



# e-Mining @ School

**Business Models of Circular  
Economy**

**eurecat**

Frederic Clarens  
26 Abril 2019



## Index

- **Critical raw materials**
- **What is Circular Economy?**
- **Business models in circular economy**
- **Example: Canvas model. Business model planning.**

Today's presentation covers four themes:

- I will set the scene for CRM
- I will also explain the fundamentals of CE
- I will then go on to give an overview of the Business models in CE
- And finally I will talk about a very useful tool that is the canvas model that allows us to analyze and create business models

## What is the meaning of *raw materials*?

**Raw materials are currently essential in the European economy.** They are the base of industrial development. Its contribution aims to help producing a wide range of products and applications that are used for everyday life and modern technologies.

Minerals and metals represent the basis of any industrial production process. They become the core of daily use products and also new technological and industrial solutions.

To start, what is the meaning of raw materials.? Raw materials are materials or substances used in the primary production or manufacturing of goods.

Among them, Critical Raw Materials (CRMs) are those raw materials which are economically and strategically important for the European economy, but have a high-risk associated with their supply.



## What is the value of WEEE?



Material	kilotons (kt)	Million €
Fe	16,283	3,582
Cu	2,164	9,524
Al	2,472	3,585
Ag	1.6	884
Au	0.5	18,840
Pd	0.2	3,369
Plastics	12,230	15,043

Estimated value of raw materials at  
**55 BILLION EUROS**

Baldé, C.P., Fort V., Gray, V., Kuehr, R., Stegmann, F.: The Global E-waste Monitor – 2017, United Nations University (UNU), International Telecommunication Union (ITU) & International Solid Waste Association (ISWA), Bonn/Geneva/Vienna.

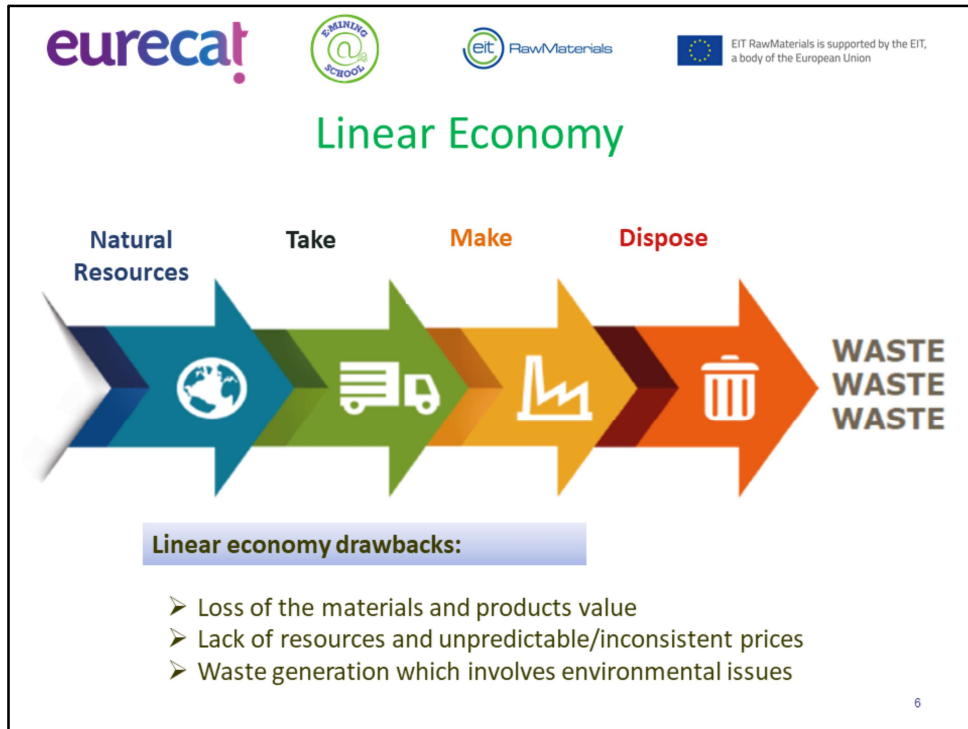
5

Waste of Electrical and Electronic Equipment (WEEE) is waste that is made up of devices that base their operation on electricity and which are currently in disuse

In 2016 some 44.7 million tones of WEEE were generated, about 6.1 kg per inhabitant. The estimate for 2017 was 46 million and for the year 2021 52.2 million are expected. With a growth of between 3 and 4% per year.

This slide shows the accounting global economical impact of not recycling the WEEE Waste of Electrical and Electronic Equipment

As you can see, it's estimated that the value for the volume of global generated WEEE is equivalent to 55 billion of euros



I will explain the concept of linear economy and why it doesn't work

For many years, most manufacturers and production facilities have operated using a linear economy. A linear economy traditionally follows the “take-make-dispose” step-by-step plan. This means that raw materials are collected, then transformed into products that are used until they are finally discarded as waste. Value is created in this economic system by producing and selling as many products as possible.

Among the many issues related to the linear economy limitation we can name:

- Loss of the materials and products value
- Lack of resources and unpredictable/inconsistent prices
- Waste generation which involves environmental issues

## Linear Economy - What doesn't work?

*"Every year about 80% of the materials used to produce consumer goods,  
worth \$ 3.2 trillion, are not recovered"*  
(Nguyen, Stuchtey & Zils 2014)

*"Humanity requires more than 50% more than what the planet can generate"*  
(Global Footprint Network 2012, p.21)

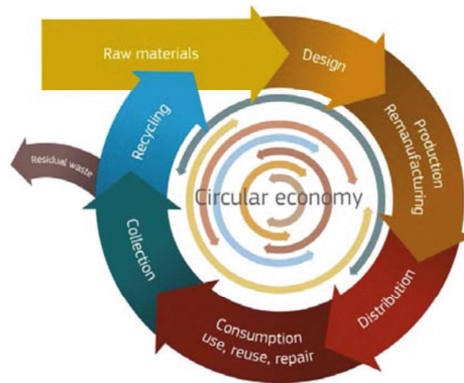
Some quantitative data to glimpse the magnitude of the problem

¿What if we turn wastes into  
new resources?

What if we turn wastes into new resources?  
In that way we could make a shift from a linear economy to a circular economy



## Circular economy

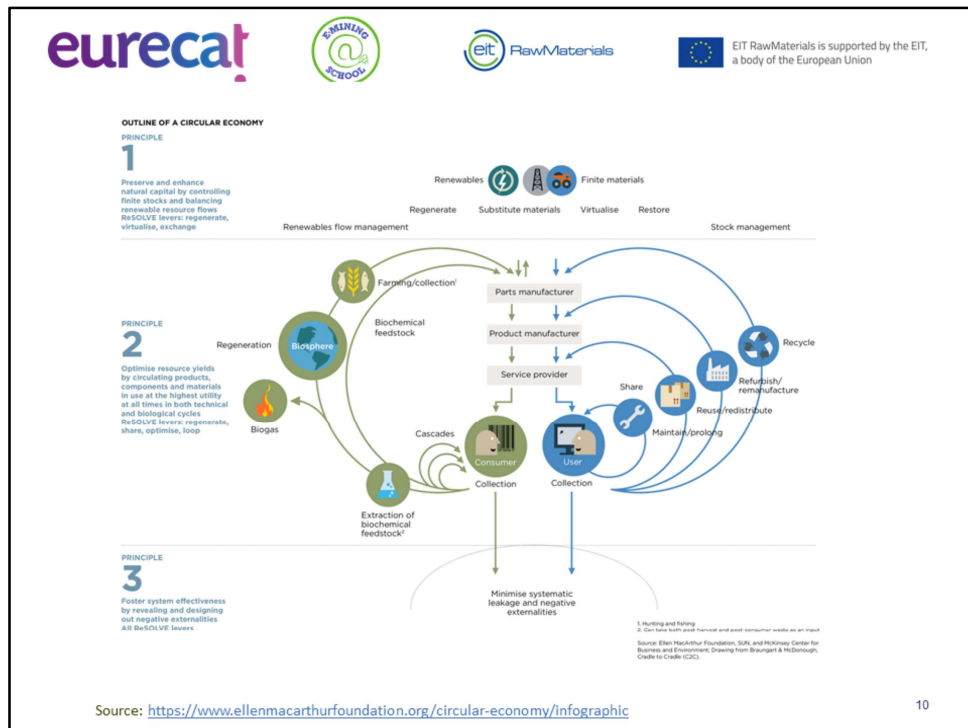


Source: European commission

9

In order to create a truly sustainable future for generations to come, we need to ensure all manufacturing processes are carried out with a circular economy in mind.

A circular economy is a closed-loop economy that aims to extend the life of assets and resources through recycling, keeping quality materials at their highest value and utility. Unlike linear economy that is based on creating products from raw material and disposing of them in landfill after use, in CE products are created from recycled materials and recycled at the end of their life. In this way, resources are conserved while the quality of products created remains the same.



The drive to shift the material composition of consumables from technical towards biological nutrients and to have those cascade through different applications before extracting valuable feedstock and finally re-introducing their nutrients into the biosphere, rounds out the core principles of a restorative circular economy. The Figure shown illustrates how technological and biological nutrient-based products and materials cycle through the economic system, each with their own set of characteristics.

The circular economy rests on three principles:

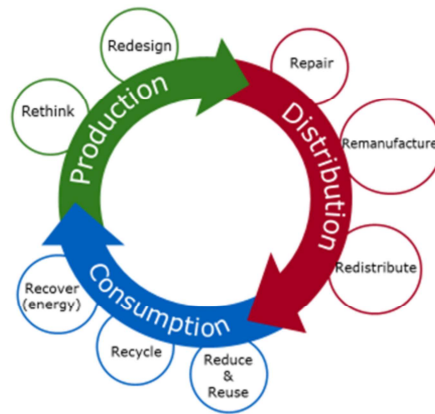
**Principle 1:** Preserve and enhance natural capital by controlling finite stocks and balancing renewable resource flows. This starts by dematerialising utility – delivering utility virtually, whenever optimal. When resources are needed, the circular system selects them wisely and chooses technologies and processes that use renewable or better-performing resources, where possible.

**Principle 2:** Optimise resource yields by circulating products, components, and materials at the highest utility at all times in both technical and biological cycles. This means designing for remanufacturing, refurbishing, and recycling to keep technical components and materials circulating in and contributing to the economy.

**Principle 3:** Foster system effectiveness by revealing and designing out negative

externalities. This includes reducing damage to systems and areas such as food, mobility, shelter, education, health and entertainment, and managing externalities, such as land use, air, water and noise pollution, and the release of toxic substances.

## CIRCULAR ECONOMY: multi-R approach



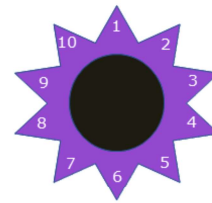
Source: ACR+

11

The traditional approach of circular economy is governed by the 3Rs, namely Reduce, Reuse, and Recycle. “multi-R” approach expands the 3Rs concept and it helps to give structure to the circular economy at all stages of the process (production, distribution and consumption)

## Potential benefits for enterprises

1. It is the only way to guarantee a mid or long term competitiveness.
2. Open new market niches or business opportunities.  
Create new value from waste or coproducts.
3. Technology, products and processes innovation.
4. Create employment and improve job skills.
5. Optimize resources and extend materials life.



Source: <http://www.centraldecambio.com/creemos/economia-circular-transicion-y-beneficios/>  
<http://www.futurosostenible.elmundo.es/sostenibilidad/economia-circular-un-cambio-hacia-la-sostenibilidad>  
[http://economiaecircular.org/DOCUMENTACION/Publicaciones/Monografias/201703\\_Por%20qu%C3%A9%20y%20c%C3%B3mo.pdf](http://economiaecircular.org/DOCUMENTACION/Publicaciones/Monografias/201703_Por%20qu%C3%A9%20y%20c%C3%B3mo.pdf)

12

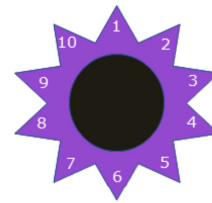
The opportunities of a circular economy span across economies, the environment, businesses and citizens. These benefits come together to offer a promising vision for a regenerative and restorative economy in the future.

It is worth mentioning the potential benefits for enterprises:

- 1-It is the only way to guarantee a mid or long term competitiveness.
- 2-Open new market niches or business opportunities for your product or service. Create new value from waste or coproducts.
- 3-Technology, products and processes innovation.
- 4-Create employment and improve job skills. Social benefits: more jobs for the local community members; fair trade jobs, cooperation within local communities.
- 5-Optimize resources and extend materials life.

## Potential benefits for enterprises

6. Decrease production and wastes associated costs.
7. Promote enterprises collaboration, since one's wastes could become the other's resources.
8. Reduce economic and resources dependence.
9. Reduce wastes and environmental impact.
10. Improve the enterprise image and its clients reliance.



Source: <http://www.centraldecambio.com/creemos/economia-circular-transicion-y-beneficios/>  
<http://www.futurosostenible.elmundo.es/sostenibilidad/economia-circular-un-cambio-hacia-la-sostenibilidad>  
[http://economiaecircular.org/DOCUMENTACION/Publicaciones/Monografias/201703\\_Por%20qu%C3%A9%20y%20c%C3%B3mo.pdf](http://economiaecircular.org/DOCUMENTACION/Publicaciones/Monografias/201703_Por%20qu%C3%A9%20y%20c%C3%B3mo.pdf)

13

6- Decrease production and wastes management associated costs

7- Promote enterprises collaboration, since one's wastes could become the other's resources: you can build stronger partnerships

8- Reduce economic and resources dependence.

9- Reduce wastes and environmental impact: In terms of environmental benefits, becoming more circular would help avoid emissions, reduce the loss of resources, and ease the burden on global ecosystems

10- Improve the enterprise image and its clients reliance.

## What is a business model?

A business model describes the rationale of how an organization creates, delivers, and captures value in economic, social, cultural or other contexts.

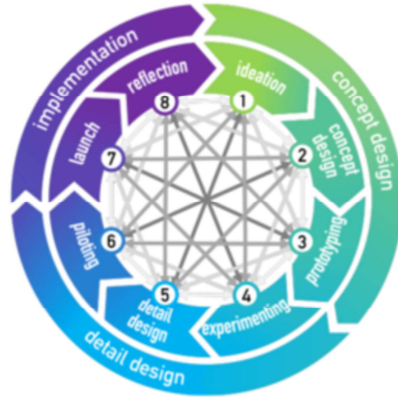
What is a business model?

It is a comprehensive understanding about how a company does business and how value is created.

A business model is a simplified representation of the elements of an organisation and the interaction between these elements for the purpose of its systemic analysis, planning, and communication in face of organisational complexity.

Briefly, I will present some of the well-known and widely cited and used business model frameworks.

## What is a business model?



Concept design	Idealisation Concept design Virtual prototyping
Detail design	Experimenting Detail design Piloting
Implementation	Launch Adjustment & diversification





Source: Geissdoerfer, Martin; Savaget, Paulo; Evans, Steve (2017). "The Cambridge Business Model Innovation Process". *Procedia Manufacturing*. 8: 262–269. doi:10.1016/j.promfg.2017.02.033

15

This slide shows the circular and iterative nature of the CBMIP (Cambridge Business Model Innovation Process), which addresses the different stages of business model generation, from early conceptualisation to implementation

The Cambridge Business Model Innovation Process (CBMIP) is a comprehensive guiding framework that is both (1) a map that shows what activities and challenges are generally expected when engaging in sustainable business model innovation; and (2) a tool to ideate and plan the different phases and identify challenges customised for the specific needs and context of the company



eurecat     EIT RawMaterials is supported by the EIT, a body of the European Union

## What is a business model?

Concept design			Detail design			Implementation	
Everything needed to create something			Everything needed to sell something			How and what the customer pays	
Ideation	Concept design	Virtual prototype	Experimenting	Detail design	Piloting	Launch	Adjust & diversific.
<ul style="list-style-type: none"> <li>Raw materials</li> <li>Design</li> <li>Production</li> <li>Employees</li> <li>...</li> </ul>			<ul style="list-style-type: none"> <li>Marketing</li> <li>Communication</li> <li>Distribution</li> <li>Service delivery</li> <li>...</li> </ul>			<ul style="list-style-type: none"> <li>Revenue strategy</li> <li>Price strategy</li> <li>Payment method</li> <li>Payment times</li> <li>...</li> </ul>	

Source: Geissdoerfer, Martin; Savaget, Paulo; Evans, Steve (2017). "The Cambridge Business Model Innovation Process". *Procedia Manufacturing*. 8: 262–269. doi:10.1016/j.promfg.2017.02.033

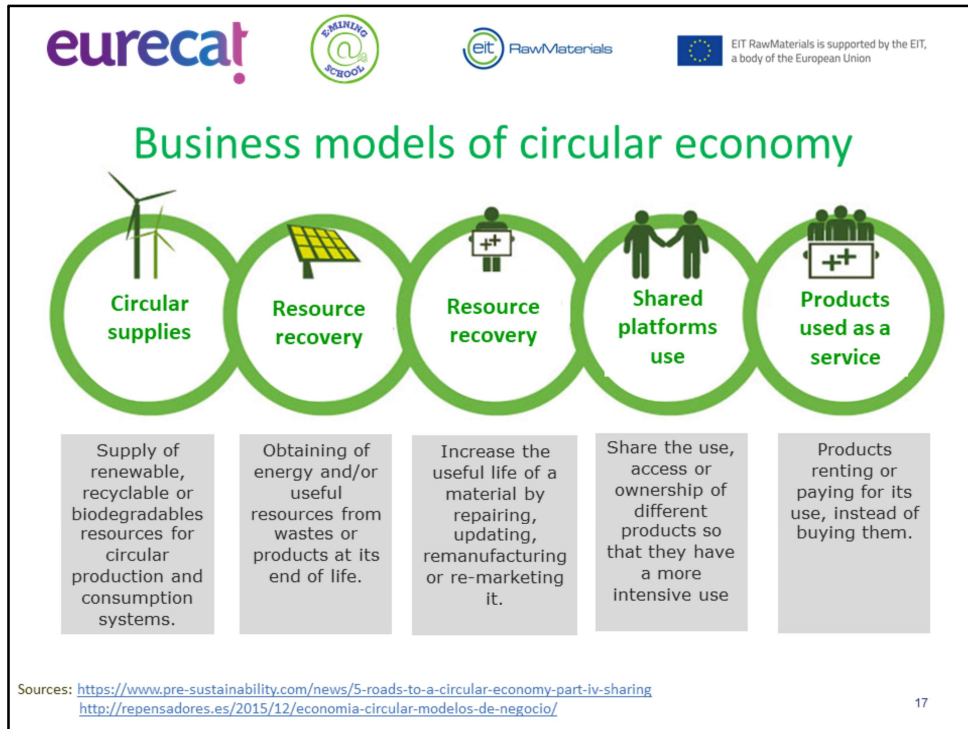
16

CBMIP comprises eight steps:

1. **Ideation:** The purpose of the business model innovation and its key stakeholders are defined, and the value proposition and first conceptual ideas are ideated.
2. **Concept design:** A first rough conceptualisation of the key business model elements is developed and documented.
3. **Virtual prototyping:** A range of prototypes is generated and revised to refine and communicate the business model concept. The phase also comprises benchmarking with solutions and concepts from other parties.
4. **Experimenting:** Key assumptions and variables of the concept are tested in simulations and field experiments, ideally through randomised controlled trials.
5. **Detail design:** An in-depth analysis and detailing of all the elements of the business model and interactions between these elements is conducted.
6. **Piloting:** The entire concept is tested by running a first limited version of the business model in a subsection of the target market.
7. **Launch:** The business model is rolled out across all responsible organisational units and the target market.
8. **Adjustment and diversification:** The business model is revised according to initial plans, expectations, and strategic fit.

Based on this evaluation, adjustments and diversifications are made and, depending on the comprehensiveness of the necessary changes, the entire business model innovation

process may be repeated.



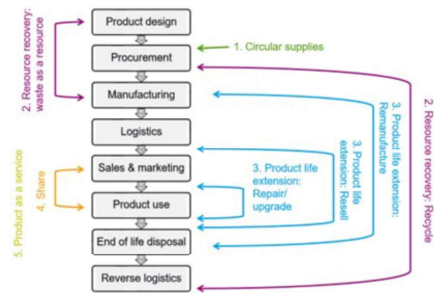
Organisations increasingly understand that meeting their sustainability ambitions does not only require new technologies, but innovation on the business model level.

Innovating new business models is about creating new value for the society and its different actors, companies and consumers, through changing one or several constituents of the business model

Circular business models serve among others, to reduce the extraction and use of natural resources and the generation of industrial and consumer wastes. They represent the key activities required to transition to a more resource efficient and circular economy.

## Business models of circular economy

1. Circular Supplier
2. Resources recovery
3. Product life extension
4. Shared platform
5. Product "as a service"



Existing circular business models can inspire companies when they look for circular opportunities and are ready to renew or make their business model more sustainable. Accenture (2014) distinguishes five business models that are promising in a circular economy. These models are:

- Circular Supplier
- Resources recovery
- Product life extension
- Shared platform
- Product "as a service"

## Business models of circular economy

1. **Circular Supplier:** Provide renewable energy, bio based- or fully recyclable input material to replace single-lifecycle inputs.
2. **Resources recovery:** Recover useful resources/energy out of dispose products or by-products.
3. **Product life extension:** Extend working lifecycle of products and components by repairing, upgrading and reselling.
4. **Sharing platforms:** Enable increased utilization rate of products by making possible shared use/access/ownership.
5. **Product as service:** Offer product access and retain ownership to internalise benefits of circular resource productivity.

Source: [https://www.accenture.com/t20150523T053139\\_w\\_us-en/acnmedia/Accenture/Conversion-Assets/DotCom/Documents/Global/PDF/Strategy\\_6/Accenture-Circular-Advantage-Innovative-Business-Models-Technologies-Value-Growth.pdf](https://www.accenture.com/t20150523T053139_w_us-en/acnmedia/Accenture/Conversion-Assets/DotCom/Documents/Global/PDF/Strategy_6/Accenture-Circular-Advantage-Innovative-Business-Models-Technologies-Value-Growth.pdf)

19

These business models are often easy to combine.




-Circular suppliers, who supply sustainable energy, biodegradable or fully recyclable materials to prevent single-use materials.

-Raw material collectors, who retrieve useful raw materials from by-products or products at the end of their life cycle;


-Life cycle extenders, which through repair and resale ensure that products stay in the market longer;







-Sub-platforms, where more effective use of products is possible by enabling shared use;

-Product-to-service, where the use of products leads to positive value for the owner

**eurecat**    EIT RawMaterials is supported by the EIT, a body of the European Union

## ReSOLVE model

ReSOLVE offers companies and countries a tool to generate circular strategies and growth initiatives. 

	<b>REGENERATE</b>	<ul style="list-style-type: none"> <li>• Change to energy and renewable materials</li> <li>• Recover, retain and restore ecosystems health</li> <li>• Return the recovered biological resources to the biosphere</li> </ul>
	<b>SHARE</b>	<ul style="list-style-type: none"> <li>• Share assets (eg cars, rooms, appliances)</li> <li>• Reuse / second hand products</li> <li>• Extend life through maintenance, design for durability, updating capacity, etc.</li> </ul>
	<b>OPTIMISE</b>	<ul style="list-style-type: none"> <li>• Increase product performance / efficiency</li> <li>• Eliminate waste in production and the supply chain</li> <li>• Use of big data, automation, sensorizing and remote operation</li> </ul>
	<b>LOOP</b>	<ul style="list-style-type: none"> <li>• Products or components remanufacturing</li> <li>• Materials recycling</li> <li>• Anaerobically digestion</li> <li>• Biochemical products from organic waste extraction</li> </ul>
	<b>VIRTUALISE</b>	<ul style="list-style-type: none"> <li>• Directly dematerialize (eg books, CDs, DVDs)</li> <li>• Indirectly dematerialize (eg online purchase)</li> </ul>
	<b>EXCHANGE</b>	<ul style="list-style-type: none"> <li>• Replace old materials for advanced materials</li> <li>• Apply new technologies (eg 3D printing)</li> <li>• Choose new products / services (eg multimodal transport)</li> </ul>

Sources: [https://www.ellenmacarthurfoundation.org/assets/downloads/publications/EllenMacArthurFoundation\\_PolicymakerToolkit.pdf](https://www.ellenmacarthurfoundation.org/assets/downloads/publications/EllenMacArthurFoundation_PolicymakerToolkit.pdf)<sup>20</sup>

The ReSOLVE framework include six action areas for businesses and countries wanting to move towards the circular economy. The 6 business actions are:

**REgenerate.** Shift to renewable energy and materials; reclaim, retain, and regenerate health of ecosystems and return recovered biological resources to the biosphere.

**Share.** Keep product loop speed low and maximise utilisation of products, by sharing them among different users, by reusing them through their entire technical lifetime (second hand), and by prolonging their lifetime through maintenance, repair, and design for durability.

**Optimise.** Increase performance/efficiency of a product; remove waste in production and supply chain; leverage big data, automation, remote sensing and steering.

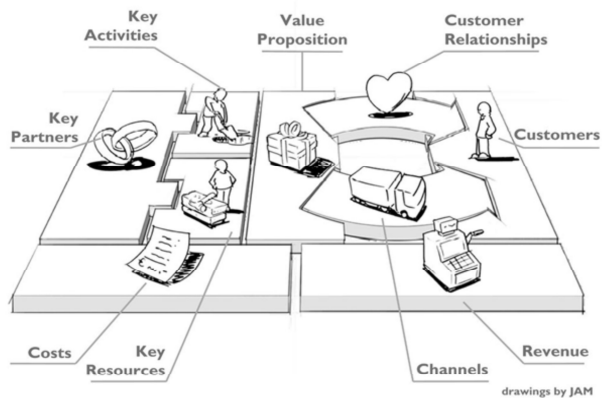
**Loop.** Keep components and materials in closed loops and prioritise inner loops. For finite materials, it means remanufacturing products or components and recycling materials.

**Virtualise.** Dematerialise resource use by delivering utility virtually: directly, e.g. books or music; or indirectly, e.g. online shopping, autonomous vehicles, virtual offices.

Exchange. Replace old with advanced non-renewable materials, apply new technologies and choose new products/services (e.g. multimodal transport).

## Methodology - analysis

## CANVAS model



<http://trabajardesdecasasi.com/modelo-canvas/>

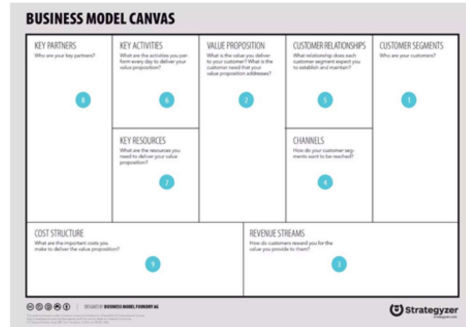
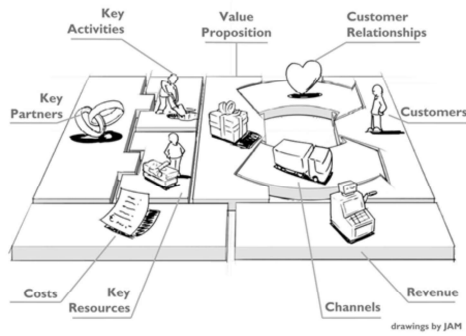
21

Finally, some brief words on the canvas model.

Business Model Canvas is a strategic management and lean startup template for developing new or documenting existing business models. It is a visual chart with elements describing a firm's or product's value proposition, infrastructure, customers, and finances. To be more precise, a BMC allows you to understand your project idea and the field where you are about to develop. Business model canvas is the simplified and more comfortable and visualized version of a business plan.



# Business Model Canvas

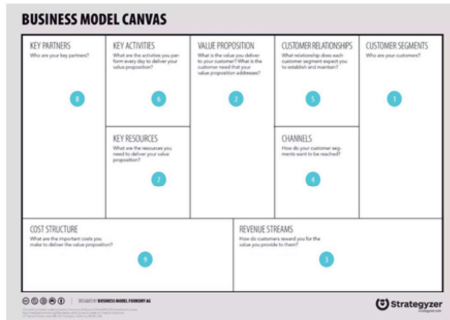


The Business Model Canvas reflects systematically on your business model, so you can focus on your business model segment by segment.

The Business Model Canvas outlines nine segments which form the building blocks for the business model in a nice one-page canvas.

This also means you can start with a brain dump, filling out the segments the spring to your mind first and then work on the empty segments to close the gaps.

## Business Model Canvas



- CUSTOMER SEGMENT**  
 Identify who are the most important customers and users we address to and for whom we create value.
- VALUE PROPOSITION**  
 What value do we offer to the customer and to the user; what problem or unmet need, solves our solution.
- REVENUE STREAMS**  
 For what value our customers are willing to pay, how they are willing to pay and how much.
- CHANNELS**  
 Through which channels we can reach our customers, which ones work best and which ones are the most efficient.

The Business Model Canvas can be printed out on a large surface so groups of people can jointly start sketching and discussing business model elements with post-it note notes or board markers. It is a hands-on tool that fosters understanding, discussion, creativity, and analysis. The following question could help you brainstorm and compare several variations and ideas for your next business model innovation:

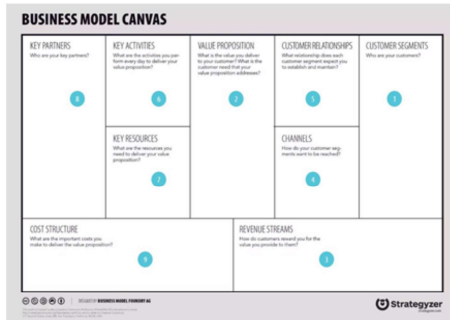
1.Customer Segment: Which classes are you creating values for? Who is your most important customer?

2.Value Proposition: What core value do you deliver to the customer? Which customer needs are you satisfying?

3.Revenue Stream: For what value are your customers willing to pay? What and how do they recently pay? How would they prefer to pay? How much does every revenue stream contribute to the overall revenues?

4.Distribution Channel: Through which channels that your customers want to be reached? Which channels work best? How much do they cost? How can they be integrated into your and your customers' routines?

## Business Model Canvas



5. **CUSTOMER RELATIONSHIP**  
What kind of relationship our customers expect of entertain with us and which of these is the most efficient.
6. **KEY ACTIVITIES**  
What key activities are needed to get the value proposition that we have set ourselves to propose to the client.
7. **KEY RESOURCES**  
What resources are needed for our value proposition (physical, financial, human resources, etc ...)
8. **KEY PARTNERS**  
What are our key partners, such as resources and activities we need to get from them.
9. **COST STRUCTURE**  
What are the main costs that our model requires of business; which key resources / assets are the most expensive.

5. Customer Relationship: What relationship that the target customer expects you to establish? How can you integrate that into your business in terms of cost and format?

6. Key activities: What key activities does your value proposition require? What activities are important the most in distribution channels, customer relationships, revenue stream...?

7. Key Resource: What key resources does your value proposition require? What resources are important the most in distribution channels, customer relationships, revenue stream...?

8. Key partners: Who are your key partners/suppliers? What are the motivations for the partnerships?

9. Cost Structure : What are the most cost in your business? Which key resources/ activities are most expensive?



**THANK YOU**

[www.eurecat.org](http://www.eurecat.org)

**Frederic Clarens**  
[frederic.clarens@eurecat.org](mailto:frederic.clarens@eurecat.org)