to end-users. The decision to go direct (straight from producer to end-user) or indirect (with wholesalers and retailers/dealers) is taken based on various criteria such as: volume, value of offer, standardized versus tailored product, proximity of markets, additional services, choice of customers, etc. Along the way all channel partners play a role and add value to both the upstream suppliers and downstream customers. In every step in the channel, there are changes in ownership, risk and financial considerations, etc. (see figure).

New circular business models will have an impact on the roles of the channel partners. It involves the transformation from the one way (linear) delivery stream from producer to end-user, to a continuous management of the products as well as the reverse logistics required at the end of the first life of the product so the second life can begin.



Why does it matter how I go to market?

The success of your new circular business idea is very dependent on how it is being delivered to channel and end-user.

1. In a direct model, you have immediate control over how your products and services are offered to customers, and how they are advised on their benefits.
2. In an indirect model you need to first convince your channel partner/reseller about your new ideas/products and then to provide them with the tools needed to present this to the end-users. If your channel partners don't like the idea, they won't sell it and may even (directly or indirectly) hamper your efforts. On the other hand, if you can convince them, you will have a powerful channel to help your program succeed.

Should I consider doing more myself?

Most companies have a mix of direct sales to (large) end-users and indirect sales via distributors and dealers, for example to customers in international markets. This allows you to test concepts in various channels. You might indeed consider further vertical integration in two directions:

Forward integration gets you more involved in the activities towards the sale of the product to the end-user. For example by providing a financing concept to the end-user with an end of term agreement covering manner and conditions required for the return of the products, you will have control over the upstream flow of products for refurbishment and redeployment.

Backward integration gives you more control over the supply activities for the procurement of materials and parts. By sourcing materials closer to the location they are created, you have more comfort that the materials are sourced and produced in a way that meets your corporate social responsibility ambitions.

? Plot your current way to market in the channels in the graph on the left. Consider how the various flows would change in your possible service based business model

4.3 WHICH CUSTOMERS DO I GO TO FIRST?

Who are your current customers? And who are your customers in your new circular business model?

You will most likely have different responses to these questions. This of course depends on how you run your business today. But most likely, many of your customers are purchasing new products from you. And after the economical or technical life of your product has been attained, you will try to retain them and sell another new product.

This won't stop. But in the new model you will expand your market to reach new customer groups that are using your products effectively in their 2nd, 3rd or longer lifecycles. And you will have models to close the loop and stay in control (or at least strongly involved) on what is happening with your products after they leave your production.

?

Who are going to be your pilot customers? Choose the ones that are committed to partnering with you. The ones where it is OK to experiment and collaborate; the customers who see the benefits in working with you to create Circular business models (the win-win situation).

How are you going to avoid channel conflicts for the new and 2nd life products. If your sales teams and dealers are focused to sell only new products they will see the 2nd life products as competing and will hamper your ambitions in this direction..

?

Can you differentiate your customer based on the requirements they have? Who are the customers for your new product and service offering? And who is utilizing 2nd or longer life products? You will notice that this is an opportunity to expand your market share.

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Academic hospitals and clinics are interested in the latest technology and have budgets to upgrade their products regularly. They are buying the newest technology first and willing to pay a premium especially if this supports their research and garners them recognition in the global world of healthcare. Regional hospitals have many patients that require standard diagnostic and operating procedures. Their targets are to reduce costs and waiting lists. It is their priority to purchase reliable products that do the work without useless extra features. They are open to acquire a 6-year-old refurbished imaging product that comes at 75% of the new price. But the supplier needs to guarantee its performance.

Are you talking with the right people at your customer's organization? When talking about your ambitions with a customer, you will find that you might have to go to other decision making units. Most of your contact might be with purchasing or production management. To discuss your circular plans you might have to convince the finance manager, the sustainability manager or even the general manager.

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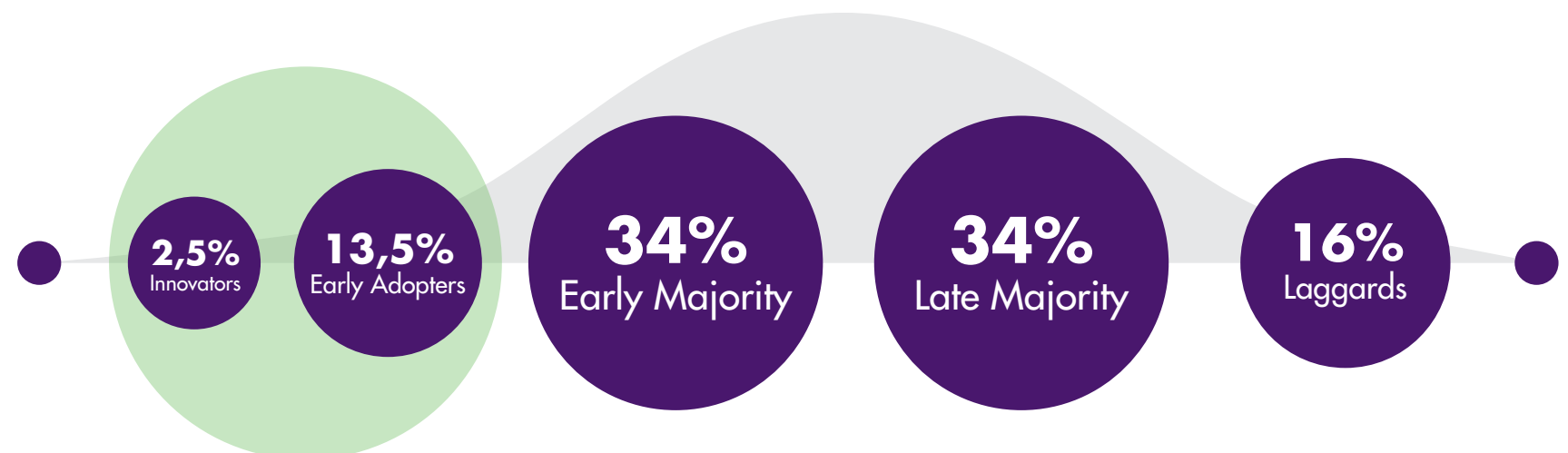
Segment your customers and identify the Innovators and Early Adopters. Decide where you are pitching your new products and services.

The sale of 2nd life or refurbished products might also bring you to new customers in emerging international markets.

The re-use of components or raw materials can trigger customers in a completely different area.

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*Check the following striking example:
→ [Freitags bags](#)*



4.4 HOW DO I CALCULATE MY SERVICE RATE?

Performance based contracts have many different delivery models. It depends on the level of service a customer wants to outsource and the level of risk you can manage as a company. In this section three commonly used terms are identified around performance based contracting and explain at a high level which elements are covered in this service level.

How do I calculate total costs of ownership?

Generally this calculation is presented as a price per month, quarter or year. For the product you want to evaluate, the following information is needed for this calculation:

1. **Determine the usage period in which you want to depreciate your product:**
2. **The investment price:**
3. **The interest rate you pay your bank**
4. **The total number of scheduled services (parts and labor) that will be required by the product based on the usage period for a particular application.**

In excel there is a (PMT) function that allows you to calculate a payment per month utilizing this information. In this model the customer does not take into account their own management time, maintenance, unexpected breakdown and operational costs as taxes, insurance and inspections. All the risks on the functioning of the products are left to the knowledge of operator and the owner.



Experiment with these values and see how extending the use period of a product affects your price per month.

How do I calculate total costs of usage?

Generally this calculation is presented in a price per hour, kilometer, mile, print or scan. For the product you want to evaluate find the following additional information:

5. **A usage indicator that reflects the usage for this product in the defined period**
6. **The residual value (second life prices of your product at the end of the defined period)**
7. **Taxes, periodic fees (including insurances) related to the usage of the product**
8. **The service and maintenance costs for your product during the defined usage period**
9. **Software licenses needed to monitor / manage the product**

Recalculate the payment per month including the 2nd life residual value. Sum all the costs during the period of usage and divide these costs by the number of months that the customer plans to use the product. Add the two costs per month and divide them by the expected usage of the product per month.

In this model you take all kind of risks that normally are with the customer for your own account. For what price can I resell the product? Do prices of labor increase during the period? Is 'wear and tear' properly calculated, and is my product as good as I expected?



Experiment with these values and see how extending the use period of a product affects your uncertainty.

How do I calculate total costs of service?

Generally this calculation is presented as a subscription, license or service.



For the product you want to evaluate find the following additional information and add it to the data collected for the total cost of usage calculation.

10. Your products consumption of energy to operate

11. Advice, consultancy, inspection, upgrades, helpdesks

Recalculate the payment per month including the 2nd life residual value. Sum all the costs during the period of usage including the elements above and divide these costs by the number of months that the customer plans to use the product. On top of that provision for upgrades.



Calculate the % difference between the total costs of service and the total costs of ownership of your products. If this is a low % than your product is less risky to sell per use than products with a high % of usage costs.

When you are at the end of your calculations, summarize your findings. Be aware that calculating services is an extensive exercise. In addition to that, building the right contract and selling the calculated service is difficult and requires diligence. Generally speaking, customers are often not adept at calculating the total cost of ownership of your products, so you will have to help educate them on the different aspects required for this calculation such as scheduled and unscheduled maintenance, down-time, usage tracking and management.

4.5 HOW DO I AVOID UNPROFITABLE CUSTOMERS?

Do you have users of your current products that you identify as “bad customers”?

When you are busy finding customers that you want to sell your “circular service” to, it is easily forgotten that there are also customers you don’t want. Especially when you want to supply services. It is a behavioral rule that customers who don’t “own” products are less careful than “owners” of products. Think of how some people treat rental cars in comparison to their own.

When you rent a washing machine, tractor e.g. there might be an incentive for “careful” companies and people to hire your products because these customers value “the outsourcing of repair and maintenance and insurance” as they have had high costs in their current operations.

You will have to price your service in order to compete with the “good” customers on total costs of service. However if you don’t set the right contractual conditions and convince the “good customers” with this proposition you might end up with “bad customers” who pay the price of good customers. The feeling of ownership could be vital to influencing some customers behavior and not important at all to others. Think of the difference between a hotel room and a bed&breakfast room.

So how can you overcome these issues?

- **Segment your customers and decide where you want to offer your new service offering (and to whom you do not).**
- **Have clear agreements, which include an agreement on how the product is being used and maintained.**
- **Include rules on what additional charges will be the customer’s responsibility if the product is being used longer than expected, gets damaged or lost.**
- **Monitor the product during the usage. Inspect the product regularly.**
- **Adjust your offering when you experience things you did not think of in advance. You are developing a new product so you don’t know everything in advance.**
- **Offer incentives for ‘good husbandry’ during usage.**

Consider using technology to monitor your products during usage. Several GPS based devices are available to track the location of any product that is mobile. With remote meter reading technology you can monitor the usage (hours, kilometers). More advanced technology provides full remote diagnostics with up to 20 parameters measured on the product. QR labels and RFID tags can be used to verify that the product is still at the location where you expect it to be.

Definition of ‘Lemons Problem’

The issue of information asymmetry between the buyer and seller of an investment or product was in a 1970 research paper by economist George Akerlof popularized as the ‘Lemons problem’. The term is derived from Akerlof’s demonstration of the concept of asymmetric information through the example of defective used cars, which are known as lemons in marketplace. Information asymmetry arises when the parties to a transaction do not have the same degree of information necessary to make an informed decision. For example, in the market for used cars, the buyer generally cannot ascertain the value of a vehicle accurately and may therefore only be willing to pay an average price for it, somewhere between a bargain price and a premium price. However, this tilts the scales in favor of a lemon seller, since even an average price for this lemon would be higher than the price it would command if the buyer knew beforehand that it was indeed a lemon. This phenomenon also puts the seller of a good used car at a disadvantage, since the best price such a seller can expect is an average price, and not the premium price the car should command.

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4.6 HOW DO I MANAGE THE RETURN OF THE PRODUCTS?

How do I retain ownership?

The technical part of the Circular Economy is based on the concept that products are collected from the first customer and prepared for re-use in its 2nd or further life. How many of the products you sell are currently returned? And if they are, what do you do with them? The chances are high that, like many companies, you don't see any used products being returned to you. Or, if you sell high value products, you might have some trade-in products that you sell after some cosmetic cleaning and quick fixes. This chapter takes you through the process of how you as a manufacturer can be involved in a closed loop supply chain for your product.

So what can you do to make sure the products do come back after x years of use? In other words, how can you retain ownership on the products? Here are a few ways of doing this:

- **Trade-ins**, when selling a new product, the customer is offered a trade-in price for his redundant product. The trade-in price is often given as a discount on the new product sale. Trade-ins can be offered for your own as well as other brands. This is a very common practice with cars, forklifts, agricultural, medical and other products that have a substantial value after the initial period of use.
- **Guaranteed repurchase price**, at the moment of selling the new product, provide the customer with a guaranteed price at which you will repurchase the product. Terms usually include the condition and usage (hours, kilometers) of the product, price, location of return and time. This method can have an impact how your initial sale is treated from an accounting perspective.
- **Leasing, instead of selling the product**, lease the product to the customer. This would be a viable option for products above € 15,000 that are being used by businesses. The customer benefits from a payment spread over a defined term and low monthly costs. The lease agreement would be for a given time (usually 3 to 5 years) after which the product is returned by the customer. You can agree with the lease company that the returned products flow into your 2nd life processes. The simplest forms are Operating Leases in which the customer doesn't have the risk of owning the products for their entire life cycle and ultimate disposal; just the rights to use it for a specific portion of it. Full Service leases would also allow you to include maintenance and other services in the contract. This gives you an additional advantage of having information on how the products is being used and that it is properly maintained. Many manufacturers offer leasing under their brandname as a sales financing program or have a referral program with a leasing company.
- **Rental**, the customer is given the right to use the product for a limited time, ranging from a day to one year. The customer never becomes the owner of the product

but will use it and then return it at their convenience.

Rentals normally include all maintenance and additional services such as insurance. Rentals are very common in automotive, trucks/trailers, forklift trucks, tooling, etc. As a manufacturer you can either have a rental-fleet yourself or work with a third party rental company. Since rental fleets have a relatively short period of initial usage, it provides you the opportunity to move new products through their first usage phases quickly and control the value of used products. Through rental you have a good control on which products you put out for rental and when is the best time to move them out of the rental fleet and into another application. Car manufacturers put new models in rental fleets, so that these models flow in the used car markets after 6 months. This gives new buyers more comfort on the value of their used car.

- **Pay per use**, the customer is paying for the performance of the product. This provides him flexibility that he is not paying when not using the product. Typically the usage is estimated beforehand (for example 1200 hours/year or 30.000 km/year, or 7.000 copies/month). The customer commits to a minimum usage and a minimum period of usage (usually some years). The final cost per month is flexible and dependent of usage. These models have become more popular and meet the flexibility customers require. Most important is that the customer has the product that performs according to his requirements. What the exact brand, type or age is, is not that important.
- **Disposal / Scrapping**, for products that do not have a high residual value, you could set up a disposal or scrapping service for the customer. Some customers would be willing to pay to dispose their redundant products. Provide them with a certificate that the product is being disposed of in an environmental friendly way. This releases the customers from their obligations.

What do I do with the products that are returned to me?

So if you have set up some forms of retaining ownership on the products, what do you do with them?

First of all, check if your logistical processes are capable of handling the reverse logistics of the used products (return authorization, transport, inspection, storage, administration). If you have all of that under control, then you have made great steps towards your closed loop supply chain.



You can do several things with the products returned to you:

- Sell/Redeploy* them “as is” to another end user or market segment;
- Refurbish the product and then sell to another end user or market segment;
- Take the product through a remanufacturing process and then sell to another end user or market segment;
- Parts harvesting. Use the parts to meet your future part obligations;
- Raw materials harvesting to use in your own production process or sell to somebody else.



Do you know what the value of the components are in the products when they are used for x years?

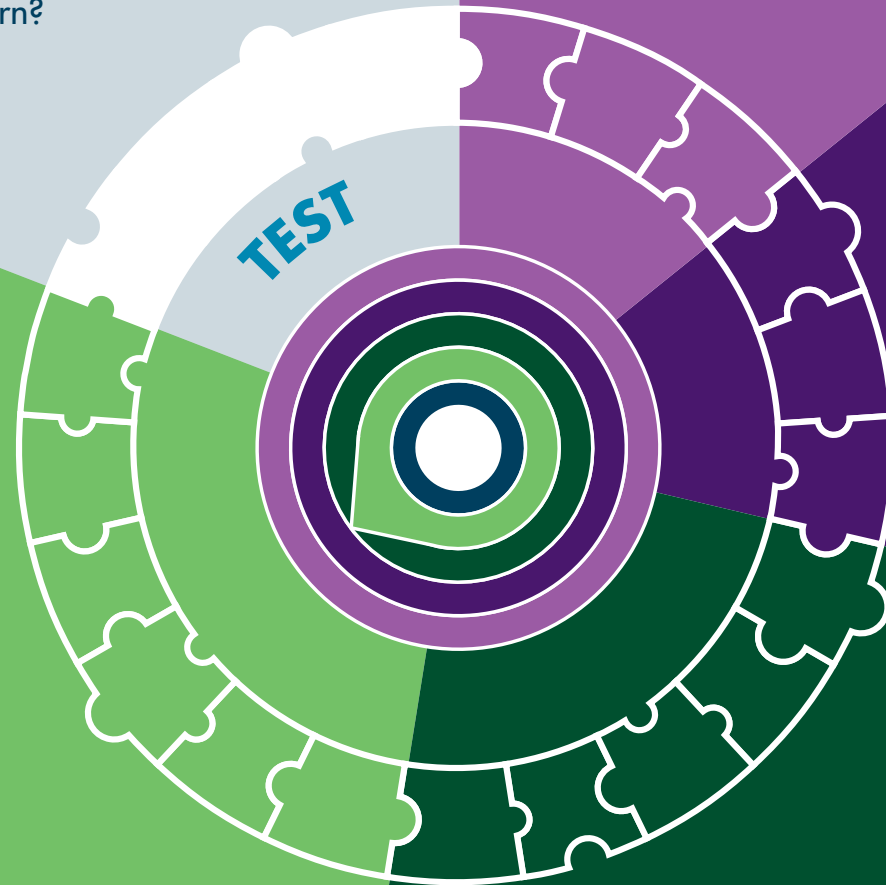
* Selling means, making sure the product is being used in its next lifecycle. This can also be through one of the service models described in the previous section.

**YOU'VE
READ**

**YOU'VE
LEARNED**

**YOU'VE
TALKED**

**YOU'VE
TRIED**

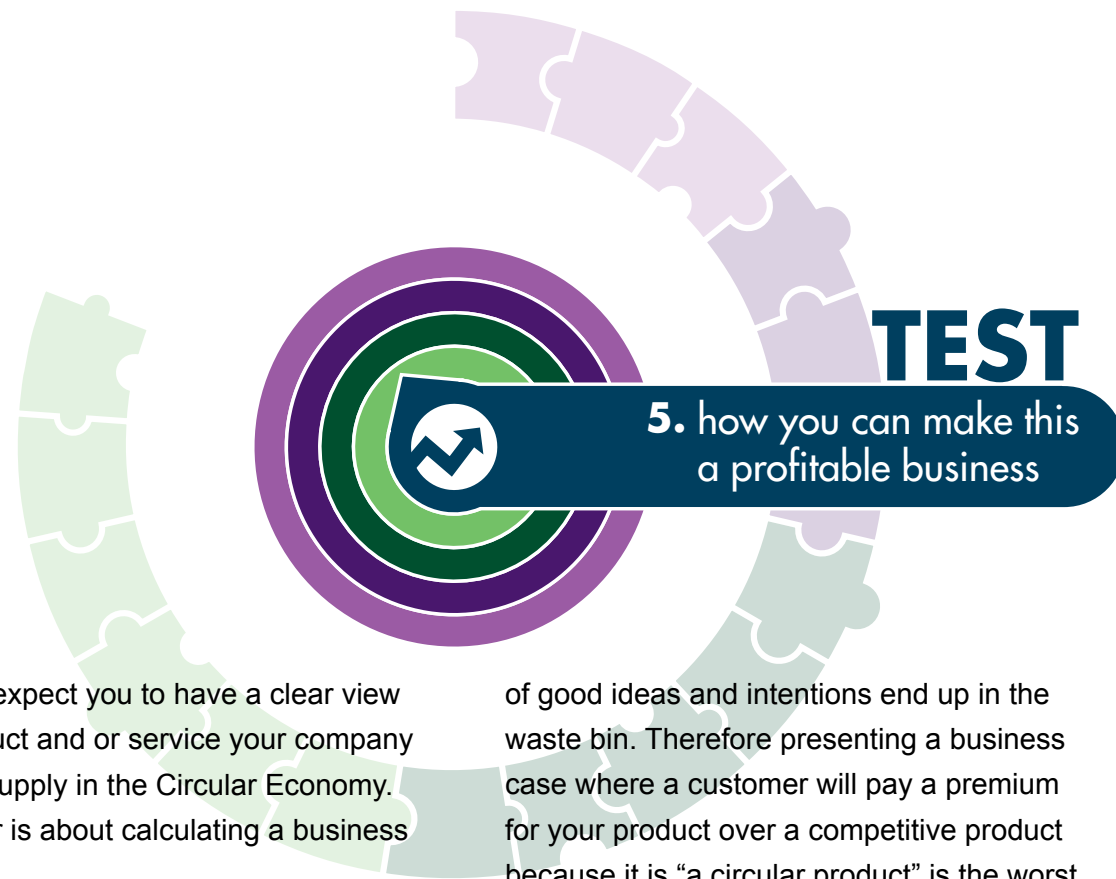
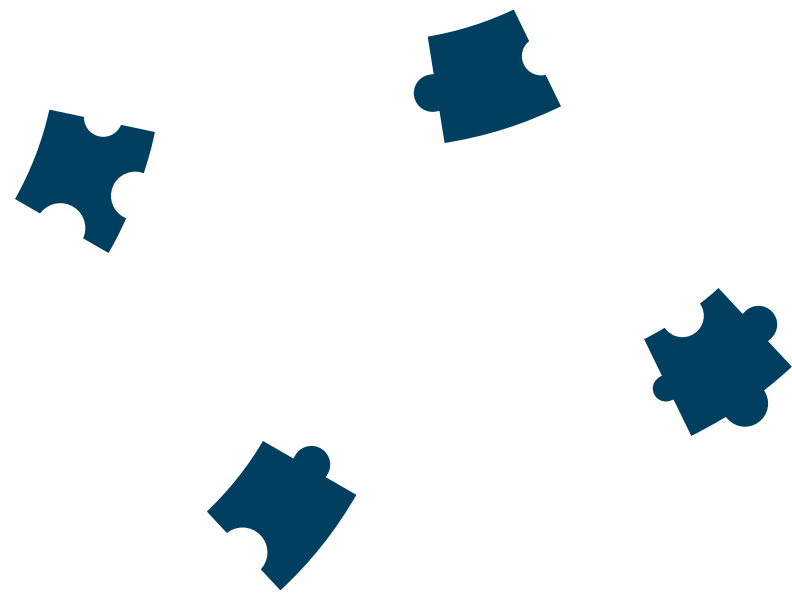


How do I finance
all of this?

How do I manage the
development costs?

Partnerships or
do it yourself?

Return on Investment, is
there anything to earn?



By now we expect you to have a clear view on the product and or service your company is going to supply in the Circular Economy. This chapter is about calculating a business case for it.

Furthermore one could claim that a lot of sustainable ideas are financially quite unsustainable in today's world. At the chamber of commerce you can find statistics on new companies started versus companies discontinued. Looking for 5 minutes at these numbers makes you aware that a lot

of good ideas and intentions end up in the waste bin. Therefore presenting a business case where a customer will pay a premium for your product over a competitive product because it is "a circular product" is the worst business model. The Circular Economy will not become a reality simply because the products and services in this economy are circular. The Circular Economy and its marketing potential might initially bring you some educated customers in the first years of operations. But over time your proposition will become a market practice

if there is inherent value to all participants; customer, suppliers, channel partners and the environment.

Whatever product or service you bring into the Circular Economy, make sure it is paid for by the people that value it. By reading this chapter well, you won't fall in the same pitfalls as some of your predecessors did.

5.1 HOW DO I MANAGE THE DEVELOPMENT COSTS?

The visual underneath shows the product lifecycle of your product or service. It makes it clear that your development costs are to be compensated by revenues over time. This section of Guided Choices towards a circular business model will help you garner insight about future profits and investments necessary to create a profitable circular proposition.



Looking at the product life cycle where are your current products? Please plot them in the graph below.

Are most of your current products concentrated in the middle or the right side of the graph? Are you currently making enough money? Can you honestly say that your business model, if unchanged, will be sustainable in 5 years? 10 Years?

If all of your propositions are on the left side of the graph, then do you have enough potential to develop your business over time? Does the time it will take to complete development, introduction and achieve growth pose funding risks for these products?

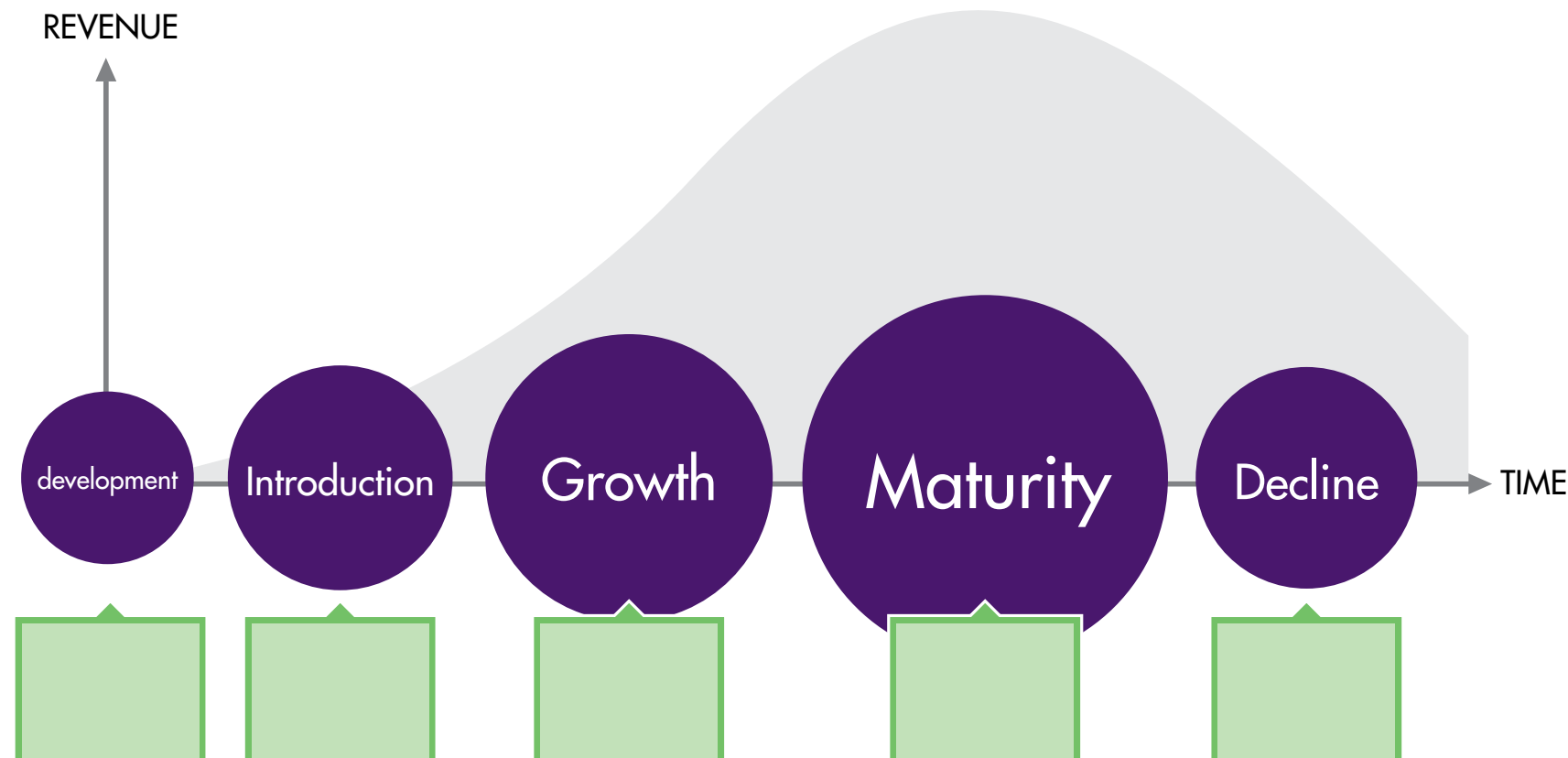
Looking at the product life cycle, can you estimate how much time is there for you to “harvest” on your investments? Know that markets are tough and competitors copying your proposition are a serious risk.

Do we run a business or a project?

It is remarkable how many business models start “from scratch”. Brainstorming sessions generally have the tendency to create totally new and “crazy” concepts. Making people enthusiastic for such an idea is generally easier than gradually changing an existing proposition in the market. In marketing terms one calls this “do you want a revolution or an evolution”. However having a team of experts taking deliberate small steps in the right direction alongside their normal business is more likely to succeed than investing heavily into the “unknown”. Some companies make the choice of running the ‘revolutionary road’ and creating a new division or company, next to the existing business. That diminishes the risks in the existing proposition and give the innovators the chance to explore and develop the totally new.



*Do I need to develop my business proposition over the course of a month or can I take a year?
Do you want to start a revolution or an evolution?
Starting a revolution without the funds and time is a waste of energy. So when you plan for a revolution make sure you get the necessary budget and decide if the creation of a new company or division separate from the existing business is the best course for developing your circular product.*



How do I fail cheap?

Big retailers like Proctor and Gamble and Unilever have marketing and innovation departments that design numerous new products every week. Product development is not a “once in a lifetime” experience for them. As such they also test various new product / market combinations in the supermarkets. They know that only a certain percentage will be successful. Knowing this, they pre determine strict “go / no go” criteria and they set clear goals and expectations. If you know you will fail in rolling out a profitable product, the best thing you can do is “fail cheap!”



What budget can you make available for your new business proposition without harming your day-to-day business?

Sunk Costs

The concept of Sunk Costs has been around for a while. Its mantra is: “We invested so much time and money already, it is a waste of money if we stop now”.

When you hear these signals it’s time to wake up and review your activities carefully because this can be a signal warning you for possible losses if corrective action is not taken. This concept is well explained in the following soccer match example:

You have a ticket to a soccer game that was paid for some time ago, but you realize now that you don’t want to go or like the game to begin with so you have two choices:

- 1. Even though you have paid the price of the ticket, you decide against attending and use the time to do something fun.**
- 2. Since you have paid the price of admission, you decide to attend and suffer due to your favoring sports other than soccer.**

In either case, you have paid the price of the ticket so that part of the decision no longer affects the future. If you regret buying the ticket, the current decision should be based on whether you want to see the game at all, regardless of the price, just as if you would go to a free match.

Rationally speaking you would think that all people would take the first choice. But in reality a lot of decisions are made based on irrational motivations as people do not like to be associated with losses or failed projects.



Be aware that this reasoning gets companies into bankruptcy. Be smart, take a step back and re-evaluate if you don’t see success in the estimated time frame.

Pre funding your sales

When your proposition is successful you find yourself supplying more and more products or services. Since it is a common practice in the service business to provide such services before being paid for it, how are you going to pay for these outlays as your circular models grows in popularity? This becomes a big issue when companies move from a product towards product and service based model. A solution to this issue is the pre-funding of the service and maintenance portion of these products.



*What would be the capital requirement for your business if you want to change 25% of your annual turnover from pure product sales into a service? Who is going to supply this money?
If tomorrow all of your customers want to get your products in a service, how do you manage that?*

5.2 RETURN ON INVESTMENT, IS THERE ANYTHING TO EARN?

Do you know how much cash you have to invest to have a first prototype of your concept realized?

Your business and initiatives should make money. Don't confuse the Circular Economy with philanthropy. There is a reason it is called the Circular Economy: your activities should provide a sustainable cash flow, return on your investments and have the potential to provide you with income to sustain your business.

Project costs

Your circular business plans might require a considerable amount of time before they start making money. Who is going to lead the project and how much time can they spend? What product development costs do you estimate your company will incur? Is the new model going to be accepted by the market in the first month of introduction? Or are you going to use the new proposition for marketing purposes mainly?

Provision for the unexpected



Make a clear and honest overview of the costs that you are expecting to invest.

Don't be too overambitious on the financial benefits. This is not the same as pessimistic. Be critical on your product and organizational quality especially when you start providing services to your customers.

Expect to encounter some hurdles in this process, which will be understood by the early adopters of your circular services.

Opportunity costs

When you work on product development towards the Circular Economy one cannot work on other items. This fact seems simple but it is easily neglected by creative people.



Which developments and activities would you have pursued if you never heard of the Circular Economy and its possibilities? How profitable or rewarding could these activities be? Do the possible outcomes of a Circular Economy project give your company enough success for the upcoming years?

Sales recognition and cash flow

Your new circular business product will move your company toward a more service based model. This will have an impact on the revenue recognition of these sales. When selling a product to your customers you generate an invoice for the full amount delivered, let's say €50.000. You have received the money upfront or you give your customers a 14 days payment term. When the invoice is generated (and the money received) your administration books the invoice as sales revenue. If you sell maintenance or other service contracts, you have either agreed on a prepaid price for a certain period, or (more likely) you send the customer's monthly or annual invoices. Simple.



But do you know the financial and accounting impact of these changes if you move to providing services?

Let's say you have chosen a model in which you provide customers access to your products for three years and you supply them with additional services as well.

New price of product	€ 50.000	
Value of product when returned after 3 yrs	€ 10.000	—
Product value consumed	€ 40.000	
Additional services provided during 3 yrs	€ 17.500	—
		+
Total value delivered to customer	€ 57.500	
Per Month (during 36 months):	€ 1.597	

After three years you will have the product returned and move it into its 2nd life to generate revenue for you.

Do you see the difference? In the service model your sales revenue in the first year is €19.164 and not €50.000. Your sales revenue model changes. You notice the impact in the beginning. On the longer run it could be more beneficial, but you should realize the transition that needs to be understood from a simple product sale model. Also make sure you make a cash flow calculation to plan on how to cover for the investments and running costs. External financing of some of these flows might be a solution.



Important note: check the financial impact with your financial staff and accountant. The way this is accounted for depends very much on the accounting principles you are following. This is different for national accounting principles, IFRS and US General Accepted Accounting Principles.

5.3 PARTNERSHIPS OR DO IT YOURSELF?

So you are getting close to your new circular business model. You have your offer to the customer figured out. Now it is time to see who is going to do what. Can your current resources handle all the new services, structures and processes that are required? Probably not. So are you going to do it all yourself or outsource some activities to others? It is very likely you are going to partner up with others to deliver your new circular business model.

Why should I search for partnerships?

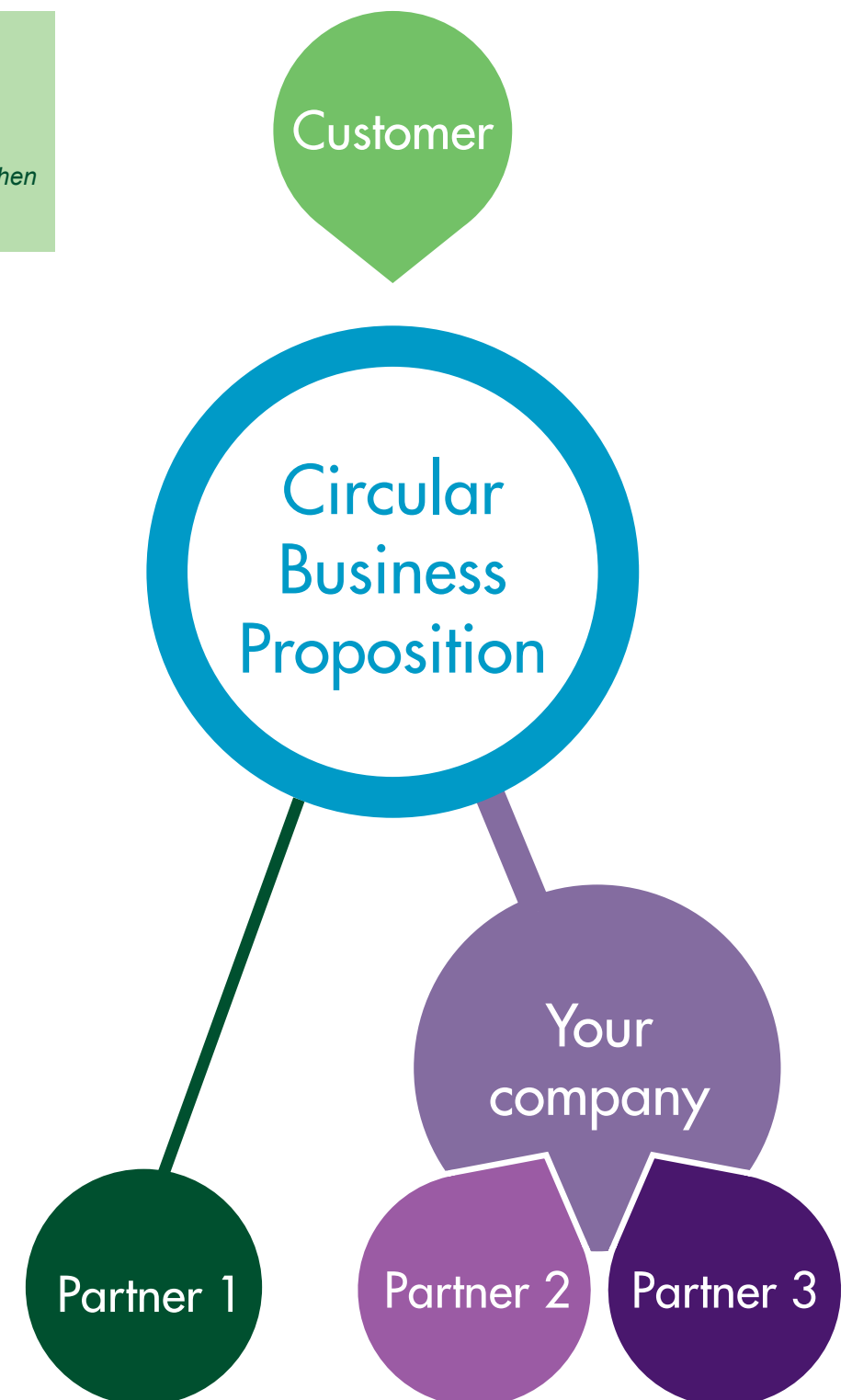
Working with partners gives you a number of benefits:

- Obtain expertise and experience that you do not have yourself
- Benefit from scale and volume that your business alone would not bring
- Know more than one, which helps in your product and business model design
- Bigger impact to the market if your partners help selling (in all aspects)
- Spread the risk, especially if you agree on risk and benefit pools or joint ventures.

What kind of partners should you look for?

This depends of course on what your offering is all about. The recommendation is develop a value proposition detailing the activities that are needed. Then check who can deliver these activities.

In your new circular business model your customer is benefitting from a one stop shop. Instead of having to work with several service suppliers himself, he now gets an integrated offer from you. For example in a pay-per-use model many risks are moved from the customer to the supplier. Are you willing to take all these yourself or would you want to work with partners and all take part in the offering with a reasonable risk based reward for all participants?



5.4 HOW DO I FINANCE ALL OF THIS?

When you have decided that you need external funds to develop your circular proposition you can do this in a couple of ways. The most common way is to make an appointment at the bank. But getting a bank loan is often times the longest route. You should evaluate your proposition based on: **“how much are we going to earn when this proposition is realized and successful.”** But banks generally review your business proposition as following: **“How big is the risk that the requested amount of money is not repaid”**. Realize that you are the entrepreneur and they are the financers. These are the roles that have been determined by international regulations and as such you better prepare to provide “low risk” investments. This saves you time, energy and it increases your chance of acquiring the required funds.

Using future customers to build a low risk business case.

You are not the only one with “new ideas”. For example, big Dutch telephone companies like KPN, XMS and their global competitors face the same issues when they are investing in infrastructure for a future service as G4 mobile and high speed cable internet utilizing glass fiber cables. Rather than requesting high risk funds from their investors and banks for a national roll out of the necessary infrastructure, they first build low risk business cases.

Step 1) They split up you total investment into little chunks. (e.g. the whole of Holland or a whole city is divided into numerous understandable regions.

Step 2) in the determined regions you appoint a (third party) market developer who reaches out to possible customers for the planned services.

Step 3) customers can be requested to pre sign up for the determined service at a discounted rate, limited to the fact that a certain threshold is met.

Step 4) The threshold is determined by dividing the contribution margin per customer during the contract duration by the total necessary investment to provide the service during a certain period.

Step 5) When the necessary threshold is met and the needed amount of customers have pre-registered, most of the investors are willing to provide the necessary funds.

Basically you transformed your “high risk investment” into a low risk business case. Still you need to convince the investors that you are able to deliver the promised service, but proving a business case by proving the concept with an existing customer base is a very powerfull tool to get your business funded.



Learn from the telecom industry, can you scope a certain, region and customer profile to presale your proposition. If yes, invest in a small team with a good sales pitch and test the potential!

Can I ask for a downpayment from my customers?

Many initiatives are pre funded by downpayments of customers. Virgin is a good example when they marketed their idea for orbital flights. Without the technology to even deliver the product, Virgin successfully sold seats on these future flights to interested customers who wanted to be among the few who wanted (and could afford) to be the first in a line of civilian astronauts traveling the globe.



Do you have or see customers who value the first mover marketing potential?



You are advised to check for relevant opportunities in your sector. However do not forget that securing these funds will take time, capital funds and energy as well, so make sure your efforts are of practical usage.

Can I get subsidies, grants or other funds?

There have been many competitions, subsidies and investors linked to sustainable and circular innovations. In fact there are too many to simply list here. They range from funds provided by private foundations, governmental subsidies to company innovation awards.

Peer-to-Peer Lending in the Supply Chain

If you are a party in a supply chain of products or services towards an end customer, you could consider reaching out to parties in your supply chain. Especially when you are supplying components, which become part of a service or product, it could be the case that other parties have (more) commercial benefits from your circular achievements. Requesting them to fund, co-finance, staff or support your R&D activities is not out of the ordinary.



European funding available from 2014: Horizon 2020 means simplified access, also for companies, but: no free ride (co-financing required), success of application not guaranteed. Timing for calls spring 2014. Strong focus on resource efficiency and Circular Economy.



Image courtesy of: virgingalactic.com

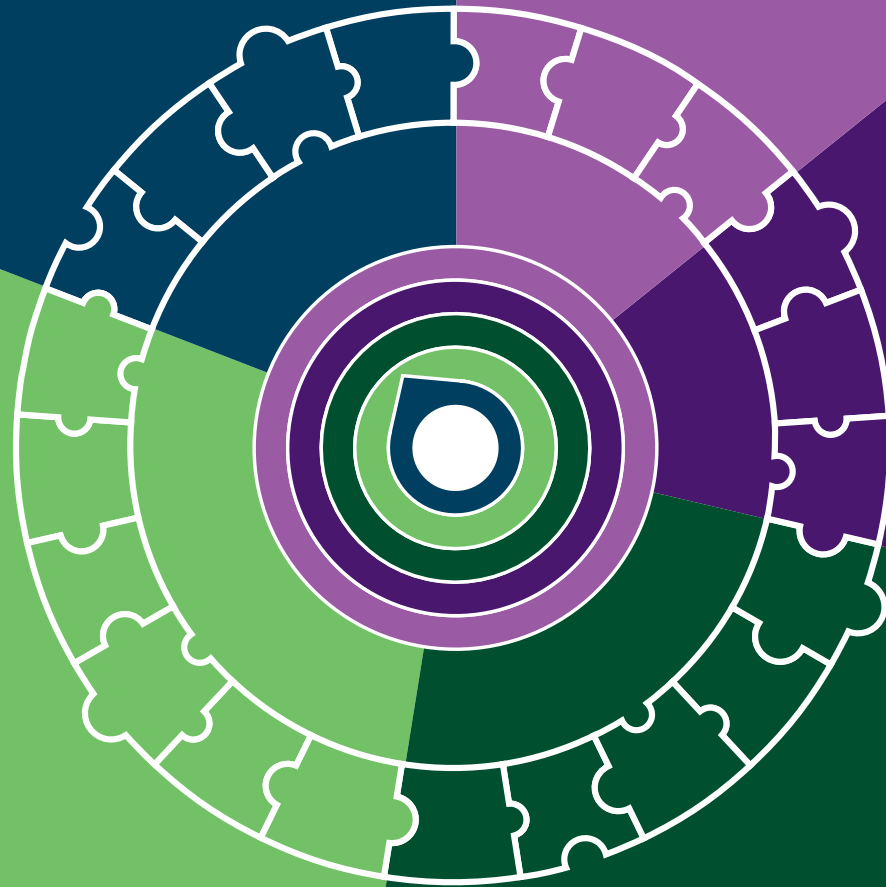
YOU'VE
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STEP 6: CROSS CHECK ON AMBITIONS

Does the circular product or service I finally developed really fit my company and does it satisfy my ambitions in the Circular Economy?

In this section you are asked to cross check on your ambition.

It is a good idea to take your future ideas and plans and bring them back to your current operations and what needs to be done now to support the future plan. This is 'backcasting'. It starts with the question: what are the real needs of the customer? When you have a definite answer to this question, you can start to identify what operations changes are needed now. The following ABCD's are for you to consider at this point in your product development:

Ask

A real need is (almost) never something that someone wants to own: it is not the need of a kitchen but the need of healthy food, it is not having to own a own car but the ability of movement. So the question is: what real need of the customer can you fulfill?

Since the answer is almost never a 'thing' we urge you to think about the product-service-combination that you can offer or create. Rethink and redesign your products and services.

Businesswise

Rethinking and redesigning products and services gives great perspectives on new markets and new opportunities for existing customers. No doubt about it, new opportunities provide a lot of enthusiasm. The question is not whether you should change your operations, the question is just when and how fast the change can be realized. This is not a technical question, since many techniques can be changed relatively quickly. It is a question of relations, finance and the power of connections.

Changers

Can you identify the people and partners that will be the foundation on which you can build the change in your business? Are these game-changers well informed and facilitated to support the change? Do these people have room to move: to innovate, to communicate, to build new relations, to redesign their operations. This is one of the most difficult parts of change: trust others, trust in the quality of people.

Do

In the end it is your decision, as as an entrepreneur to step into the Circular Economy. There are viable economical arguments to do so. Also there are viable societal arguments to do so: the need of changing from a waste-oriented system to a circular system is evident. Whatever argument you use, we think choosing for the Circular Economy is a choice for the future of business. The redesign and rethinking enhances the resilience of business for future insecurities. Through the design process the ability to adapt to changes will flourish and grow into new opportunities. Resource management brings independence.

Backcasting is daring to choose strategies for the future after a thorough analysis of the problem, solutions, current environment and future needs of customers.



Does the business model, product and service you developed when working through this guidelines, fit your ambitions.

When you are able to give a full-hearted positive answer to this question, then we wish you all the best in the realization of your particular solution. Implement, manage and keep on innovating through the decades to come!

C2C BIZZ AND AUTHORS

C2C BIZZ is the collaboration of eleven European partners in the North Western area with the objective to enhance the implementation of Cradle to Cradle on new and existing business sites

Cradle to Cradle is an innovation platform for improving quality and good business by continuing material flows, using renewable energy and creating diversity. The three Cradle to Cradle principles are applied to the entire process of business: area (re-) development, leading to business sites with a positive impact on environment, society and economy and that are future proof.

Objective

The cooperation of the partners focuses their attention on three main Cradle to Cradle principles: realizing continuous loops, finding renewable energy solutions and creating diversity. During the four years the different innovative aspects of transition towards C2C will be studied, developed and tested on pilot sites in different countries. Of course companies on the business sites will be involved to actively contribute and become aware of Cradle to Cradle. Together the pilots comprise one complete transnational Cradle to Cradle business site and a new form of park management.



Results

Tools, instruments and guidelines will be developed to facilitate the application of Cradle to Cradle on business sites. The final result of the project will be a roadmap, that leads the way to a 100% Cradle to Cradle business site. This document is one of the tools within the C2C BIZZ project. In this case the focus is on Circular Economy, because the Circular Economy is the system that can make Cradle to Cradle profitable.

Funding

C2C BIZZ has received European Regional Development Funding through INTERREG IV B.

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cradle to cradle in business sites

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