Image credit: Oliver Degabriele

"Discovery of new phenomena is what opens the pathways to innovation"

Bernard Meyerson,
Chief Innovation Officer, IBM

Designing for a Circular Economy

Seeing The Bigger Picture - Lesson 4

Total Time:

120 mins

Age Range:

12-19 year olds

Subject

Economics, Geography, Environmental Systems, Biology, Sociology, Business, Citizenship, Design Technology

Learning Outcomes:

- To learn about companies that have adopted the circular economy framework
- To design a product or service based on the circular economy

Preparation:

- Load up the PowerPoint, Designing for a Circular Economy
- Preload the YouTube videos, Rethinking Progress and From Consumer to User (both created by the Ellen MacArthur Foundation)
- Print the case studies in Appendix 1 or have the links ready to share with your class

Note

This lesson is part of a series of lessons which introduce students to a different way of thinking about how our economy could work: a circular economy. The series builds up exactly how a circular economy is different from the status quo, and looks at the economic, environmental and social advantages of a new approach.

This particular lesson is one part of a series. The whole series looks like this:

- (1/5) Challenging common conceptions
- (2/5) Exploring the circular economy
- (3/5) Understanding the challenge of 'finite' resources
- (4/5) Designing for a circular economy (this lesson)
- (5/5) The circular economy and modern agriculture

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This lesson was produced by the Ellen MacArthur Foundation, which exists to accelerate the transition to a circular economy. The Ellen MacArthur Foundation works with business, government and academia to build a framework for an economy that is restorative and regenerative by design.

More educational resources on circular economy can be downloaded for free from www.ellenmacarthurfoundation.org

Introduction

The previous lessons introduced the students to the circular economy. In this activity, students will be asked to design their own product or service fit for a circular economy.

In this activity, student can work alone or in groups.

Case Studies

10-30 mins

Using the slides as a visual aid, read the case studies in Appendix 1 to the class, or ask the class to investigate the case studies section of the Ellen MacArthur Foundation website - www.ellenmacarthurfoundation.org/case-studies.
You will find the teachers notes to the slides in Appendix 2

Learning Activity - Video, from Consumer to User

5 mins

This video (https://www.youtube.com/watch?v=Cd_isKtGaf8 - 3.11 minutes) investigates the move away from ownership of goods to access to goods. Might the students use this idea as inspiration for their business model?

Learning Activity - Designing a product or service

40+ mins

The remaining slides, from “a challenge for you” onwards, set the scene for the students to design a product or service fit for a circular economy.

Note: each example in the PowerPoint comes with a question for the students to answer.

An idea…

You might want to ask your students to pitch their business ideas to a panel of peers or teachers.

Plenary

10 mins

Ask your students to reflect on what they have learned in this process. Use a ‘think, pair, share’ approach to help collect responses from everyone in the room.

Take Action for the Global Goals

As an educator you have the power to channel students’ positive energies and help them believe that they are not powerless, that change is possible, and that they can drive it.

How To Take Action - Right Now:

- **Write** to your local government representative, **tell** them how the circular economy can help achieve the Global Goals and **ask** them what action they are taking toward Goal 12 specifically.
- Make a 30-second **video** or design a **poster** about the circular economy and its links to the **#GlobalGoals** and **share** it with World’s Largest Lesson on Facebook or Twitter @theworldslesson @circulareconomy

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How To Take Action - Deeper Engagement:

- For deeper learning and impact, students can also take part in **projects** to make change for the Goals in their local communities.

  Visit the “**Take Action**” page on our website: www.globalgoals.org/worldslargestlesson and find organisations, resources and lesson packs to help you get started.

GYSD Global Youth Service Day · DESIGN for CHANGE · Jane Goodall’s roots&shoots · WORLD MERIT

Case Studies can be found at:

http://www.ellenmacarthurfoundation.org/case-studies/philips-and-turntoo
http://www.ellenmacarthurfoundation.org/case-studies/floow2-1
http://www.letote.com/

Or see below :

Case Study 1 Philips & Turntoo

Selling light as a service

Architect Thomas Rau worked with Philips to purchase light as a service. The end result was a bespoke 'pay-per-lux' intelligent lighting system to fit the requirements of the space, at a manageable price. Philips retain control over the items they produce, enabling better maintenance, reconditioning and recovery.

A collaborative project between Philips and Turntoo is a showcase for the pioneering 'Pay-per-lux' model.

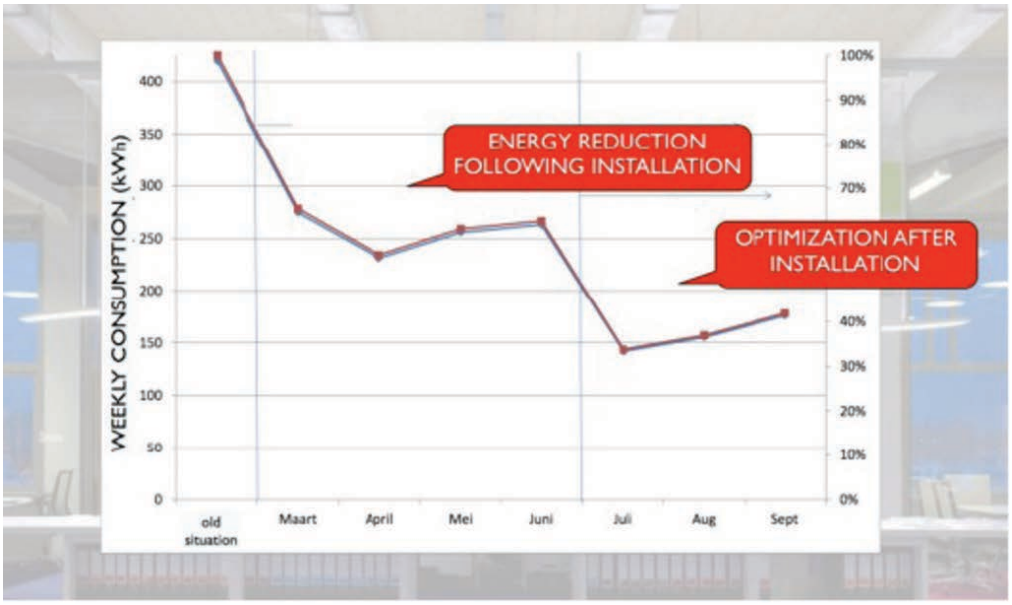
A number of new business models have emerged in recent years that aim to capitalise on overcapacity that can be found in many industries, with collaborative use services such as AirBnB and RelayRides making use of a surplus in space and car ownership. However, a project developed between Thomas Rau and Philips sought to design out overcapacity from the start by selling light as a service.

The idea of a 'performance economy', developed by Walter Stahel since the 1970s, insists on the importance of selling services rather than products. Through this method, manufacturers can retain greater control over the items they product and the embodied energy and materials, thus enabling better maintenance, reconditioning and recovery. Customers benefit too, as they only pay for the service they require and use, and often receive a better service as the manufacturer has a greater interest in providing a product that lasts.

I told Philips, 'Listen, I need so many hours of light in my premises every year. If you think you need a lamp, or electricity, or whatever – that's fine. But I want nothing to do with it. I'm not interested in the product, just the performance. I want to buy light, and nothing else.' Thomas Rau

So when architect Thomas Rau came to fit out the Amsterdam office of RAUArchitects, he sought to employ the principles of a performance model throughout the space. When considering lighting, Rau did not want to purchase an expensive lighting infrastructure that he would eventually need to replace and dispose of, but rather light as a service, and just the right amount to suit the building. RAU Architects worked with Philips to develop a system that could work within this new way of thinking.

Philips ended up creating a minimalist light plan that made as much use as possible of the building's natural sunlight, again to avoid providing a surplus of material of energy. The team worked with an installation partner, CasSombroek, and used an LED light fitting for ceiling systems, adapted to be hung in the high-roofed offices. A combined sensor and controller system further helped keep energy use to an absolute minimum, by dimming or brightening the artificial lighting in response to motion or the presence of daylight.



The end result was a bespoke, intelligent lighting system that fit the requirements of the space, at a manageable price for the customer. Furthermore, by moving from a one-time sale to a 'Pay per lux' model in which Philips maintain ownership of the materials, Rau Architects benefit from maintenance and service, as well as the option to adapt or upgrade the setup, with the manufacturer able to recover the materials when necessary.

Following the success of this first 'Pay per Lux' project, Thomas Rau went on to set upTurntoo, an intermediary platform than treats products as resource banks, facilitating resource management between manufacturer, supplier and end-user. Having seen the potential of a performance offering, Philips are now further developing the business underpinnings for this model, and drawing up contracts that systemise the concept.

Case Study 2 FLOOW2

Business-to-business asset sharing

FLOOW2 is the first business-to-business sharing marketplace that enables companies and institutions to share overcapacity of equipment, knowledge and skills of personnel. Users can register on the platform for free and participants pay a subscription to advertise their equipment on the platform, providing a revenue stream for FLOOW2.

FLOOW2 facilitates the sharing of overcapacity of business equipment and the skills & knowledge of personnel that are under-utilised for half of the time, by making it transparent and tradable on their platform. The platform is currently operational worldwide with a rapid global expansion plan envisaged.

There are many existing business models based on collaborative consumption, however they primarily focus on consumers and peer-to-peer sharing. Meanwhile, FLOOW2 focuses on the sharing activities between companies in a huge range of sectors, from construction to healthcare.

'I foresee the sharing economy becoming an integral part of the future. It will be inevitable for any good and responsible entrepreneur. No business in the world will be able to go without asset sharing anymore. FLOOW2 is sustainable, brings financial benefits and strengthens the social cohesion between organizations and people. Multiple value creation at its finest.' - Kim Tjoa, Co-founder

FLOOW2 sees its platform as a win-win for businesses because companies who have committed the upfront capital investment on equipment can increase their revenue through using the platform to rent out any equipment and personnel not being deployed at full capacity. It also gives other companies access to equipment they need at rental prices that make it worthwhile as an alternative to investing in and owning the equipment.

Advances in ICT and social media have contributed to collaborative consumption's viability and FLOOW2 have designed an offering that enables businesses to take advantage of this trend. The key to a collaborative consumption business model's success is its ability to demonstrate to potential clients that the convenience of having access to equipment has more or equal benefits to owning the goods themselves. FLOOW2 has designed the customer interface of their platform bearing this in mind.

Registration on the platform is free, enabling users to access an online planning tool for project managing equipment requirements and availability. The company also provide additional services, like online payments services, credit checks, tracking and trace service on assets and insurance through partnerships with other businesses. Participants pay a subscription to advertise their equipment on the platform, providing a revenue stream for FLOOW2.

The FLOOW2 platform represents a shift from the existing vertical model to a horizontal model which empowers many smaller actors to work together and do business together rather than relying solely on relationships with larger suppliers. FLOOW2 creates an additional relationship in the marketplace potentially reducing barriers to entry, because there is an opportunity for a start-up that has the sales pipeline and project management skills to conduct business without having to invest in the equipment it uses, given the vast free capacities in most probably close proximity.

One of the key barriers to medium and large companies switching to a model like FLOOW2 is the mindset change required to shift from ownership to access. Asset sharing is a new business process within most organisations, and requires a different approach to traditional operations and procurement practices. To assist with this change, FLOOW2 have developed six essential steps to asset sharing:

©FLOOW2

'When businesses implement asset sharing into their organization, they should be aware of the professional game they're playing. Asset sharing is an additional, value creating, business model so organizations should treat is as one and put in the proper amount of effort. Implementation is easy, and can be done in six simple steps.'
- Kim Tjoa, Co-founder

There is no question that FLOOW2 is a disruptive business model which, based on its design, has the potential to expand globally and be applied to multiple products and sectors. The founders of FLOOW2 have had the foresight to develop a solution that overcomes the key barriers which have up until now prevented the B2B sector adopting collaborative consumption.

This case study was researched and co-authored by Geraldine Brennan, Doctoral Researcher, EPSRC Centre for Innovative Manufacturing in Industrial Sustainability, CEP, Imperial College London

Teachers Notes from the PowerPoint presentation The Powerpoint is available to download from www.globalgoals.org/worldslargestlesson

or the slides are viewable / printable below, to use less paper we suggest you choose the 'print two per page' option.

SLIDE NUMBER	NOTES
1	This PowerPoint was produced to support LEARNING ACTIVITY: *Designing for a circular economy.* It has been produced by the Ellen MacArthur Foundation for the World's Largest Lesson. See www.ellenmacarthurfoundation.org
2	We recommend you start with a recap about the circular economy, by watching this video. URL: https://www.youtube.com/watch?v=zCRKvDyyHml
3	Here is a reminder of a useful quote to help students think about a circular economy
4	This image is a simplified graphic demonstrating the circular economy: an industrial system which is restorative by design or intention. Ask the audience what they see. Note two cycles of materials: **Biological materials** are made from things that grow and which ultimately can go back into the soils (perhaps by *composting*, or through *anaerobic digestion* and improve it. They are natural materials that can be safely disposed of in a manner which allows the soil to regenerate; thus they must not contain any toxins. **Technical materials** are metals, polymers, etc. They are materials designed to continually flow at high quality in closed industrial cycles.
5	More details here: http://www.ellenmacarthurfoundation.org/case_studies/philips-and-turntoo Students could research the case studies, or you could talk through them. You may wish to use case studies more appropriate for your audience. There are many to be found on the Ellen MacArthur Foundation website (www.ellenmacarthurfoundation.org/case-studies), or you may know of some yourself. In this model, Philips sell 'lumens' to Turntoo, instead of selling light fittings. Philips pay the electricity bill, which means they have an incentive to make the lights as efficient as possible. Turntoo pay a fee based on how many lumens they use.
6	More details here: http://www.ellenmacarthurfoundation.org/case_studies/floow2-1 FLOOW2 facilitate the overcapacity of heavy machinery. Some heavy machinery is idle 50% of the time, wouldn't it make sense to make money from machinery not in use? FLOOW2 connects idle machines with willing users. It's sort of an eBay for customers who wish to use heavy machinery for a short period of time.
7	More details here: http://www.letote.com/ Subscribe to Le Tote to receive up to $200 of clothes every month. You don't own the clothes, but you do get the chance to have an ever-changing wardrobe.
8	This video is titled 'From Consumer to User'. It describes a future in which we perhaps don't own all of our goods. Instead we use and return goods, paying a subscription fee in the process. https://www.youtube.com/watch?v=Cd_isKtGaf8 (length 3:11)

9 The next few slides provide some inspiration for students.
Some key points –

- A PRODUCT will fit within a system, or business model, which allows the materials and energy to rejoin a flow. For example, a company will have the product returned to them in order to use the product/materials in the next cycle….OR the product will be safely returned to the biosphere, perhaps by composting. Applications will need to show that system in operation.
- A SERVICE can be something we use but don't own, like a taxi, or films on Netflix.

In this activity we suggest applicants can re-design anything. For some, an open book may prove a barrier. If you think that is the case, can we suggest you amend this PowerPoint and suggest students choose from one of a few themes. This may help focus the students creativity and class research. You might want to consider these themes (but you do not have to!):

- Mobility Ecosystems / Communications & Entertainment / Living Cities / Clothing and apparel

10 'Mink' – a 3D Printer for make-up. The designer of Mink, Grace Choi, said: "It can take any image and instantly transform it into a wearable cosmetic"
Q: Why might this be of interest in a circular economy?
Likely answers:

- Relocalises production – produce at home/in a nearby store, rather than produce in a far-off land. Saves transportation costs and saves time.
- 3D printing vastly reduces waste in its production method. The 'additive' process builds items up layer-by-layer rather than by subtracting material from a larger piece, as is standard in 'subtractive' processing.
- 3D printing allows us to customise our goods, and make them more durable.

11 Playstation Network – download games to your Playstation, without actually receiving a physical disk.
Q: why might this be of interest in a circular economy?
A: It dematerialises computer games by making them downloadable (i.e. no wasted packaging, no transportation of games)
A: It's a quick way to connect with the goods you want

12 Puma InCycle trainers – can be safely returned to the biosphere when no longer suitable to wear
Q: why might this be of interest in a circular economy?
A: The waste (unwanted traniners) becomes food for the next cycle. No materials are lost, post-production. Everything has value.

13 Car2Go– all the convenience of a car (?) without any of the associated costs.
Q: why might this be of interest in a circular economy?
A: No depreciation, no MOT, very little risk.
A: Can be quick and convenient
A: It's powered by electricity, which could be generated by renewable sources
A: Use an app to find and book the cars in the city

14 [no notes]
15 [no notes]
16 [no notes]

For teaching resources, videos and articles about a different economy, visit www.ellenmacarthurfoundation.org

Designing for a circular economy

Global Partners of the
Ellen MacArthur Foundation:

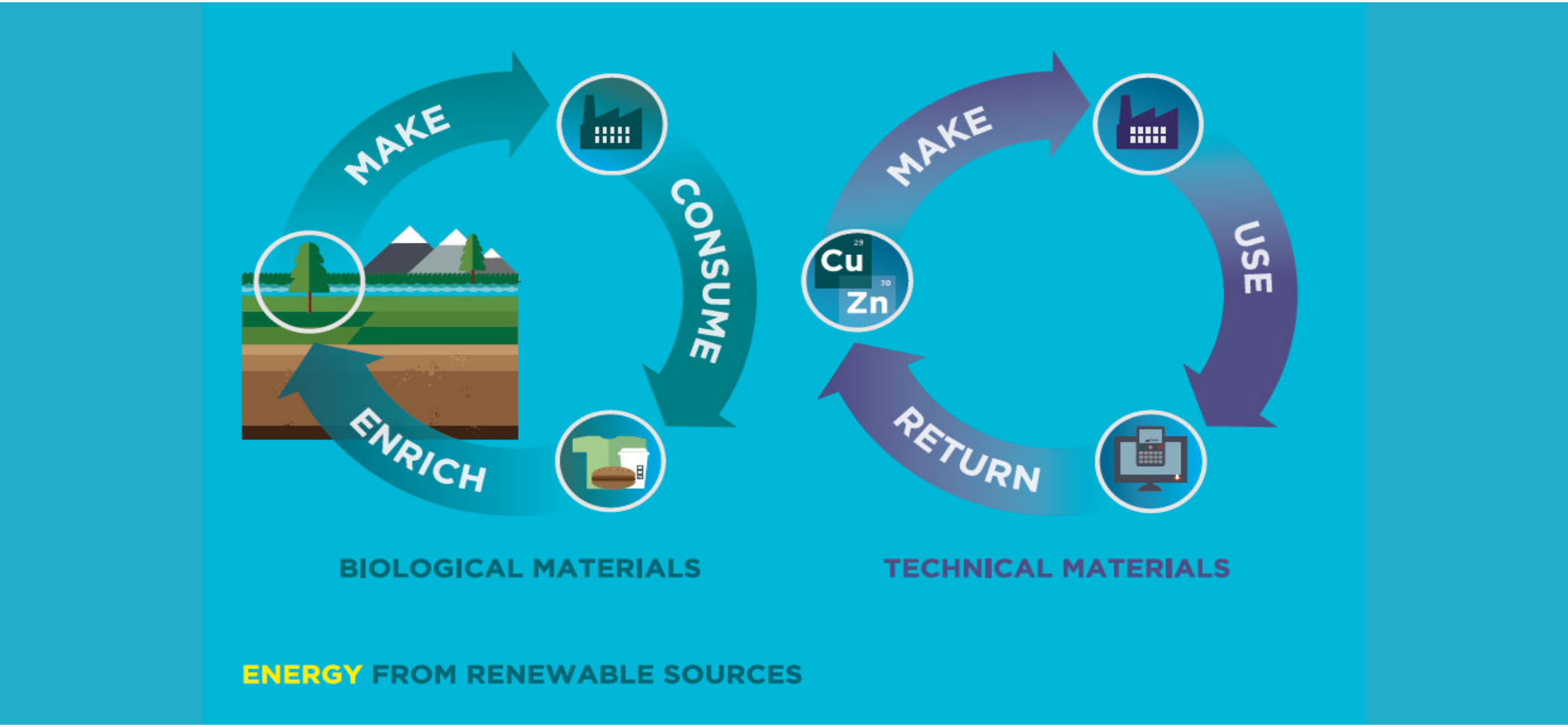
WATCH RETHINKING PROGRESS

HERE IS A QUOTE WE RATHER LIKE:

"The goods of today are the resources of tomorrow at the resource prices of yesterday"

- WALTER STAHEL

THE CIRCULAR ECONOMY



EXAMPLE 1 OF 3: PHILIPS AND TURNTOO

EXAMPLE 2 OF 3: FLOOW2

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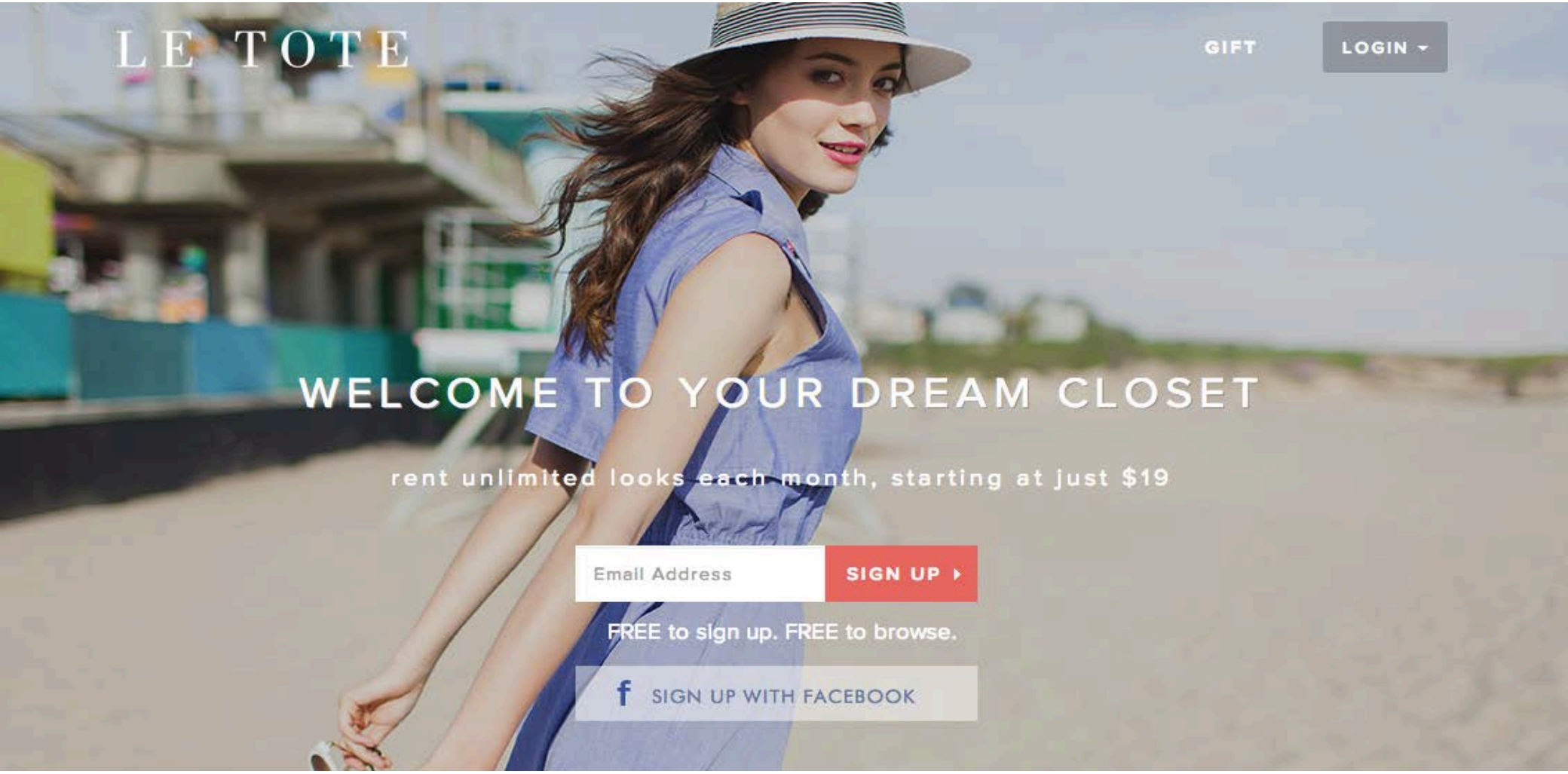
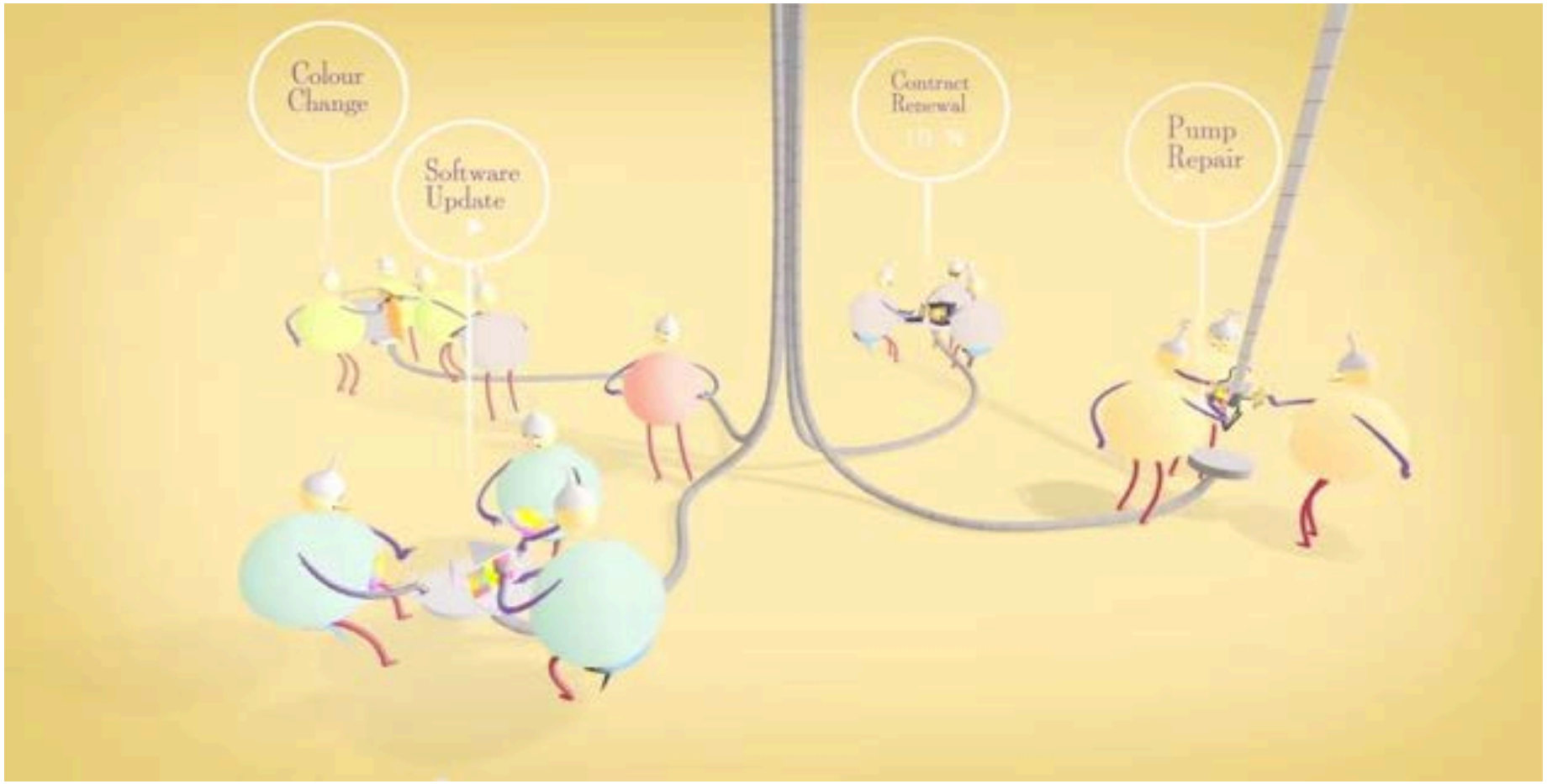
EXAMPLE 3 OF 3: LE TOTE



FROM CONSUMER TO USER



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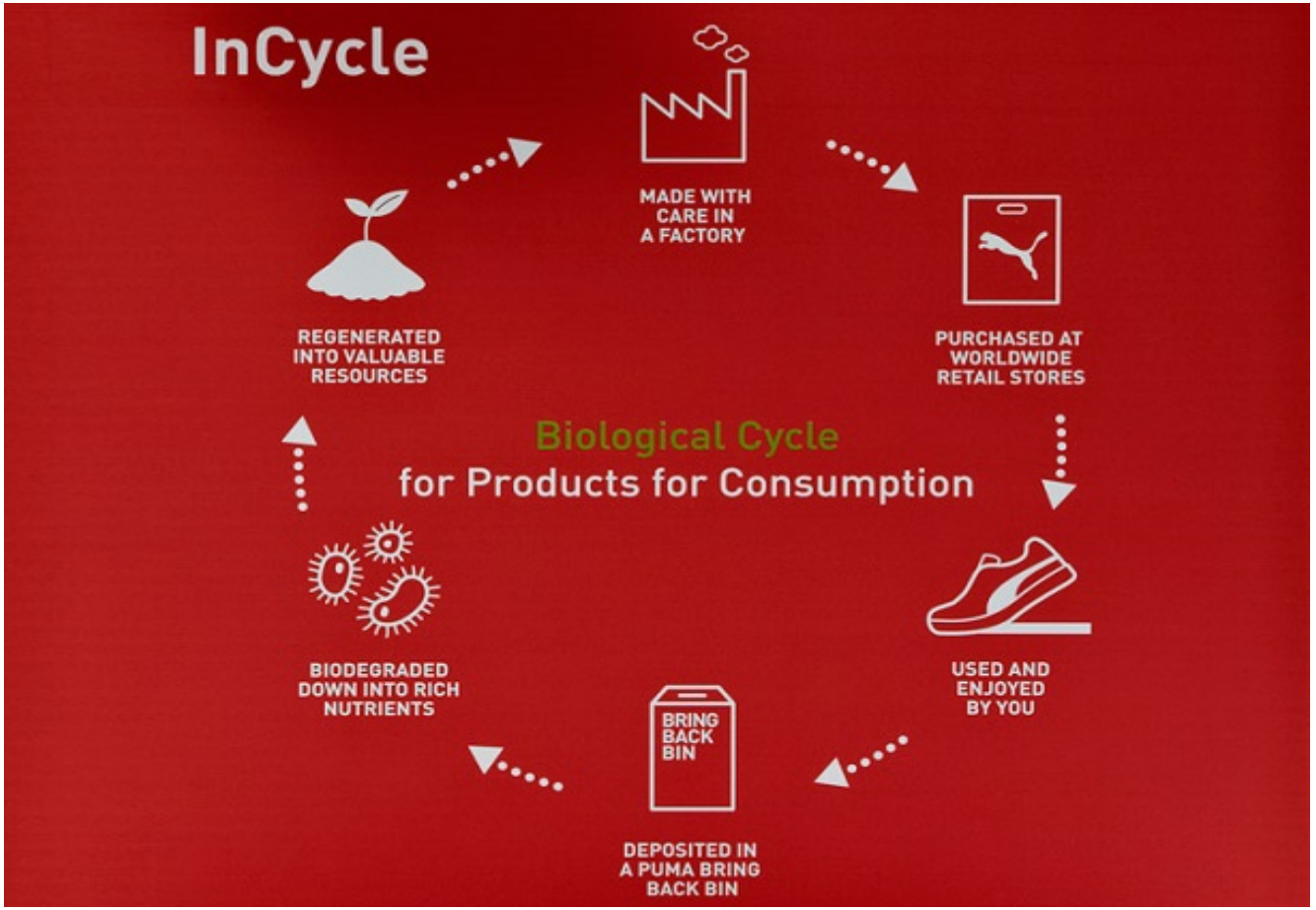
A CHALLENGE FOR YOU

RETHINK AND REDESIGN A PRODUCT OR A SERVICE FOR A CIRCULAR ECONOMY

SOME INSPIRATIONS…

SOME INSPIRATIONS…

SOME INSPIRATIONS…



SOME INSPIRATIONS…

THE BIG QUESTION…

WHAT WILL YOU REDESIGN?

SOME POINTS TO CONSIDER

- Who will use it? Why will they use it?
- If you are making a product, how does the design of your product consider a flow of materials?
- If you are designing a service, how does it fit within a circular economy?
- Describe the relationship you will require with your customers/users.

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RENAULT
Unilever