Reuse
Recycle
Refurbish

Applied to the
Electronics Industry

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Introduction

The link between As-A-Service and the circular economy is obvious. Our first white paper: "**Connecting the dots**" shows that because the As-A-Service model extends the usage time, the pressure of the production processes on the environment is therefore reduced.

In opposition to the linear system, the circular economy is often represented as a loop. The last step becomes a **value-adding** step; instead of wasting the value of the product by letting the user throw it away, the manufacturer or the integrator can optimize its value.

The "**R strategies**" are products' end-of-life solutions. The most famous are: reuse, refurbish and recycle, but there are many others and some are more circular than others.

Ultimately, circularity should be at the heart of the product development process. This paper is written predominantly from the perspective of manufacturers and/or integrators.

Smarter product use and manufacture	R0 - Refuse	Make product redundant by abandoning its function or by offering the same function with a radically different product
	R1 - Rethink	Make product use more intensive (e.g. by sharing product)
	R2 - Reduce	Increase efficiency in product manufacture or use by consuming fewer natural resources and materials
Extend lifespan of product and its parts	R3 - Reuse	Reuse by another consumer of discarded product which is still in good condition and fulfills its function
	R4 - Repair	Repair and maintenance of defective product so it can be used for its original function
	R5 - Refurbish	Restore an old product and bring it up to date
	R6 - Re-manufacture	Use parts of discarded product in a new product with the same function
	R7 - Repurpose	Use discarded product or its parts in a new product with a different function
Useful application of materials	R8 - Recycle	Process materials to obtain the same (high grade) to lower (low grade) quality
	R9 - Recover	Incineration of material with energy recovery

Increasing circularity (vertical arrow label, left side)

Challenges

Key figures

E-waste is the most rapidly growing waste problem in the world.

We generate about 50 million tons of it every year; this is the equivalent to throwing out 1000 laptops every single second. The live counter, World Counts, measured over 1,2 billion tons of electronic waste in July of 2022 alone.

In 2019, a little over 9 million tons of electronics waste was documented to have been collected and properly recycled. This means that only a portion of the total e-waste is being recycled, the rest is lost in landfills or other discarding processes meaning the value of this electronic waste is lost.

Companies like Apple started a great innovation towards the circular economy recollection strategy with the robot Daisy for the iPhone. Every initiative is welcome in the urgent need of moving towards a more sustainable life cycle management.

Critical mineral supply

The inner value of e-waste is underestimated.

Precious metals and "critical minerals" can be found within this e-waste. These critical minerals are essential for renewable energy and clean technology developments (batteries, permanent magnets, solar panels, and wind turbines). Their application fields have no limit: advanced manufacturing supply chains, consumer electronics, agriculture, medical applications, critical infrastructure...

Amongst the thousands of tonnes of electronic equipment collected each year, around half of it is assumed to be ferrous and nonferrous metals. There is no doubt that global demand for these materials will increase. However, supply will be a concern, in particular for European and North American countries. It is a risk to rely on politically unstable, dictatorship led or at war (Congo) countries. The pandemic has shown the limitations of countries codependent on a single major supplier such as China.

End of Life Electronics contain these critical minerals. Bringing awareness to both availability of these components together with their inner value is the key to success through this ongoing critical mineral supply.

How to implement it?

As assets at customer's are reaching their End Of Life, manufacturers or integrators enter the Reuse - Refurbish - Recycle journey to optimize their values.

See below for the standard steps of this journey:

07 Shipment

01 Reverse Logistics

06 Remarket

SALE

02 Asset Grading

From one customer to another

03 Data Elimination
- Data Wipe
- Physical Destruction

05 Refurbishment

04 Asset Market Value
- Reuse
- Recycle

1. Reverse logistics

Handling the logistic aspect is the first key step in the end of life journey. To reduce shipping costs and fuel consumption, it is important to ensure that a single place and time are defined for pick up. Additionally there should be an aim to avoid asset movements and optimize on-site service. Assessing equipment status before pick up can also prevent unnecessary travel and result in items being shipped to recycling directly. It also helps save the cost of a useless specific "Handling with Care"; When assets are picked up to be sent for audit (not recycling), they have to be "handled with care" (= procedure called "white glove"), so that they are not damaged during pick up and transportation towards the audit place. This "handling with care" has a cost. If assets are already identified as "to be recycled" (because they are already damaged), there is no use in paying the extra "handling with care" cost.

On site Hard disk shredding service is also an option, with some recycling companies having trucks specially designed with shredding equipment.

2. Asset grading

Assessing the general state of End Of Life equipment is key to determining its actual value. From cosmetic issues to damaged batteries, the grading of defects is defined by manufacturers. The assessment is done automatically by international softwares systems such as Blancco or Aiken.

3. Data Elimination: data wipe and/or physical destruction

The question of private data management can be very sensitive when dealing with Law firms, Schools, Bank institutions, Governmental organizations etc. Although a Certificate is provided after data destruction, it is crucial to define which security level is required and to ensure that this destruction is indeed compliant with legislation.

Sectors such as Health Care fall under very strict regulation as to Data Protection. In this environment not only standard IT assets such as laptops, desktops, servers, and monitors, have to be wiped but also medical electronics, including imaging devices such as x-ray and scanning machines. From patient names to blood types or medical records, choosing a certified expert in data destruction guarantees both know-how and respect of local legislation.

4. Asset market value

"The demand for sustainable computers and laptops is believed to increase significantly in the coming years. " (Foxway). The pandemic has accelerated this demand with the need of refurbished computers and laptops to support working from home and homeschooling.

It is important to note that more and more countries impose a fixed percentage of refurbished equipment within public requests for proposals.

Manufacturers and resellers can maximize the value of the end of life equipment to answer this increasing demand whereas no value equipment can be sent for scrap.

5. Refurbishment

The ultimate goal is to get the most out of old assets. Repairing EOL equipment and bringing it up to date, adding extra months' guarantee and selling it within a renowned distribution network increases profit.

6. Remarket

Whether using large wholesale distribution networks or going directly to the end customer, the second hand market is alive and growing!

Additionally, supporting both the local and wider community through charitable donations is a non-negligible aspect of this second hand market.

7. Shipment to new customer

As part of the As-A-Service offer, bringing the asset back to the front door of its second life at the initial customer or to a brand new one is valuable for the whole chain.

Internal or external resources

Reusing and refurbishing end of life equipment is more "profitable" than recycling it.

Recycling operations require more space, more people and more capital. However, as most equipment today ends up shredded without awareness, the value of the recycling side in terms of volume and revenue is either unknown or overlooked. This revenue is even higher if the shredded components are sorted before feeding smelters.

Whether requesting the services of a third party or adding an End Of Life processing facility within your asset manufacture, it is key to tackle the Reuse - Refurbish aspect.

Black Winch can help you pick the best partner for Reuse - Recycle - Refurbish.

Beyond Waste: Design Thinking

Rethinking the design process completely in order to optimize it both in terms of costs and environmental impacts allows the manufacturer to take into account the end-of-life stage from the very beginning. One of the keys to As-A-Service is the product use cycles, it should be designed to perform for as long a time period as possible to ensure a good return on investment, as well as having the lowest possible impact on the planet.

Within the electronics industry, the company Fairphone is a great example. The design of the phone allows the user to replace most components: camera, speaker, battery, screen, etc. , thus creating an added value to the user and a unique position in the market.

To be competitive, Fairphone focused on standard products as a basis of new product development. By re-thinking the design of products based on interchangeable spare parts, the production processes are simplified and easily optimized.

The As-A-Service business model allows for the accessibility and possibility to recycle 100% of components. However a few challenges must be addressed first:

- Identifying the material source can be difficult once it has been processed at the end of life. Traceability of raw materials should be implemented at the design stage with detailed specifications. Note that The European Commission is talking about implementing the "Digital Product Passport" which would contain information about the product's materials and components.
- Physical accessibility for disassembling and reassembling of components has to be granted to products. It makes it easier to "partially" recycle/replace.
- Recycled components can be used internally or those components can be sold to an alternative partnership. For example, Google created partnerships with manufacturers and is able to sell them their components.

Designing products that include recycled material has obstacles. So far, companies' procurement teams have been reluctant to purchase recycled material because of supply inconsistency and technical performance. Producers would not start unless supply and quality were secured. The solution is transparency; companies must work closely with manufacturers to harvest pre existing components.

Although the alignment of legislation and good recycling practices to support the e-waste valorisation might be long, moving from a waste recovery management to a resource recovery mindset will be key to succeed in this Circular Economy Transition.

Black Winch

Black Winch supports organizations to create and/or improve their As-A-Service business model according to their objectives: feasibility analysis, improving profitability, securing the market share, improving customer loyalty. By turning and developing the product-based linear business model into an in-house subscription model, it will bring value to the end users, the stakeholders and the shareholders.

The Black Winch experts help organizations to develop a successful As-A-Service business model through a proven methodology. With a personalized framework, Black Winch helps to build or adapt an As-A-Service offer, find financial partners, train teams, and provide the financial engineering required to ensure the success of the project. Additionally, it opens the door towards the circular economy and sustainable development. Black Winch is proud to be part of the 1% for the Planet movement.

From a buzzword to a business model, are you ready to take your organization to the next level? Contact info@blackwinch.eu