Circular Strategy examples

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Overall picture of circular strategies

Within the framework of the CIRCit project, the following "circular strategy scanner" is used in the development of this guideline, where different strategies and dependencies are mapped to enhance the understating of a circular economy and minimize confusion about various strategies.

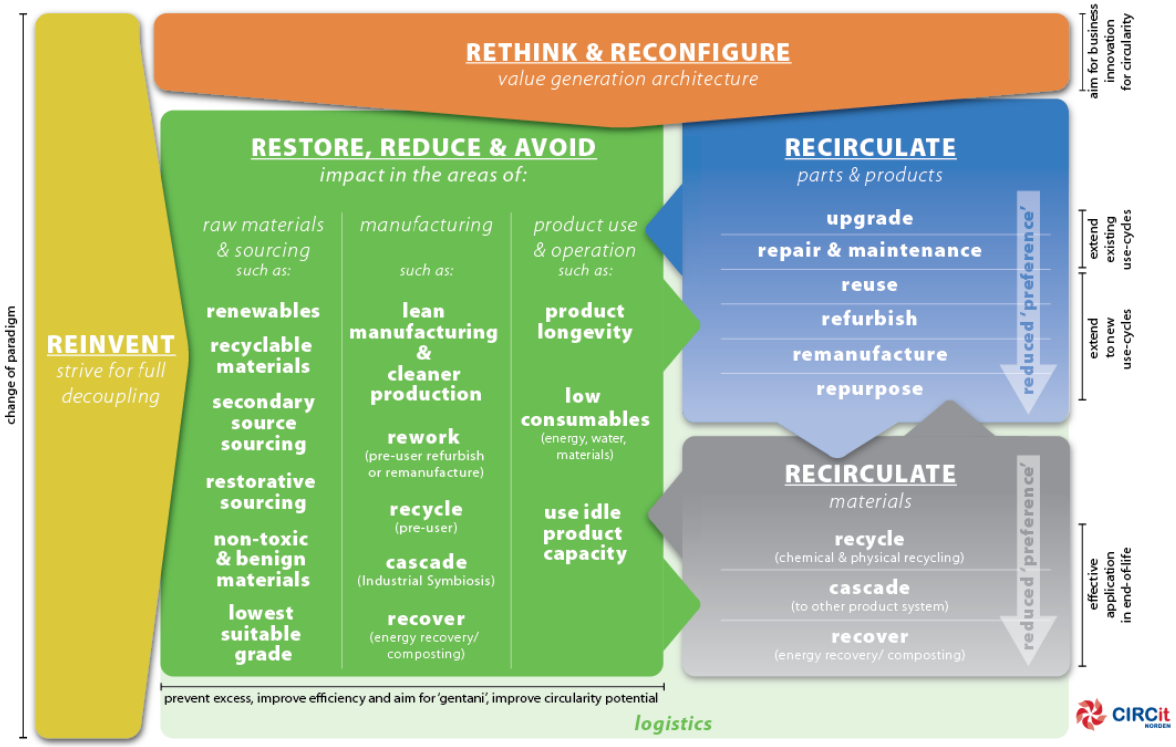

Figure 1 – Circular Strategy Scanner

Example of Rethink

- Car sharing services (e.g., Drive Now, Sunfleet, Green Mobility, Zipcar, and Blablacar)
- Clothing rental and subscriptions (e.g., Rent the Runway, Vigga, and Mud Jeans)
- Performance contracts (Rolls Royce – Power by the Hour)
- Bike sharing services (e.g., Bycyklen in Copenhagen, EU Bikes in Stockholm, Santander Cycles in London, and many other services in cities around the world). There are many bike-sharing companies all over the world where the bicycles are used by many people. These bikes are designed with some interesting aspects to be used for a longer time (life extension) and under heavy duty (life intensification). Therefore, features such as robustness, simplicity and fewer components, lightweight and same types of materials, and standard parts for replaceability and repairability are considered in their design.

Figure 2 – Rethink: Bike sharing services

Example of Reinvent

- Music and video streaming services negate the need for data carriers such as CDs and DVDs.
- Multifunctional devices such as smart phones combine the functionality of multiple devices (camera, GPS, phone, calculator, alarm clock, sound system, and computer) in a single device.
- The 'bring-your-own' movement facilitates replacing such single use items as coffee cups and utensils with durable reusables.

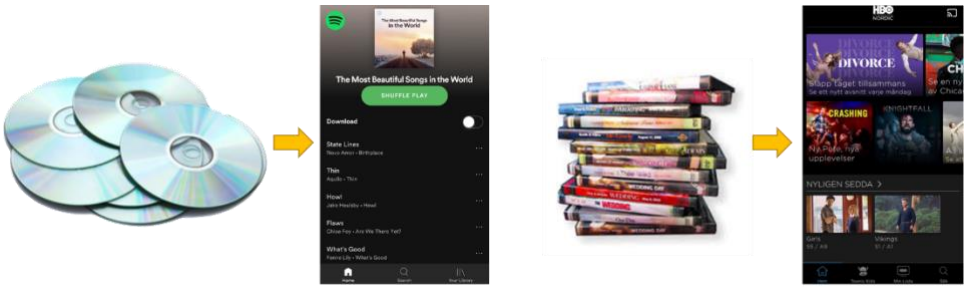

Figure 3 – Reinvent: Music and video stream services

Example of Restore, Reduce and Avoid

Example of raw materials and sourcing

- Columbia Shoe makes a sneaker with 40% recycled materials. The fabric and laces are built with recycled polyester, while the midsole is made from reground EVA foam. The rubber in the outsole is also recycled.
- Kalundborg Symbiosis in Denmark is based on public-private partnerships, with exchanges of energy, water and materials in closed loops. Kalundborg Symbiosis has made all the partnerships successful through shared values including trust, confidentiality, openness, equality and cooperation. It has also had economic advantages, including minimized costs for waste management, minimized costs for resource purchases and increased income from byproduct sales, in addition to environmental benefits in the form of resource saving in groundwater, surface water, natural gypsum and oil.

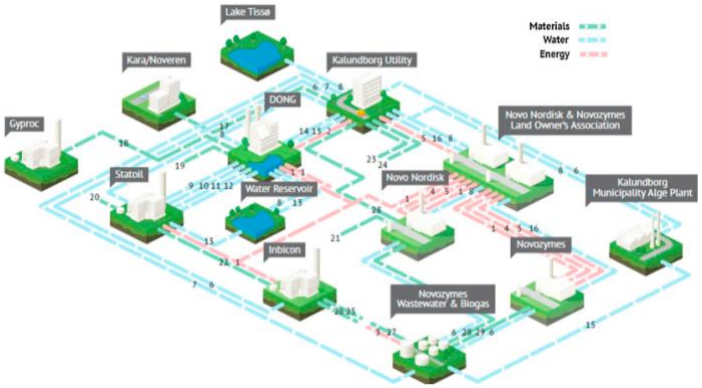

Figure 4 – Raw materials and sourcing: Kalundborg Symbiosis in Denmark

Example of product manufacturing

In 2000, Adnams PLC introduced a new set of company values and developed corporate social responsibility. Consequently, Adnams set a new innovative and sustainable production system. In 2001, state-of-the-art fermenting vessels were installed. In 2006-2007, its 100-year-old brewing system was completely replaced with the most efficient system available on the market. The new technology recycles 100% of the heat used to provide energy for the next

brew. In general, their new equipment saves an average of 30% a year on gas and water consumption each year. This saving is compounded by computerization of the processes, in which human activities, flows of materials inside the brewery and waste inefficiencies have been significantly reduced.

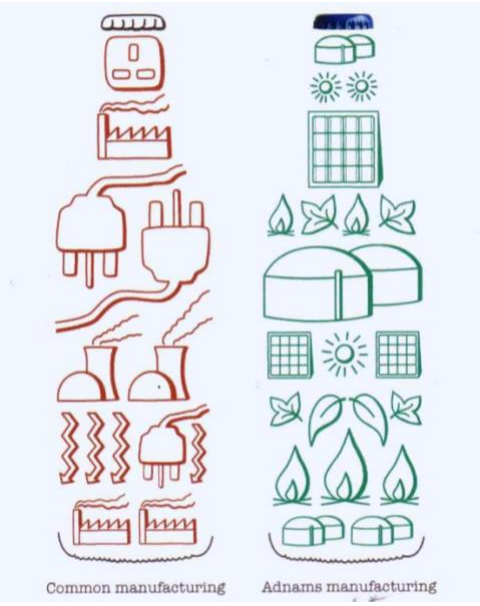

Figure 5 – Product manufacturing: Adnams PLC (source: http://www.brief-cases.com)

Example of product use and operation

Finlayson is a Finnish brand for textile manufacturing; they make their products with high quality and durable materials to ensure product lifecycle extension. To facilitate the lifespan extension of their products, a series of educational videos and manuals is published to educate consumers on how to take care of their products by washing, drying, pulling, ironing, storing and picking up textiles. Finlayson also has a tack-back system in place and uses recycled materials such as plastic bottles.

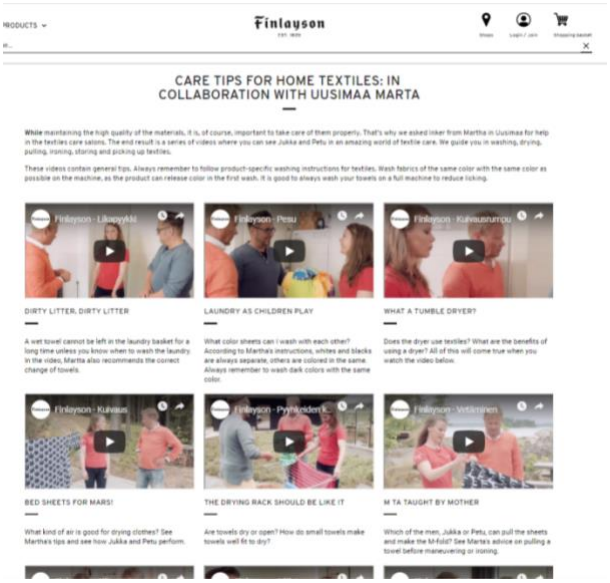

Figure 6 – Product use and operation: Finlayson (source: https://www.finlayson.fi/)

Example of Logistics and Packaging

Garçon Wines designs and produces an innovative 10-count corrugated case and flat wine bottles that will significantly cut carbon emissions and logistics costs from the supply chain of

wine. The bottle is not only made from recycled PET but also designed in a flat bottle that, compared to an average round glass bottle, is approximately 55% spatially smaller. In their innovative space-saving package design, eight flat bottles pack vertically with two lying horizontally in the airspace around the bottlenecks, eliminating almost all unused airspace. Therefore, a pallet loaded with 10 flat bottle cases could carry 1,040 bottles of wine, whereas a standard pallet with 6 round, glass bottles cases which would carry just 456 bottles of wine.

Figure 7 – Logistics and packaging: Garçon Wines flat bottle case [Source: https://www.garconwines.com]

Example of Upgrade

Fischer Lighting has integrated new LED technologies into old lighting solutions, in which the latest LED technology can be directly installed into existing fixtures without any additional changes. In addition, the design makes it possible for future LED technology to be installed similarly to almost every type of existing fixture on the market today. Through this innovative design for installing new LED technology, the energy usage is decreased significantly, and the life expectancy of the existing lighting solution is extended. Due to lower maintenance costs, the amount of waste produced is also reduced in the long term, as is the total cost of ownership. This solution is vital, as LED technology has been developed fast, but nonupgradeable solutions on the market require changing the whole technology even when the end-of-life has not yet been reached.

Figure 8 – Upgrading: New LED solutions on the existing fixture, reference: https://www.fischer-lighting.com/english/

Example of Repair and Maintenance

- Fairphone is a company that provides smartphones made for repair by the customers themselves. The products should last longer than common phones, with up to a 4-to-5-year planned lifespan. The product is designed for modular assemblies of the main functions. Every assembly can be exchanged in a very short time. The design also eases remanufacturing and recycling.

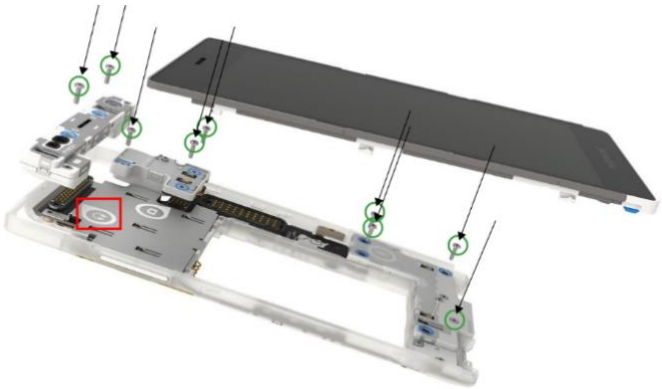

Figure 9 – Repair: A Fairphone in an opened view [Source: Fairphone]

Features for ease of repair include the following: nondestructive disassembly, opening without tools, one black and same size of screws, one mounting direction, modules that are easy to replace, documentation and signs in the form of pictograms on the modules.

- 3Temp designs and produces coffee machines that are made for easy repair by the customers themselves and for online performance tracking. On the top of the machine, the brewing tube is set as a module that can be simply opened via only two screws. The cover has a hinge; it is thus possible to open the tube and obtain access to the important parts very easily. The brewing tube is the "heart" of the machine, containing most of the vital parts of the coffee machine. The design also eases remanufacturing. Features for ease of repair include nondestructive disassembly, opening with one tool, using only a few screws, easy access to functional modules, modules that are easy to replace, and signs in the form of pictograms on the modules for disassembly.

Figure 10 – Repair: 3Temp coffee machine designed for easy access and maintenance with one tool

Example of Reuse

Ope AS, a Norwegian company, makes office interior furniture that optimizes people's environment in open-plan offices in terms of variety and flexibility. Its designs are modular and consist of modules that can be built and taken apart according to need. Like LEGO, you can build and rebuild variations from the same basic components, redecorating cost and waste free. Depending on the room and requirements, the shape and function of the furniture is decided by the owner, allowing for different possibilities, whether to create simple storage units for the home, room dividers in an office environment or sculptural structures in public spaces. The main feature and enabling of their design lie with the Ope™ connector, with which the product can be reconfigured and rebuilt as needs change to accommodate a different or expanded purpose to provide everyone from individuals, interior designers and architects with the freedom to define and redefine spaces through their furnishing.

Figure 11 – Reuse: modular office furniture, resource: https://opework.com/

Example of Refurbishment

Inrego is a company that provides repaired, remanufactured and refurbished IT equipment in Sweden. With their lifecycle management business model, they not only extend the lifecycle of laptops, TVs and smartphones through repair but also reintroduce them to a second or third lifecycle through remanufacturing and refurbishment. Their refurbishment process includes cleaning, easy repairs, fixing the aesthetic features such as polishing and removing scratches and adjusting the product to the new customer, e.g., reprinting the keyboard language to the targeted market.

Figure 12 – Refurbishment: reprinting laptop's keyboard language

Example of Remanufacturing

Canon has remanufactured its printers through retrieving used products from the market, remanufacturing them and then reselling them with the same high quality and guarantee as original products. This approach reduces product greenhouse gas emissions associated with raw materials, parts and manufacturing by more than 80% compared to a newly manufactured product.

Figure 13 – Remanufacturing: Canon copy machines

Example of Repurpose

The Sprout company makes eco-friendly pencils that are available in a variety of colors and to give new life at the end of the pencil's functional usability. The pencil is produced with sustainable materials such a cedar casing, clay and carbon-based graphite, but what makes it unique is the end of the pencil where you would expect an eraser to be, but there is a biodegradable capsule that holds plants seeds. Hence, once you have sharpened your way through that much-awaited manuscript or copious to-do list, your pencil brings new life in the form of plants. The seeds packed into the pencil range from colorful flowers to herbs and even vegetables, and buyers can select their preference.

Figure 14 – Repurpose: Sprout making sustainable pencil into plants (source: https://inhabitat.com/sustainable-pencil-stubs-sprout-into-plants/)

Example of Recycling

- These glasses frames are only made by a 3D printer as monoframes considering all the functions of common made glasses. Moreover, due to the design, they are even more durable. The elastic material allows a flexible hinge and clips at the temples. In addition, the frame is much more durable without brittle components. The glasses are made from a similar material and are also stress resistant. The plastic material is not ideal but is good

for recycling, and the lenses are made of a similar material. The initial idea was to create a product which is specially made for 3D printing and not to try to copy a common design for production in a 3D printer. Hence, there are no steel parts within a plastic frame and no joining connections that can break. This product is an example of a new approach to thinking of design by using new technologies and using only one or two materials that can be recycled easily. Features for ease of recycling include the following: using similar materials (frame and glasses), only one material for the frame (which is good for common recycling processes), and no need for dismantling.

Figure 15 – Recycling: 3D-printed glasses frame as a monoframe [Source: Projekt Samsen]

- The Kickpack football table product is developed and made from only cardboard and some pieces of wood. This example is ideal for design recycling due to the usage of only a few materials that are very good to recycle. The initial idea is that using cardboard only for packaging is a waste of a good and durable material (cardboard). Cardboard and wood of course are not as durable as steel and plastics, but you can fix them by taping or can easily replace broken parts. You can also move them into the paper recycling stream in case of damage. Features for ease of recycling include the following: using similar materials (cardboard and wood), minimum use of screws, glues and rivet connections, and simple destruction and disposal by hand without any complexity and dismantling structure.

Figure 16 – Recycling: The soccer table made of cardboard and wood [Source: KICKPACK Company]

Example of Cascade

The EcoXpac company, which produces molded pulp solutions for packaging in particular for Carlsberg Breweries, has an innovative Green Fiber Bottle concept for beer bottles. The concept of the Green Fiber Bottle is to create a sustainable, fully biodegradable beer bottle made from renewable and sustainable sourced paper fiber. Its fibers are provided from a well-managed source with trees replanted at the same rate that they are harvested. The Green Fiber Bottle could thus be randomly discarded to environmentally and nonharmfully biodegrade in nature or enter a recycle system along with other paper-based products.

Figure 17 – Cascading: The Green Fiber Bottle [Source: https://www.carlsberggroup.com]

Example of Recovering Energy

Domestic waste and nonhazardous commercial wastes of similar composition are delivered to the Spittelau waste incineration plant where waste is converted into ash, flue gas and heat.

Figure 18 – Cascading: The Green Fiber Bottle [Source: https://www.carlsberggroup.com]