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Dare to Repair

Exploring Open Repair to Keep Critical Materials in the Loop

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”This report was compiled by the students of the masters course in Environmental Sciences, Policy and Management (MESPOM). MESPOM is a two-year Erasmus Mundus programme supported by the European Commission and operated by four European and two North American universities. Students study in at least three out of six consortium universities: Central European University (Hungary); University of the Aegean (Greece); Lund University (Sweden); Manchester University (United Kingdom); Middlebury Institute of International Studies at Monterey (United States); and University of Saskatchewan (Canada).

MESPOM batch 13 consists of 25 students from 19 different countries. The 14 authors of this text are studying at the International Institute of International Economics (IIIEE) at Lund University during the autumn 2018 semester. These students represent Belgium, Colombia, Haiti, Hungary, India, Iran, Italy, Kazakhstan, Germany, Netherlands, Norway, Peru, Spain and United States. This report is the culmination of a course in Strategic Environmental Development led by Professor Thomas Lindqvist and Jessika Luth Richter, PhD student, who steered the writing and publication process.”

– *MSc Environmental Sciences, Policy and Management (MESPOM), Batch 13 Students, 2018*

Cover image: The Restart Project
This publication should be cited as:

International Institute for Industrial Environmental Economics [IIIEE]. (2018). *Dare to Repair. Exploring open repair to keep critical materials in the loop*. Lund: IIIEE.

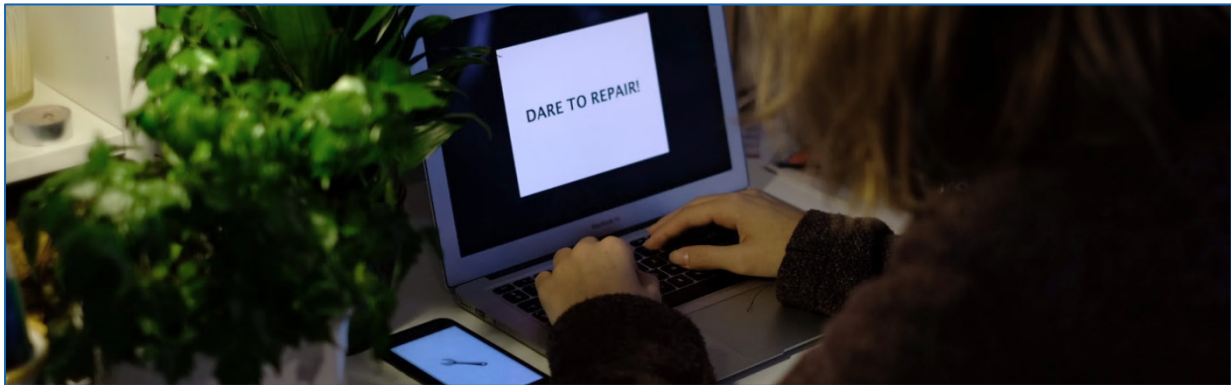
ISBN 978-91-87357-38-1

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INTRODUCTION

The Importance of Keeping Critical Materials in the Loop through Open Repair Systems



Global concerns about consumption, waste, and resource extraction levels are rising. Electronic items, which have become an integral part of our daily lives, are being produced and discarded at an alarming rate that the planet cannot sustainably support. This is partly driven by consumers' demand for new products, combined with faster product obsolescence.

Modern electronics and technologies are composed of a variety of raw materials, many of which are economically and strategically important to global economies. These are recognised as Critical Raw Materials (CRMs), owing their 'criticality' to factors such as high supply risks, a lack of substitutes, and increasing future demand.

There is growing support for transition to a more resource-efficient economy, in part by designing and optimising products for multiple cycles of material reuse. In this "circular economy", what is now considered waste can instead become a new resource.

The social, environmental and economic benefits of effective resource policies and processes have been recognised in Europe and beyond.

Various programmes, policies and legislation at national and local levels have been enacted to promote material efficiency, reuse, recovery and recycling. Product design and material recovery strategies must be developed to keep CRMs and other resources in the production loop.

At a local level, community repair organisations (CROs) aim to help people to fix their broken items instead of prematurely disposing of them. Repairing items extends the product lifetime and slows the need for new products (and embedded materials) on the market. Community repair not only provides open access to repair, but also represents a challenge to the status quo of a "throwaway" society.

This publication is the collective work of students in the Master of Environmental Sciences, Policy and Management (MESPOM) programme, currently enrolled at the International Institute for Industrial Environmental Economics (IIIEE). The report will provide insight on the fate of electronic devices after use, the challenges of open repair, and an investigation into typologies, lessons and institutional structure of the emerging community repair organisation movement.

KEEPING TRACK OF WEEE

Exploring the End-of-Life Management of WEEE through Repair, Recycling and Export Outside of the EU



By Fabiola E. Cordova, Ankita Das & Terese Nygård

The continuous growth of electrical and electronic equipment placed on the European market and its eventual obsolescence unveils a persistent challenge: how to manage its end-of-life fate. Within the EU, 10.5 million tonnes of electronic waste (e-waste) were generated in 2012 with a projected increase to 12.3 million tonnes in 2020.¹ While the EU has the highest recollection rate of e-waste in the world, efforts are not keeping up with the rate at which the waste stream is growing. E-waste contains many valuable materials, including Critical Raw Materials (CRMs). However, when an electronic product becomes obsolete, CRMs are commonly disposed of in landfills due to the difficulty and cost of recovery.

The most favoured option for controlling e-waste flows is reducing the amount of waste produced through reuse and recycling.² Circularity strategies can divert reusable components and recoverable materials from waste streams back into the market, while also contributing to resource conservation by reducing further extraction of raw materials.

This is particularly important as 65% of e-waste remains outside official recycling systems, and 13% of used electronics are exported

outside the EU.¹ Developing regions, mainly in Asia and Africa, are the main destination for exports. Owing to often-rudimentary recycling technology, these regions bear a disproportional share of the impacts of dealing with e-waste, which can be highly hazardous. Therefore, the end-of-life management of electronics demands more attention to prevent environmental and human health impacts of informal recycling and to secure the recovery of valuable materials.

Tracking the flows of e-waste and unpacking the drivers and barriers for keeping resources in the loop is key to global sustainable development goals. This chapter explores three scenarios for the fate of used electronics: repair and reuse, recycling, and the export of used electronics outside of the EU. The aim is to give an overview of the current situation in the management of used electronics, and to provide insights to how we can better deal with e-waste.

Reuse as A Strategy

Opportunities for Repair

With the onset of globalisation and open-mar-

kets bringing down the costs of electrical products, it has become increasingly common to simply throw away defective devices and replace them with new ones. At the same time, technological innovation has seen an exponential increase in the past decade, resulting in existing products becoming obsolete at a faster pace. Unfortunately, the very aspects that make the technology we have today so useful and novel also makes repair more complex. Most electronic products contain a mix of multiple components, some of which are very small in size, put together by machines and requiring expertise and precision to fix.

Products are also often designed to make repair difficult, and access to open repair manuals is limited.³ Legal barriers also may inhibit repairers' access to spare parts and the ability to sell refurbished products is usually limited to certified retailers, such as Apple and Samsung. These obstacles to repair and reuse will be explained more in-depth in the next section.

From the perspective of the consumer, the main disincentives to repair, apart from a general lack of access to repair shops, are that it may be relatively cheap to buy a new product, that there is no guarantee that the repaired product will last much longer, and the potential risk of losing warranty if the product is tampered with by unauthorised repairers.⁴

Despite these challenges, however, there are several reasons to invest in repair. Consumers often have an emotional connection and familiarity with their devices, which may be an encouragement to repair. Owning a refurbished product also gives an opportunity to access more advanced technology at a lower price. With increasing environmental awareness, utilising repair shops is becoming more popular, leading to a positive development in the refurbished products market.

Increases in the price of electronics could favour repair shops, as could the opportunity to offer cheaper repair services than the produc-

er's official stores.⁵ The latter is one of the primary factors that have led to the existence of a thriving repair industry in developing countries in South Asia, Africa and South America, as these regions tend to have weaker regulations surrounding repair of consumer electronics, and lower minimum wages compared to the EU.

Repair initiatives in the EU

Sweden: Electronicsmix is an EEE repair shop which also provides workshops to raise consumer awareness, and often explores innovative ways of finding uses for defective products. Established in 2015, the company has seen a definite increase in interest, and is very popular in the local community in Skåne.

The Netherlands: WEEE-DO is an Urban Mining start-up based out of Utrecht, with the primary aim of increasing ease of access of household consumers to repair and recycling services for EEEs. They aim to provide a platform for consumers to easily access and purchase refurbished products, and to ensure the recycling of obsolete electronics.

Austria: Refurbed was founded in 2017 in Vienna. The company currently only operates in German-speaking countries, where it aims to become the leading marketplace for renewed products. Their objective is to establish themselves as a platform for refurbished electronic products with high standards for quality, safety and warranty, allowing customers to have a feasible choice when purchasing a refurbished product.

There is currently a lack of data on the amount of EEE repaired annually in the EU. One reason could be that it is difficult to track all the different ways consumers might attempt to repair their products. Nevertheless, it is estimated

that the repair and refurbishment industry could provide around 60-110 direct or indirect jobs for every 1 000 tonnes of used electronics.⁶ Since around 3.8 million tonnes of e-waste were collected and reported in the EU in 2015, the refurbishment industry thus could have the potential to create approximately 420,000 jobs across Europe in the future.⁷

However, it is inevitable that products, even after repair, will reach their end-of-life. Thus, it is important to have proper recycling facilities in place that can effectively and efficiently dismantle the e-waste when repair is no longer possible.

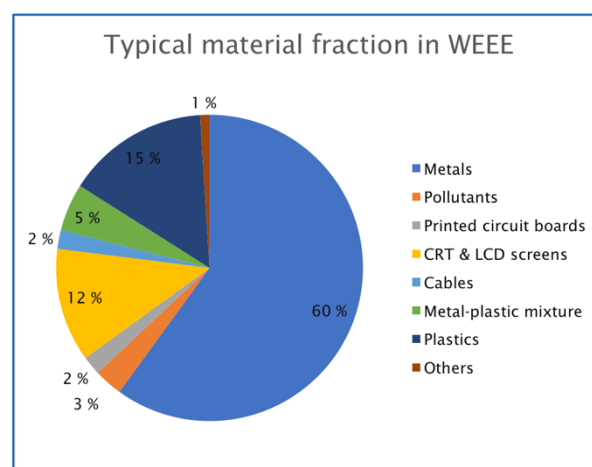
Recycling for CRM Recovery

Recycling obsolete electronics can secure the availability of materials on the market, provided a high collection rate and available recycling technologies. From a resource conservation point of view, both extending the lifetime of products by repair and reuse and improving recycling efficiency are important strategies.

Typically, e-waste flows from the consumer to municipal collection points, to specialised recycling facilities. Repair shops are also catering to a higher collection rate of e-waste, by making sure that unrepairable electronics are sent to recycling. While repair and reuse is the most sensible solution to the e-waste problem, products still need to be fed into an efficient recycling system at the end-of-life.

Recycling is a suitable measure for achieving resource efficiency provided that the impacts in terms of energy and resource use during recycling processes is lower than the impacts from extracting raw materials from nature. Many metals in e-waste are also present in higher concentrations than in natural ore, making recycling a viable option.⁸

The EU WEEE Directive is the main directive that mandates provision of collection and recycling systems financed by producers in order to



Typical material fraction in WEEE. Adapted from: Ongondo (2011).

meet targets. The Directive defines recycling and recovery targets for different categories of WEEE. For example, the target for recovery and recycling of IT and telecommunications equipment is 80% and 75%, respectively. However, while the Directive is important to improving collection and efficiency in recycling, it does not necessarily incentivise the recycling of CRMs because the targets are based on general weight of all e-waste. CRMs normally account for only 0.5% of the mass in a mobile phone, but represent over 80% of the economic value.⁹ Recyclers can reach recycling targets even with little attention to trace metals, despite their economic and environmental importance.

The physical limitations to recycling CRMs from e-waste is an additional limitation. Some downgrading of materials will occur during the recycling process. Products are usually not designed to be recycled and materials composition in products are becoming increasingly complex. The end-of-life recycling rates and global average recycled content for CRMs are low. For example, the recycling rate of indium and lithium is below 1%, and the averaged recycling content (recycled input into the global product stream) is 25-50% and below 1%, respectively.¹⁰ This means that most indium and lithium is lost in the recycling process.

Resource Saving by Urban Mining in Belgium

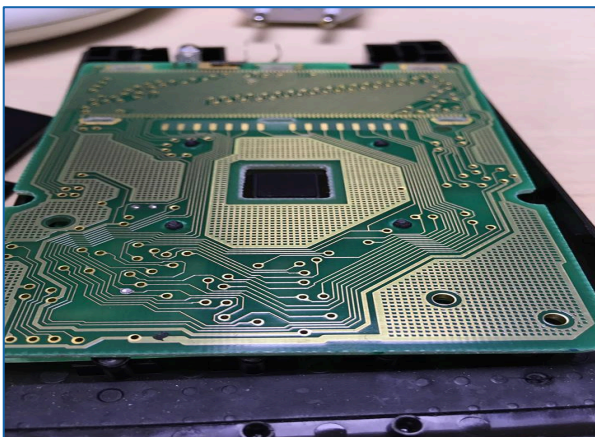
A 2016 case study on the performance of WEEE recycling in Belgium found that by recycling 256 tonnes of laptops, 32 tonnes of steel, 17 tonnes of aluminium, 15 tonnes of copper, 14 tonnes of plastics and 48 kg of precious metals could be recovered for secondary use. In total, 39% of the materials in the laptops were efficiently recycled, indicating a rather low content recycling

¹⁰

Improving pre-treatment and sorting activities can boost the recycling efficiency of CRMs. Furthermore, increasing landfill disposal costs for CRM-containing waste could incentivise higher recycling rates. On the other hand, large quantities of CRMs are lost by exporting e-waste outside of the EU where greater incentives for repair and recycling can be found.

Exporting WEEE out of the EU

It is clear that repair, reuse and recycling of electronics are important strategies for keeping CRM in the loop. Nevertheless, the market of repair and reuse in the EU is still underdeveloped and exporting products for reuse can be highly profitable. Institutional weakness, lax environmental regulations and demand for the much-needed income have created favourable economic conditions for retailers to export to developing countries. Informal or rudimentary



recycling systems within these countries, smuggling networks and a lack of regulations add to the complexity of tracking e-waste out of the EU. These factors contribute to an end-of-life management system with serious negative environmental and human health impacts.

In order to manage these challenges and protect human health and the environment from the consequences of unregulated treatment of e-waste, several legislative and political actions have been taken over the last years. The Basel Convention (1989) is the most important legislation which governs transboundary movement of hazardous materials, including e-waste.

CRMs in The Nordic Region

The Nordic region is one of the largest consumers of electronic products in Europe (about 8% of the EU28 total) and as a result produces a significant amount of e-waste containing CRMs. To secure the supply of CRMs and meet growing demands, installing additional recycling capacities can be a solution. The criticality of CRMs to important industries in the region justifies more investments into recovery. At the same time, there is a lack of data on the use of CRMs by industries, creating a barrier to estimating to what extent recovery from e-waste can contribute meeting demands.¹¹

Based on this Convention, which has been ratified by 187 countries, the movement of hazardous waste from one state to another should only be permitted as long as it does not endanger human health and the environment, and if it has been officially agreed among the countries involved. Furthermore, in recent years several of the main destination countries, such as China, Cambodia, Malaysia, Pakistan, and Vietnam have banned the import of e-waste while others like, Hong Kong, the Philippines, and Thailand have permitted it only under the Basel Convention. However, regardless of these initiatives, trade of e-waste almost doubled since 1996 and continues to flow through illegal channels.^{12,13}

Ambiguity of definitions in the Basel convention and among EU and non-EU countries on what is considered used electronics (UEEE) and e-waste (WEEE), is one of the main causes of this illegality of exports.¹⁴ While UEEE can be exported for repair, refurbishment and re-use, WEEE can only be exported if it's destined for recovery and final disposal. Differentiating between the two groups of EEE is one of the most problematic issues during port inspections. As previously mentioned, while some of the main destination countries have

Tracking exports of e-waste

Recent studies have experimented with GPS technology to track the paths of e-waste from exporters along multiple flow routes from collection to where they eventually end up. A 2016 study by the Basel Action Network (BAN) showed that 34% of the tracker deployments from EU and USA moved abroad. Of those, 93% went to Asia, and 7% went to Mexico and Canada. Tracking the paths and networks for e-waste to destination countries is complicated, and these networks have become more dispersed with time, stretching the capability of tracking technology to remain operative throughout the trip.

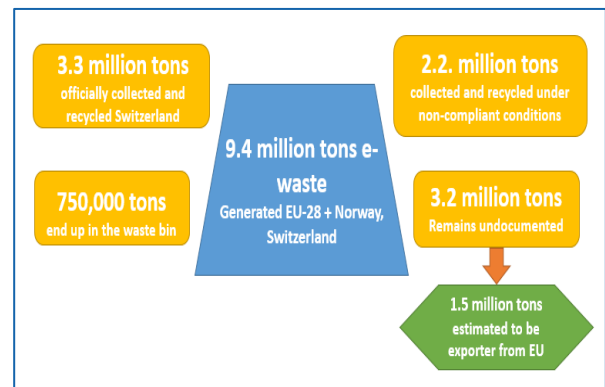
officially banned the import of WEEE, the import of UEEE is still permitted in most of them.¹⁵ This scenario complicates even more the transboundary control of e-waste, leading to the production of faulty data and diminishing enforcement of compliance of current legislation.

Some studies have suggested that a bulk of the official amount of e-waste exported to destination countries is actually subject to be repaired, reused and/or refurbished.¹² A 2012 study on e-waste in Nigeria found that from the total electronics imports, 70% of them were of functional standard and 30% were officially declared e-waste (considered non-functional). Yet half of this was actually repaired in local stores

and sold to the consumers.¹⁶ A similar scenario is recorded in data on EU electronic exports. From the total 1.3 million tonnes of documented e-waste the EU officially exported in 2012, 70% is considered functioning second-hand items, and only 30% e-waste, which could also include repairable items.¹⁴ In this sense, the entire amount of EEE traded, its final EOL management, and the paths it will follow at the destination countries is a grey area subject to different legal and technical interpretations.

This scale of illegal transboundary movements of e-waste and the diversity of outcomes within destination countries demonstrates that the global and local movement of e-waste is much more complex than previously thought. While extremely poor recycling conditions in destination countries keep causing severe environmental impacts and threatening the health and safety of the people involved in these activities, the complex network of reuse, repair and refurbishment in these countries support employment and provides access to technology to people.¹²

Whilst repair and reuse of the imported electronics could have a positive outcome in terms of extending the life of a product and keeping CRMs in the loop, there are high possibilities that when these electronics reach their end of life they will be recycled (if they are not disposed in landfills) under hazardous conditions with negative consequences for the environment and health of the people involved.



Flow of e-waste in EU. Adapted from Huisman et al. 2015. Data 2012.

Conclusion

The aim of this chapter was to explore different scenarios for the fate of used or waste electronics produced in the EU: through repair, recycling and the movement outside of the EU. The complexity of the end-of-life networks makes it challenging to create a complete picture of what happens to electronics at the end-of-life stage. While there is a lack of data both related to exports and recycling, we can still address the consequences of improper treatment of e-waste.

Although repair activities in developing regions is significant, recycling practices are often informal and rudimentary. These practices and their serious environmental impacts are widely documented in many countries around the world. These regions often have weak governmental institutions and lack resources for enforcement.

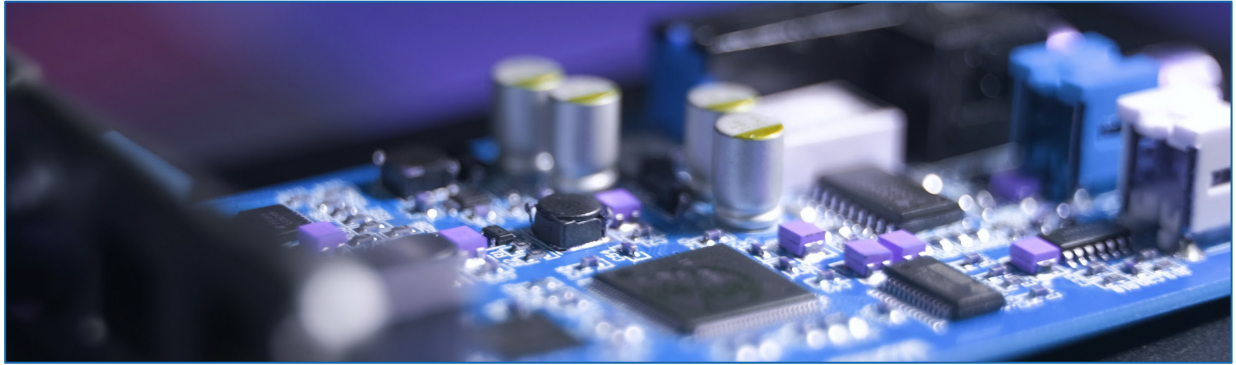
A solution to avoid the loss of valuable materials is to incentivise informal recyclers to sell key components to formalised recycling systems instead of destroying them during recycling processes. This could also address the environmental and human health impacts in the informal section, which despite growing international concern, continues to expand.¹⁷

References

- Huisman, J, I Botezatu, L Herreras, et al. (2015). *Countering WEEE Illegal Trade (CWIT) Summary Report, Market Assessment, Legal Analysis, Crime Analysis and Recommendations Roadmap*. Lyon, France.
- European Parliament, Council of the European Union. (2015). Directive 2008/104/EC of the European Parliament and of the Council of 19 November 2008.
- Ackermann, L., Mugge, R., & Schoormans, J. (2018). Consumers' perspective on product care: An exploratory study of motivators, ability factors, and triggers. *Journal of Cleaner Production*, 183, 380–391.
- Basel Action Network. (2016). Time to Repair the "Repairables Loophole" in the e-Waste Guideline.
- Andersson, A., Carlestam, J., Gunnarsson, J., et al. (2018.). Circular Economy: Research into the Availability and Willingness to Repair Consumer Electronic Products, 79.
- reuse. (2015). Briefing on job creation potential in the re-use sector.
- Huisman, J., Leroy, P., Tertre, F., et al. (2017). *Prospecting Secondary Raw Materials in the Urban Mine and mining wastes (ProSUM) - Final Report*. Brussels, Belgium.
- Hampus, A. (2018). Resource and environmental impacts of resource-efficiency measures applied to electronic products. *Chalmers University of Technology*. Master thesis.
- Ongondo, F.O., Williams, I.D. and Cherrett, T.J. (2011). How are WEEE doing? A global review of the management of electrical and electronic wastes. *Waste Management* 31, 714-730.
- Van Egyen, E. et al. (2016). Resource savings by urban mining: The case of desktop and laptop computers in Belgium. *Resources, Conservation and Recycling* 107, 53-64.
- Bakas, I. et al. (2016). Critical metals in discarded electronics: Mapping recycling potentials from selected waste electronics in the Nordic region. *TemaNord*, Nordic Council of Ministers.
- Lepawsky, J. (2015). The changing geography of global trade in electronic discards: time to rethink the e-waste problem: The changing geography of global trade in electronic discards. *The Geographical Journal*, 181(2), 147–159.
- Li, J., Lopez N., B. N., Liu, L., Zhao, N., Yu, K., & Zheng, L. (2013). Regional or global WEEE recycling. Where to go? *Waste Management*, 33(4), 923–934.
- Huisman et al. (2015). *Countering WEEE Illegal Trade (CWIT) Summary Report, Market Assessment, Legal Analysis, Crime Analysis and Recommendations Roadmap*.
- Secretariat of the Basel Convention, SBC, 2011. *SBC WEEE Africa Project, Ghana WEEE Country, Assessment*.
- Ogunbuyi et al. (2012). *E-Waste country assessment Nigeria Basel Convention Coordinating Centre, Nigeria/Swiss Federal Laboratories for Materials Science and Technology (EMPA), Switzerland*.
- Williams, E. et al. (2008). Environmental, social and economic implications of global reuse and recycling of personal computers. *Environmental Science Technology* 24, 6446-6454.

WARRANTY AND REPAIR

The Obstacles for the Repair and Refurbishment of Electronics – With a Focus on Warranty



By Stanzi Litjens, Ildiko Matrai & Dóra Varga

Today we live in a society of modern consumerism. By discarding immense volumes of products, valuable raw materials are lost. Keeping these materials in use – through repair – diverts them from waste streams and has potential to prevent critical resources from exiting the value chain. To facilitate repair, legal guarantees and commercial warranties are offered by the European Union (EU) and its Member States.¹ They provide protection to the consumer against faulty goods and items that do not function as advertised, for example by giving consumers the right to ask the seller for repair.²

Although guarantee and warranty are supposed to facilitate repair, they sometimes act as a barrier instead. Moreover, looking into the topic further, it appears guarantee and warranty considerations are part of a number of factors that can hinder the practice of repairing products.

This chapter explores how repair by individuals and repair and refurbishment shops are affected by Original Equipment Manufacturers (OEMs), first focusing on guarantee and warranty followed by examination of other interlinking factors such as planned obsolescence and intellectual property rights.

Guarantee & Warranty

To encourage repair, the European Union's Consumer Sales and Guarantees Directive offer two types of protection: the legal guarantee and the commercial warranty.

EU Consumer Sales & Guarantees Directive

In order to provide a guarantee scheme that favours consumers, the Consumer Sales and Guarantees Directive (1999/44/EC) was introduced in 1999. The Directive includes the responsibilities of a seller, remedies for consumers and regulation for commercial warranties as well.¹

According to Article 2, the **legal guarantee** rule grants – from the moment of receiving the product – a minimum two-year guarantee for all goods, free of charge. This is just the minimum right of the consumer. Every Member State can provide extra protection according to their national rules, which must always be in the consumer's best interest.³ If an item bought anywhere in the EU is faulty or it is not as advertised, according to the law, the seller is

obliged to repair or replace the product free of charge or give the buyer either a price reduction or a full refund. Also, if a product defect is discovered within six months after purchase, the seller must prove that the product was not already defective at the time of purchase. This is the so-called reverse of the burden of proof.

After six months, it is the buyer who must prove that the product was defective at the time of purchase through acquiring an independent expert opinion. Acquiring this proof can cost a disproportionate amount of money compared to the price of the product and the counter opinion is not considered to have legal value. In the 2018 report of the European Consumer Centres Network (ECC-Net), 42 repair shops in 17 different countries were asked to check how easy it was for the consumers to have an independent expert opinion. 43% of the requests were denied due to different reasons. For example, one repair store refused to open the item because it could void the existing warranty. Another repair shop argued against repairing the product due to them not being a brand representative and therefore possibly invalidating the legal guarantee in case of repair. These are only two examples that demonstrate the obstacles represented by the way the law is currently constructed. The limited timeframe of the guarantee and required opinion of an independent expert makes it difficult for the consumer to seek repairs for defective products after the first six months, as the burden of proof is on them. Further barriers interlinked with what was mentioned previously are a knowledge gap about the legal rights of guarantees and the law itself. If the repair shops or even consumers are not aware of the legal rights of guarantee, it hinders repair because they may not understand their rights under the law for fixing defective products. Yet if they are in fact aware, then the voiding of warranty itself is the obstacle to repair.

In addition to the EU legal guarantee, which is a fundamental right of every consumer, stores

or producers can decide whether they want to give the buyer an additional guarantee. This **commercial guarantee** is often referred to as a **warranty**. There are two types of warranties: the first one, which is included in the price of the item and the second one, which costs an additional fee. In many EU Member States, the second option is the most common one. The warranty may give more advantage than the base guarantee as some producers might offer a longer period for returning the faulty items, but it can never reduce or replace the two-year guarantee.^{1,3} It is explicitly stated in the Consumer Rights Directive that warranties “must provide services to the consumer in addition to the legal obligations relating to the guarantee”.¹



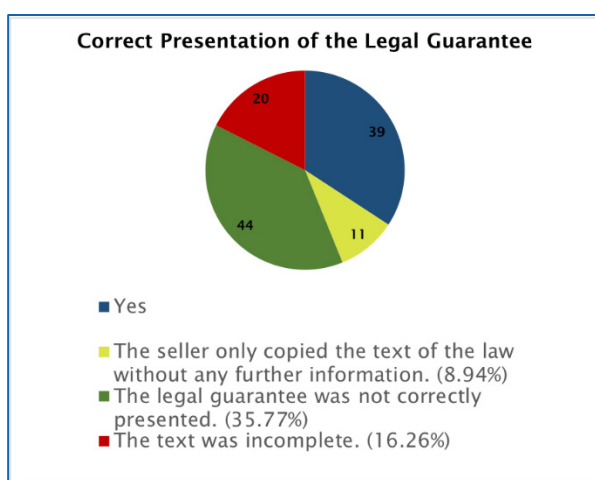
The duration of warranties for electronic goods is usually between one and three years and the duration starts with the possession of the product. The most common warranty duration offered for TVs was two years, similar to the legal guarantee. The amount of time given is quite short considering the product lifetime, which is four to ten years on average. Such warranties only cover a limited amount of time compared to the time the TV should function. Therefore, the short duration of warranties present a barrier to repair.

According to the Consumer Rights Directive, the seller has the obligation to inform the consumer about the content of the warranty before “being bound by the contract”.¹ According to the Directive, “Before the consumer is bound by a distance or off-premises contract, or any corresponding offer, the trader shall provide the consumer with the following information

in a clear and comprehensible manner: (...) a reminder of the existence of a legal guarantee of conformity for goods and where applicable, the existence and the conditions of after sales customer assistance, after-sales services and commercial guarantees”.¹ The contract signed by the consumer should contain a reminder about the guarantee and inform that warranty does not affect the rights of the customer regarding their legal guarantee provisions.

Research conducted by the ECC-Net showed poor awareness of consumers about guarantee and warranty rules. A low level of sometimes incomplete or unclear information with unsatisfactory description of the guarantee was found. Moreover, 41.67% of the shops advertised warranty as a seller’s warranty without referring to the legal guarantee.

As presented in the picture below, out of 123 cases, only 39 properly presented the legal guarantee online.



Correct Presentation of the Legal Guarantee¹

Due to the two kinds of guarantees having similar features, the ECC-Net regularly receives complaints about sellers who refuse to apply the guarantee of conformity, justified with the expired time limit. The ECC-Net discovered that in these cases the seller was referring to the warranty, instead of the guarantee. Consumers are often “misled about their rights under the legal guarantee and also sometimes

under commercial warranties” which significantly hinders repair.¹

A Focus on Guarantee & Warranty for Businesses

Guarantee and warranty incentivise producers to create longer-lasting products in order to avoid costs incurred during the guarantee period.¹ In the meantime, guarantee and warranty through repair slows down the turnover of products, thus decreasing sales. Warranty can serve as a sign of trust, since consumers can reason that it is not in the OEM’s best interest to create a low-quality product with high repair costs.⁴

During guarantee and warranty period, the question arises: who is responsible for a defective product?¹ OEMs protect themselves to avoid expensive claims by establishing a list of criteria that indicate what falls in and outside of its responsibility.

It is not uncommon for consumers to decide to have their products repaired by third party repair organisations during the guarantee and warranty period due to multiple reasons. For example, the authorised repair shops are not available in the area, or the authorised shop offers unsatisfactory repair and the consumer must turn to a third party for a proper solution. Repair in a third-party unauthorised shop may result in loss of guarantee – in case of damaging the product throughout the repair process – thus holding people back from taking their products to third-party repair shops.

Apple explains that warranty coverage is void when a non-authorised repair shop performs a repair, and Apple is not to be held accountable for that product.⁶ Samsung also states the same rule in its warranty manual.⁵

“Warranty does not apply (...) to damage caused by service (...) performed by anyone who is not a representative of Apple or an Apple Authorized Service Provider (...)”⁶ - Apple

*“Warranty repairs must be carried out by a SAMSUNG Authorized Service Centre. Warranty cover will be void, even if a repair has been attempted by any unauthorized service centre. SAMSUNG shall not be liable for reimbursements, claims and damages that may result from the unauthorized repair of the product”.*⁵- Samsung

When a product is repaired at a non-authorized shop, the OEM does not have control over the quality of repair through the techniques and materials used and can therefore not guarantee the quality of the product.¹

Unauthorised Repair Businesses

Repair and refurbishment businesses are obliged to provide legal guarantees of two years in the EU. This is a risk, as these businesses already work with second-hand products, which may mean the product lifetime is not as reliable as that of a new product.¹ Arguably, the communication by OEMs of the loss of the OEM guarantee and warranty through unauthorized repair possibly creates negative sentiments in consumers towards such repair. It is argued that protective guarantee and warranty criteria contribute to the struggle for repair.⁷ The case study of LEAPP will illustrate the struggle for refurbishment of electronics.

When researching guarantee and warranty and its effect on repair, it was found that this is

The Case of LEAPP

LEAPP was selling refurbished Apple products for less money than new Apple products.⁸ In 2014, LEAPP was the fastest growing retail organisation in the Netherlands with 24 physical stores all across the country, as well as an online store.⁹ Due to the highly competitive markets of electronics, LEAPP did not succeed to remain profitable and filed for bankruptcy in June 8th, 2018.¹⁰ The role of warranty on LEAPP’s

The Case of LEAPP (cont.)

hard to determine. LEAPP itself offered a one-year commercial warranty on its products.¹¹ It arguably suffered from the fact that Apple did not provide enough spare parts, which made it a challenge to scale up.⁸ Others argue that Apple itself was competition for LEAPP, as it started to offer its own branch organisation of refurbished products such as iUsed, MacRelife, Forza which are simply more trusted by the

only one of many factors that influence the success of repairing electronics. The following section presents some other factors, such as planned obsolescence and intellectual property rights.

Factors that Hamper Repair

In industrialised countries there is a steady decline of firms active in the electronics repair and maintenance industry. United States data shows that in the 1960s, being a television and radio repairman was a promising career path to take with long-term perspectives. But trends proved the opposite. According to the United States Bureau of Labour Statistics Occupational Employment Survey, from 1963 until 2006, the number of people employed as such dropped from 110 000 to 40 000, while the average number of television sets per household more than doubled.¹²

During the Great Depression of the 1930s, manufacturers saved on costs by producing products of inferior quality. These products wore out faster, forcing customers to buy replacements. Manufacturers soon realised that by creating items that lasted for a shorter period of time, the demand for new products started to increase. This was the beginning of the so-called planned obsolescence.¹³ But other types of obsolescence exist, such as technical obsolescence, when old products lose their appeal because of new technical parameters of

newer products, or economic obsolescence caused by higher efficiency of newer products.



Manufacturers spend a great deal of resources on advertising and inducing consumers to purchase these new products with new functionalities and trends. As a result, obsolescence induces customers not to consider repair alternatives.¹² They became culturally conditioned to automatically opt for buying a new product.

There are more factors at play that contribute to a declining repair industry in the developed world. The price ratio between the repair and replace alternatives plays a decisive role in the consumer's choice between the two. The amount of money customers are willing to pay for repair has kept pretty much constant for the past 30 years: around 20% of the replacement cost.¹² This means that consumers are willing to pay for repair around one fifth of the price it would cost to buy a new product. As new electronics production moved to countries with low labour wages, the repair industry in the developed world with high labour costs find it increasingly difficult to offer its services at the 20% price ratio.

Their job is further hindered by the OEMs' choice of design for difficult disassembly. Today's design trends include making products smaller and slimmer, which requires gluing and integration of parts and materials.¹⁴ Such design features do not have product reparability as an aspect. It is also uncommon to find OEMs that

are advertising a product with high reparability features. After all, advertising that a product is well-repairable implies that it is likely to fail. This is considered as an obstacle, even though businesses can benefit from designing for reparability. Studies have found that successful repair outcomes increase customer loyalty. In line with this, sharing repair manuals and usefulness of repair information that contribute to successful repair also have positive effect on customer loyalty. However, manufacturers often opt for design for limited repairs and short-lived products.¹⁵

As mentioned, one reason for the OEMs designing for limited repair and short-lived products is to increase demand for new products. But there are other reasons behind their strategy. OEMs invest a lot of resources in developing their products. Once these products reach their end-of-life they may be collected by independent remanufacturers or refurbishers. Independent remanufacturers recover parts or a significant part of the original product, refurbish it, and sell it as their own. Therefore, any actions an OEM takes to improve the reparability of its product makes it easier for independent remanufacturers to free-ride on the OEM's investment.¹⁶ The level of reparability an OEM chooses to employ is therefore affected by its perception of how remanufactured products will affect the sales of new products, but also by the extent the OEM can collect, refurbish and resell its own products.

An OEM's choice on design for manufacturability is also dependent on the strength of its intellectual property rights.¹⁶ Intellectual property rights include patents, trademarks and industrial design, among others. A patent protection gives exclusive right to the patent owner for the production, distribution and sale of its patented invention. A trademark is a sign that identifies goods and services and helps consumers make decisions based on the expected quality. Finally, industrial design protects against the copying of the visual design by un-

authorised parties. Intellectual property rights are intended to incentivise invention by ensuring the rights holder that it will exclusively benefit from the fruits of investment.¹⁷ Strengthening intellectual property rights, therefore, could be used as a policy instrument to enhance OEMs' design for remanufacturable products.¹⁶

Intellectual property rights can also act as a barrier to repair if that repair poses an intellectual property right infringement. In general, repair is permitted so long as it does not entail significant modification of the product, which in turn would be called reconstruction. Reconstruction is considered an act of intellectual property right infringement. There is no clear boundary drawn between repair and reconstruction, it is generally decided upon by courts on a case-by-case basis.¹⁸ What may be deemed infringement in one country may not be one in another. Thus, the ambiguity of what is permissible can hinder repair. For example, is refilling the printer cartridge a reconstruction? In 2006, the Japanese Supreme Court ruled against refurbishers that refilled empty Canon printer cartridges with ink and resold them.¹⁹

Final Words

Our report attempted to examine the factors affecting repair, focusing on those that are closely connected to OEMs' strategic choices. Although guarantee and warranty were originally meant to enhance repair, there are several cases where OEMs employed strategic steps that do not necessarily align with these intentions. The same is true for OEMs opting for planned obsolescence. Intellectual property rights are found to also affect repair.

Design for reparability and the accessibility of repair services might lead to a higher number of repaired products and increased sales of refurbished products.¹ This could in turn mean that fewer new products are purchased, resulting in the decrease in the amount of critical raw

materials mined and used in these new products.²⁰

As you might have come to understand, this is just the tip of the iceberg and the cases presented only scratch the surface of this topic. Nonetheless, they show how the success of repair and refurbishment is very much affected by OEMs' strategic decisions.

References

1. ECC-Net. (2017). Commercial warranties, are they worth the money? Brussels: EU Commission.
2. Europa.eu. (n. d.). Consumer guarantees. Retrieved from europa.eu/youreurope/business/dealing-with-customers/consumer-contracts-guarantees/consumer-guarantees/index_en.htm
3. Europa.eu. Guarantees & returns. Retrieved from europa.eu/youreurope/citizens/consumers/shopping/guarantees-returns/index_en.htm
4. Rahman, A. (2016). Evaluation of Customer's Risk to Lifetime Warranty. Industrial Engineering and Engineering Management (IEEM). Retrieved from ieeexplore.ieee.org/document/7798096
5. Samsung. (2018). Warranty Information. Retrieved from www.samsung.com/levant/support/warranty
6. Apple. (2018). Guaranteed Apple Quality. Retrieved from www.apple.com/shop/refurbished
7. Behad, S. (2017). Why are companies trying to make it illegal to repair our electronic devices? Retrieved from qz.com/1028356/why-are-companies-trying-to-make-it-illegal-to-repair-our-electronic-devices/
8. ReMaTec. (2018). LEAPP: What went wrong. Retrieved from www.rematec.com/news/news-articles/leapp-what-went-wrong/
9. Financieel Dagblad. (2014). Leapp geeft Apple-apparaten een tweede leven. Retrieved from <https://fd.nl/frontpage/ondernemen/635339/leapp-geeft-apple-apparaten-tweede-leven>
10. Emerce. (2018). Emerce. Retrieved from <https://www.emerce.nl/over-emerce/contact>
11. LEAPP. (2018). LEAPP. Retrieved from <https://leapp.nl/>
12. McCollough, J. (2009). Factors impacting the demand for repair services of household products: the disappearing repair trades and the throwaway society. *International Journal of Consumer Studies*, 33(6), 619-626.
13. Slade, G. (2006). Made to break: Technology and obsolescence in America. Harvard UP.
14. Mashhadi, A. R., Esmailian, B., Cade, W., Wiens, K., & Behdad, S. (2016). Mining consumer experiences of repairing electronics: Product design insights and business lessons learned. *Journal of cleaner production*, 137, 716-727.
15. Sabbaghi, M., Esmailian, B., Cade, W., Wiens, K., & Behdad, S. (2016). Business outcomes of product reparability: A survey-based study of consumer re-

- pair experiences. *Resources, Conservation and Recycling*, 109, 114-122.
16. Krystofik, M., Wagner, J., & Gaustad, G. (2015).
 17. Leveraging intellectual property rights to encourage green product design and remanufacturing for sustainable waste management. *Resources, Conservation and Recycling*, 97, 44-54.
 18. World Intellectual Property Organization (WIPO). (n. d.). What is intellectual property? https://www.wipo.int/edocs/pubdocs/en/intproperty/450/wipo_pub_450.pdf
 19. Liu, B. P. (2014) Toward a Patent Exhaustion Regime for Sustainable Development. *Berkeley Journal of International Law*, 32 (2), 330-387.
 20. Tobias, S. M. (2007). No Refills: The Intellectual Property High Court Decision in *Cannon v. Recycle Assist* Will Negatively Impact the Printer Ink Cartridge Recycling Industry in Japan. *Pacific Rim Law & Policy Journal Association*, 16(3), 775.
 21. Vrijdag, S. (2018). Opgelapte Iphones. The Hague: Consumentenbond.

TYOLOGY OF NON-PROFIT REPAIRS

Identifying Opportunities for Long-Term Viability



By Hodjat Arabi, Virginie Laroche & Tais Reznikova

Concerns about unsustainable overconsumption, waste production, and resource depletion are growing in Europe and worldwide. A large portion of the waste generated is disposed of via landfilling or incineration. However, both methods negatively impact the environment and often provoke intense public opposition from existing or potential neighbours of the physical facilities. As a result, countries and municipalities are increasingly exploring alternative streams to deal with their waste. Several policies and programmes have been put into place at national and local levels to minimise waste production by promoting materials reduction, reuse, and recycling. In a similar vein, over the last decade, a global network of non-profit repair ventures has emerged. Many of these initiatives are publicly sponsored and/or community-based and they aim at encouraging and teaching people to fix broken items instead of throwing them away. □

Repairing products enables the extension of their lifespan and a more efficient use of materials. Moreover, this can significantly reduce the

environmental impacts of waste disposal, especially in the case of electronic waste (e-waste), which makes up one of the fastest growing waste streams in the world. Every year, around 50 million tonnes of e-waste is generated globally and only 10% of it is recycled.¹ This constitutes a missed opportunity for recovery by reuse or repair, considering that valuable materials are contained in these discarded devices. In our consumerist culture, when products develop small faults, they are most often replaced by new ones rather than being fixed. □

In this context, the rapid development of non-profit repair organisations (NROs) is promising. They provide opportunities for interested people to work together at a local level to foster repair, transferring repair skills and increasing awareness of repair as an alternative to replacement. For example, repair networks that are very active in Western Europe, particularly in Scandinavia, United Kingdom and the Netherlands, have played a key role in raising the profile of non-commercial repair initiatives. They have facilitated the repair and maintenance of

old products and empowered consumers through the free provision of training and sharing expertise, and resources (e.g. tools and equipment).² In doing so, the fixer movement challenges the trend of premature disposal of consumer items. The resulting increase in product lifetimes reduces resource consumption. These repair organisations also build a sense of community. They offer a place for people to socialise, share and learn new skills and address issues related to sustainable consumption. Participants have the possibility to work with other like-minded people to make a difference and give a valuable service to their community. □

Within this movement, there is a wide range of organisational models. The current chapter presents a typology focusing on the most common non-profit repair models operating in Denmark, Sweden, England, and the Netherlands. Our field research and literature review have allowed us to identify three different types of initiatives: top-down, bottom-up and hybrid. For each option, we have examined their advantages and disadvantages, as well as their long-term viability. Among the challenges faced by non-profit repair organisations, finding a financial strategy that allows the continued existence and development of their activities is essential. As these platforms do not generally generate profit, questions related to establishing their financial foundation are high on the organisers' agenda. Currently, they rely on different financial support schemes, as will be outlined later in the paper. This report is intended to provide useful infor-



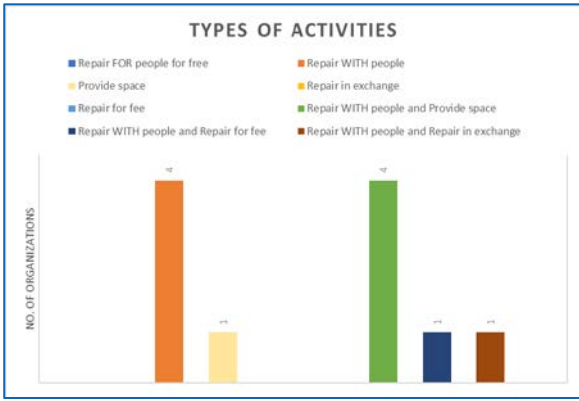
Word cloud created from keywords used in our research

mation to new actors wishing to enter the sector, seeking for the most suited and viable operating model to implement in their communities. It can also give existing repair organisations suggestions on how to think strategically about their longer-term viability. □

Survey of Non-profit Repairs

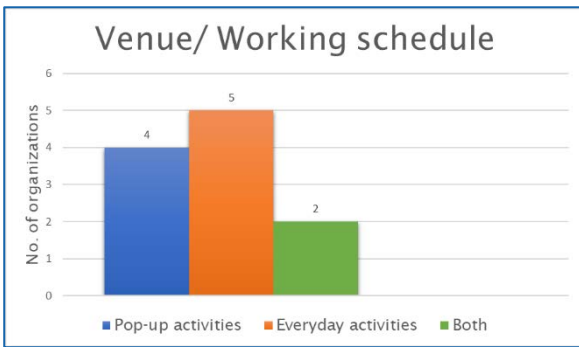
Previous studies and reports were searched, selected and reviewed according to their relevance vis-a-vis the scope of our report to find the scientific gaps. A synthesis matrix (visual representation of main ideas) was created to facilitate the literature review. For data collection, we followed two approaches. The first method involved interviewing NROs in Lund and Malmö. The second approach was examining websites and social media pages for NROs, which were not available for personal interview. The collected data helped us further categorise these organisations into five groups, according to their *venue/working schedule, motivations towards repair activities, business model, and stakeholders*. Collected data were sorted and visualised with charts. We used SWOT (Strengths, Weaknesses, Opportunities and Threats) tool to analyse our data from interviews and surveys and examined the pros and cons of the different types of NROs.

Based on their activities we divided NROs into five different groups: a) *repair for people for free* where people bring their products to get fixed for free; b) *repair with people* where people bring their products and repair them together with knowledgeable volunteers; c) *provide space* where people have a space and appropriate tools and/or spare parts to repair by themselves; d) *repair in exchange for something* where products get repaired for a service, donation or membership fee and; e) *repair for a fee* where people pay a little amount for their products to be repaired in order to maintain the organisation's operation costs. Out of the eleven examined organisations, four *repair with people*, one *provides space*, four *repair with people and provide space*, one *repairs with people and asks for a fee*, and finally one *repairs with people and in exchange for something*.

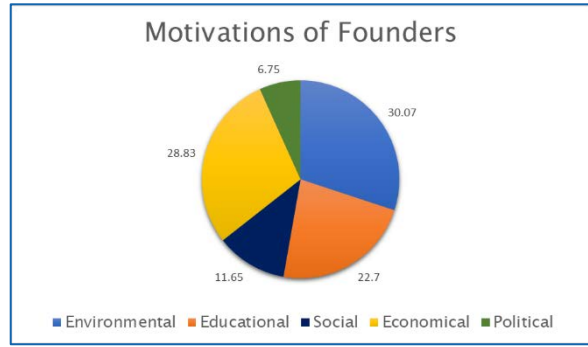


There were no organisations repairing *for people for free*.

We also categorised NROs according to their *venue/working schedule*. Four of them had pop-up activities and mostly weekly workshops, five had daily activities while up three were involved in daily activities and pop-events.



There were various motivations defined behind the examined initiatives. The founders were either driven by **environmental** (moving from linear economy to circular economy, reducing waste and raw materials consumption); **social** (helping people to get socialised); **educational** (training people how to repair their own products); **economic** (as a promotion tool for their business or additional value by their business) and **political** (ideological transformation which can lead to policy changes) motivations. The most important motivation was rated 5 and the lowest was rated 1. The results showed that environmental, social, and educational motivations are dominant, while political motivation is less important for these organisations. For Repair Café Malmö, Repair Café Denmark, Slowdesign Stockholm, Electronicsmix, Fixatill, and Farnham, environmental aspirations were identified



as the main driver. For Restart, Stenkrossen, and Repair Café International (Netherlands), education was found to be the dominant motivation.

In the next step, we evaluated the NROs' business models using two main parameters. First, the *current sources and forms of funding* were identified; they could be projects, financial support from municipalities or private investments, but also a free space. Second, the *future financial strategy* of each initiative was analysed. With regards to the current funding, the dominant sources are grants, municipalities' budgets, EU funds or other development organisations. Repair Café Malmö had a start-up funding and a free space provided by municipality. Fixatill was funded from an EU Interreg Project and Lund municipality. Some of the NROs rely on donations and grants, like Restart project. Repair Café International (Netherlands) has been supported by Dutch subsidies and donations from Dutch funds. Others are more or less self-financed; e.g. Electronicsmix received one-time funding from Lund municipality, but currently it covers most of its operating expenses using the profits from its commercial repair activities. SlowDesign Stockholm is another initiative, which is based on the collaboration of its members who are independent designers, artisans and other individuals interested in sustainable design, economy and development. Its financial sources are diversified and include the revenues from workshops organised for urban planners and traders, which not only focused on repairing but also on other sustainability topics. Other identified financial sources also include the revenues from renting out their space for other businesses, events and running coffee shops at their venue.

With regards to the future financial strategy, the information on financial plans is missing. We also found the lack of intentions to develop a financial plan for the period beyond the project funding. Most of the respondents and website profiles do not define the organisation's future strategy or post any information on it. For instance, Fixatill, which has defined terms of its contract with Lund municipality, does not express an intention to operate after January 2021. The Restart Project website did not provide any information about future strategy either. In the case of the personal interviews, most of the respondents mentioned that they would most likely continue their current strategy. Repair Café Malmö intends to keep relying on the support from STPLN (incubator for non-profits). Electronicsmix, which has received an initial start-up funding for buying tools, is planning to pursue its current strategy and will remain self-financed through its commercial repair activities.

In the last step, we were looking to identify the main decision-makers for these non-profit repair organisations. We found that they can be classified into three main categories. In the first category, decisions are made by the founders themselves such as Electronicsmix, Restart, Repair Café Malmö, Repair Café International (Netherlands), Repair Café Denmark and Remakery. The second category includes the cases when decisions are made by either the grant provider or the financing organisation such as the municipality, the national government or the EU (e.g. Fixatill). In the third category, decisions are made in a collaborative approach between the financing organisations and the founders such as Stenkrossen, Slowdesign Stockholm and Farnham.

Typology of NROs: Pros and Cons

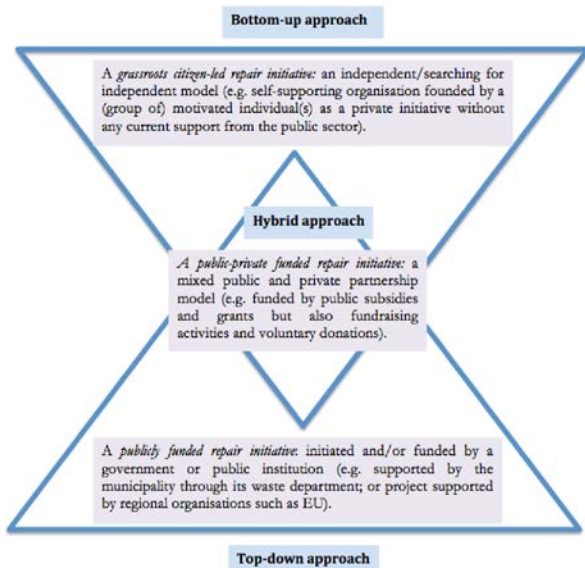
Based on the characteristics described in the previous section, particularly current and future financial strategies and the reliance on public

Remakery, Edinburgh, UK

Edinburgh Remakery³ was created thanks to the financial support of Zero Waste Scotland and City of Edinburgh Council. It was founded in 2011 by Sophie Unwin, with the aims of promoting repair, reuse and recycling in the local community in order to reduce waste generation. Positioning itself as a social enterprise, Remakery offers not only space and tools as most of the traditional repair cafés, but a wide range of other activities. The repaired and refurbished furniture and electronics (including laptops) are sold to customers for very affordable prices in the Remakery charity shop. There is also a possibility to book a workshop on different topics for companies or groups of friends or to order a social enterprise-led Christmas Party Experience (e.g. upcycling activities).

Since its opening in 2012, the Remakery has diverted 205 tonnes of waste that would have ended up in the landfill.⁴ In addition to promoting zero-waste goals in the community, the organisation aims to create social value. In cooperation with other community organisations, Remakery delivers laptops to the families of refugees in the UK. The financial sources of the enterprise are very diverse and include grants, revenues from workshops and a charity shop, membership fees, and voluntary donations (both money and belongings of no use like furniture). In 2017, the shop had an income of EUR 263,000 – 30% from grants, 70% generated through sales of furniture and electronics, workshops and repair appointments. The successful work of this organisation is maintained by both full-time paid staff and volunteers. The development strategy of Remakery proved to be sustainable and financially viable and can be considered as a successful operating model for further initiatives.

sector involvement, we have developed a typology and categorised the studied NROs into three types of organisational models. The typology can be further expanded if other criteria are taken into account (venue, staff, type of activities, etc.). The following types were identified as shown in the figure below.



The 11 examined case studies were classified along these three types:

Top-down approach

- Fixatill (Sweden) - initiated and funded by municipality with support of EU project.
- Stenkrossen (Sweden) - initiated by public university and funded by municipality.
- Farnham Repair Café (UK) - initiated by public university and funded by Town Council.

Bottom-up approach

- Remakery (UK) - citizen-led, funded by private donations and fundraising activities, provide paid services.
- Electronicmix (Sweden) - citizen-led, non-commercial and commercial activities.
- Slowdesign Stockholm (Sweden) - citizen-led, funded by private donations and fundraising activities, provide paid services.

Hybrid approach

- Repair Café Malmö (Sweden) - citizen-led, funded by municipality.

- Repair Café International (Netherlands) - citizen-led, funded by public subsidies and grants but a greater share of private donations and fundraising activities.

- Restart Project (United Kingdom) - citizen-led, funded by public subsidies and grants but aiming at a greater share of private donations and fundraising activities.

- Repair Café Denmark (Denmark) - citizen-led: members of this association are social entrepreneurs, funded by government.

The three models represent the majority of the observed cases. There are many other distinctive characteristics, but the source of funding is one of the basic features of the model as it also defines the decision-making process, future strategy and planning.

Most of the respondents in a similar research⁵ conducted in Southern Sweden for sharing organisations mentioned that external funding has been a decisive factor to enable the start-up and running of the local shared platforms. The majority of the local shared initiatives from this study received financial support primarily from municipalities, but also from specific projects and events. The biggest advantage of such models is the availability of the initial start-up funding. However, the capability to operate after the end of the funding remains the biggest challenge. The reliance on the external funding not only hinders the future financial viability, but also impedes the development of a reliable volunteers' network, simply because there is no need for their constant involvement. The private initiative with an independent funding model seems to be more attractive from a long-term perspective. However, there are some disadvantages of full financial self-sufficiency. Any attempts to commercialise some of the activities may negatively affect the perception of the place as community-oriented, inclusive and environmentally dedicated initiative. Another survey⁶ found that the proportion of people disagreeing with introduction of any charges for repairs by repair cafés is increasing.

Grassroots activities are emerging in the non-profit repair sector. However, most of the private initiatives have “grown” from the public-funded projects. Often, the participants after gaining some experience in repairing, as well as the volunteers after learning how to run such community-based initiatives start their own repair non-profit business. Such networks of professionals from different initiatives gives most fruitful results for the communities since it allows for the exchange of expertise, tools and ideas.

The developed typology captures organisations with the purpose to repair. But there are also organisations whose main purpose is not to repair, but they still organise some activities as part of their Corporate Social Responsibility. For example, Annabel Giraud-Telme is a UK fashion brand, which in collaboration with a community organisation initiated repair workshops, where professionals repairers resurrect disused items from jeans to bags brought by local citizens.⁷

Operating models	Strengths	Weaknesses	Opportunities	Threats
Top-down initiative (public funding)	<ul style="list-style-type: none"> - Usually paid full-time staff - Stable funding and regular venue allow to successfully integrate the role of social centre with environmental goals - All the services are provided for free, no need to commercialise. 	<ul style="list-style-type: none"> - Stick to the municipality’s goals (sometimes specific targets) and agenda - Sticking to some geographical scope can limit the number of visitors– work with certain districts’ community - Limited period of funding - Lack of incentives to build a volunteers’ network due to paid staff. 	<ul style="list-style-type: none"> - Cooperation, exchange of experience with similar initiatives of other municipalities - More opportunities for collaboration with other public institutions (such as universities, schools, community centres) - Stable and sufficient funding for project duration allows engagement and payment of professional repairers to share valuable skills (especially for electronics’ repair). 	<ul style="list-style-type: none"> - Lack of financial and organisational capacities to continue operations after the end of the funding.
Bottom-up private initiatives (social entrepreneurship)	<ul style="list-style-type: none"> - Total independence and variety of possible business models: combination with other services (e.g. souvenir shop, second-hand store, café, book store, etc.) - Freedom of choosing location, working schedule; - Partial commercialisation of the provided services help to remain financially viable in the long-term. - Financial security and possibilities of long-term planning regardless the terms of the projects. 	<ul style="list-style-type: none"> - Need for significant initial investments - Lower level of community feeling and pursuit of environmental benefits. 	<ul style="list-style-type: none"> - Opportunity for symbiosis with other organisations due to flexibility of the business model (e.g. refurbishment and selling of used furniture from hotels, schools, restaurants). 	<ul style="list-style-type: none"> - Competition with profit-based repair organisations - Lack of supportive regulations like tax reduction, insurances (except for Sweden which is more advanced in this domain).
Hybrid, mixed funded initiative	<ul style="list-style-type: none"> - Possibility to avoid the financial vacuum when start-up funding ends by differentiating the sources - Various fundraising mechanisms (e.g. online resources like Crowdfunder, RocketHub, Crowdrise; membership fees, donation parties, etc.). 	<ul style="list-style-type: none"> - Application for external funding requires considerable amount of time and resources - Different projects require different conditions for funding. 	<ul style="list-style-type: none"> - International network of repair organisations financed from the same project/source - Involvement in wider sustainability issues, both social and environmental due to combination of municipality’s goals for local development and other perspectives of the funding projects. 	<ul style="list-style-type: none"> - Decrease of interest in financing repair projects from development organisations.

SWOT Analysis of the three main types of nonprofit initiatives. Source: Own research.

Recommendations

The long-term viability of local non-profit initiatives is determined by the capabilities of a self-sufficient operation. The research identified various funding schemes used by NROs. The analysis of these schemes should take into account the fact that the repair movement is comparatively young. Many of the examined initiatives appeared in recent years and are too early to be evaluated for their long-term viability. However, there are some general recommendations, based on the experience of longer performing initiatives, which may assist the new actors in choosing a more viable non-profit repair model:

Location is an important factor: According to the respondents, locating the repair organisation close to a lower-income neighbourhood instead of a richer one will attract a larger audience. Since people with lower financial capacities see a value in repairing their belongings instead of rapidly replacing them.

Avoiding dependency on one source of funding, diversifying the organisation's revenues if possible. For example, the organisation should try to build connections with businesses and not only depend on subsidies or donations from municipalities or EU funds.

Identify the motivation driving the non-profit: It is better for more socially oriented initiatives (e.g. related to community improvement) to have an organisation with a fixed space. If it focuses on environmental education and ideological switches in mindsets, it might be more reasonable to organise pop-up activities and events changing its location and reaching wider groups of people. A well-developed website serves the educational goals as well.

Marketing matters: It is important to allocate some time to advertise the organisation's activities on different media channels. According to the Fixatill's representative, the number of participants attending is significantly higher when the events are publicised on social media.

More engagement in **informational campaigns to change policies** to support the repair movement: It is important to allow repair organisations to provide information about their activities and explain the benefits of repairing broken products to people when they go to waste disposal sites. In the case of Sweden, it is currently prohibited to do this at waste stations. Another challenge for the non-profit repair movement is an easier access to spare parts. Changes in policy are still needed to make regulations friendlier to repair initiatives.

This chapter tried to make the first attempt to categorise the growing non-profit repair sector. The proposed typology reflects a division by generalised characteristics. There is a space for further studies on this topic, which can take into account other characteristics of NROs, to divide them into more precise subcategories.

References

1. Charter, M. & Keiller, S. (2016). The Second Global Survey of Repair Cafés: A Summary of Findings. The Centre for Sustainable Design. The University for the Creative Arts.
2. Cole, C., & Gnanapragasam, A. (2017). Community repair: enabling repair as part of the movement towards a circular economy. Nottingham: Nottingham Trent University and The Restart Project. Retrieved from: <http://irep.ntu.ac.uk/id/eprint/30462/>
3. Remakery Official website. (2018 December 14). Retrieved from: <https://www.edinburghremakery.org.uk/>.
4. Lyons, K. (2018 March 15) Can we fix it? The repair cafes waging war on throwaway culture. Retrieved from: <https://www.theguardian.com/world/2018/mar/15/can-we-fix-it-the-repair-cafes-waging-war-on-throwaway-culture>
5. Raggars, S. & Schickner, A. (2017). No Shared Vision for the Sharing Economy? Exploring the Transformative Potential of the non-profit Sharing Economy in Southern Sweden. Master Thesis. Lund University Centre for Sustainability Studies.
6. Charter, M. & Keiller, S. (2014). Grassroots Innovation and the Circular Economy. A Global Survey of Repair Cafés and Hackerspaces. Working Paper. Center for Sustainable Design. University for the Creative Arts.
7. Eastcott Community Repair Café & Free Shop. (2017 June 17). Retrieved from: <https://annabelgiraudtelme.com/2017/06/17/eastcott-community-repair-cafe-free-shop/>

ELECTRONICS COMMUNITY REPAIR IN SKÅNE

Barriers and Opportunities



By Carmen Huidobro, Brendan Pipkin, & Alejandro Valencia

In the Skåne region of southern Sweden, communities are working together to transition from a culture of consumption and waste to one of repair and reuse. Utilising community spaces to host repair events and activities, non-profit organisations are working with municipalities and local universities to help citizens be more sustainable consumers. For the city of Malmö in the region, community repair activity provides multiple benefits and is aligned with the city's sustainability goals of making it easier for citizens to do the right thing. Olov Källgarn of the Malmö Environmental Department explains that repair events support the “environmental programme focus of smart and sustainable consumption, where people can consume knowledge and spend time, instead of money to learn small-scale waste reduction, and have a social meeting platform that connects people around a common interest to have conversations about sustainability.”

Community repair has been growing across Sweden and Skåne, but a newly emerging trend is the development of repair spaces specifically for consumer electronics. Electronics repair is an increasingly important topic for strategic environmental development in the European Union and globally.

As electronics have become cheap and readily available, it is often easier for consumers to simply buy new products instead of repairing their old ones. However, discarded electronics often have just a small malfunction that can be fixed and are full of valuable and resource-intensive materials and components that are lost when discarded or recycled.

While producers must improve their products for longer lifetimes, and easier repair and reuse, consumers can contribute by only buying items they need and repairing what they have to extend product lifetimes.

The Skåne region provides an interesting case study on how existing community repair activities, often geared towards bikes or textiles, can inform the development of community repair organisations and activities for electronics.

Community Repair in Skåne

What are Community Repair Organisations?

The term Community Repair Organisation may refer to a wide variety of things, all the way from repair cafés, bike kitchens and maker spaces, all the way to workshops and events happening as often as twice a week to as seldom as once a year

(as is the case of Fixajulen, a christmas event that encourages repair and is organised by Malmö's Repair Café and the Swedish Society for Nature Conservation).

These repair spaces are (often) free meeting places where people socialise and work together with volunteer fixers, on repairing a broken or malfunctioning product. However, the activities carried out in these spaces are not only limited to repair. Rather, most repair spaces offer services for modification of clothing and the upcycling of electronic equipment (such as Electronicsmix's TV2lamp programme, which uses flat screen TVs with broken displays and turns them into lamps). This 'fixer economy' has existed for a very long time, especially with the clothing and car industries, but there is a new grassroots movement led by a set of organisations who are helping product owners to repair and prolong the useful life of their items.

There is a rise in people's interest to prolong the life of their products. According to the U.S. Census Bureau, the spending of American consumers and businesses on repairs increased by 16.42% (to USD 137,733,000 or EUR 121,819,000) during the year leading to the 2008 recession. Researchers have suggested that this increase could be due to consumers becoming more restrained in their consuming behaviour, which led them to try alternatives that would make products last longer, and to discarding the 'everything-is-disposable attitude'.

But, according to consumer reports, people often find having their broken products repaired to be too costly, inconvenient and at times frustrating. In contrast, the fixer movement appeals to the satisfaction and sense of empowerment that self-repair might bring to customers. During an interview, Noori Saber, owner of Electronicsmix and recurring professional fixer at Stenkrossen Lund, expressed similar thoughts as he frequently recognised that self-repair "gives people happiness and a sense of proudness."

Although studies conducted on the motivation for being part of these community repair organisations, show participants have interest in sustainability, this is not their main reason for participating. Instead, attendees are more interested in being a part of a community of people with similar interests and where they can be intellectually stimulated. But the motivation of participants pointing at mostly social gains should not distract from the great potential that such initiatives have in fostering a post-consumer and more sustainable approach to production and consumption.

Lund and Skåne Repair Landscape

As the circular economy moves up the policy agenda, the Skåne region of Sweden is developing a growing number of community repair organisations and initiatives aimed at facilitating consumer choice towards more sustainable consumption of goods and services, and following the 2014 EU Commission's communication titled "Towards a circular economy: A zero waste programme for Europe"

At the national level, the Swedish Environmental Protection Agency (EPA) has led a set of innovative competitions focused on organisational, business, design and technology development to increase the lifespan of products through repair and reuse.

In the Skåne region context, this interest in circular economy and product life extension manifests itself in the form of programmes funded nationally and by the municipalities under various initiatives (like solid waste or social engagement), or by the Interreg Fund (at the EU level). Places like Fixatit, Stenkrossen, Electronicsmix and STPLN Open Maker Space all survive partly by such funding schemes which allow them to pay for facilities and tools, while the human component is often voluntary or municipally funded.

These community repair organisations have generally focused on easy to repair items, such as bikes, furniture and textiles, but the fixer movement is expanding to the field of electronics repair. While many lessons can be learned from conventional repair spaces, electronics may be particularly important yet tricky to address.

Electronics Repair and Critical Raw Materials

“If we used every mobile sold this year for just one-third longer, we could prevent the yearly greenhouse gas emissions of a country like Singapore” -The Restart Project

Rapid innovation cycles and the current consumption patterns make electronic waste the fastest growing waste stream in most countries worldwide. Manufacturing electronics has huge environmental and social impacts, whether we recycle or not. Moreover, the recycling rates of many metals found in these electronic devices remain very low, creating a risk for supply availability of potential valuable resources. But... Which resources are these? Why is it important to keep them? And, if recycling rates are not enough, what is the alternative?

Many electronics and modern technologies rely on a wide variety of raw materials that are strategically important for the European and worldwide economies. These are known as Critical Raw Materials (CRMs), defined by:

- A significant importance for key sectors such as consumer electronics, technologies, health, and defence.
- A high-supply risk due to extreme import dependence and geopolitical location.
- A lack of viable substitutes for existing and future applications due to unique characteristics and functions.

CRMs can be found in many products that are used every day, such as the integrated circuits that drive many modern technologies. With their critical status and environmental impact related

to product-manufacture, CRM recovery is not only a matter of nature and climate protection, but also of key economic importance worldwide.

The environmental impact of most consumer electronics is highest during manufacturing and distribution even before they are used. This is something most consumers are not aware of. However, extending the lifetime of these products would decrease the need to purchase new ones, and in consequence, reduce the negative impacts on the environment and provide economic benefits.

Repair spaces play a key role in helping consumers fix those items that can still be used instead of thrown away. By sharing skills and experience, most items can potentially be repaired, from computers and home office goods, to electronic gadgets, household and kitchen items.

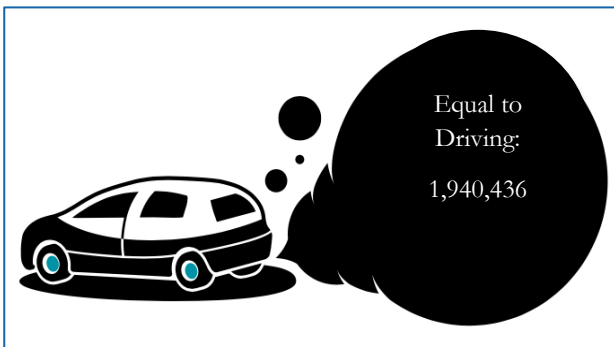
“Every time we extend a gadget’s lifetime, we space out and slow the impacts of manufacture. The fewer new items we buy, the more we limit greenhouse gas emissions, save water and avoid using minerals that are hard to mine and harder to recycle” - The Restart Project.

The Restart Project – London based “people-powered social enterprise that aims to fix our relationship with electronics” – reported over two years hosting 11,552 participants and 9,500 devices. 5,025 were fixed, 2,672 were still repairable and 1,803 were dead already. This amounts to a total of 3,673 kg of material waste and a total of 82,480 kg CO₂ emissions prevented during that period.

Laptops (containing CRMs such as palladium, rhodium, neodymium), mobile phones (magnesium, indium, gallium), and small kitchen devices (tantalum, gallium, platinum) are the most commonly fixed ones, as they are also the most commonly brought. In terms of fix rates, musical instruments, toys, headphones and lamps are most likely to be fixed. These repairs mean keeping the CRMs contained in them on the

loop, making the most out of them and preventing unnecessary extraction.

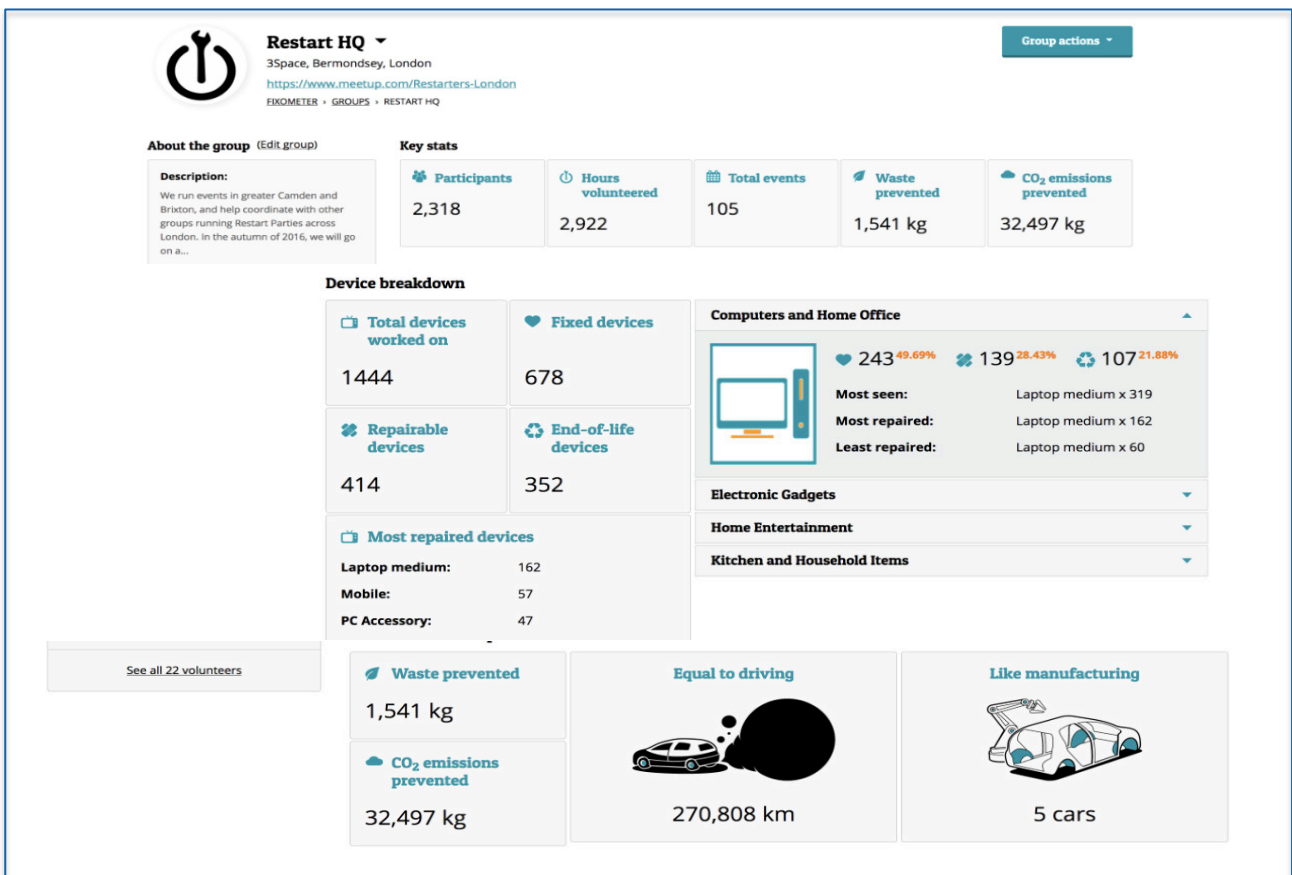
However, in order to fix an electronic item, sometimes a spare part is needed. Roughly 18% of repairs require spare parts, something that has opened opportunity for collaboration with operators of 3D printers, who can often make the precise spare parts needed.



The 13544 kg of waste and 82852 kg of CO₂ emissions prevented is like driving 1 940 436 km.

It is possible to measure the amount of items that are brought to each event and their environmental impact in ways that are both understandable and engaging, for e.g. Restart’s project Fixometer tool. This may help to raise awareness and encourage more participation, as their calculations and databases are open to the public, allowing any repair space to make their own analysis. Below (Figure 1) is the summary of repair events reporting their impact in the Fixometer tool so far – reported by the Restart Project Headquarters (Restart HQ).

Nottingham Trent University research with the Restart Project identified repair spaces as drivers of change and consumer empowerment. Their activities have potential to inspire and influence participants, demanding better products and supporting repair business. The Restart Project, iFixit and other community electronics repair organisations are providing knowledge for this activity to grow, as it may in southern Sweden.



Fixometer tool example of data tracking and electronics repair impact.

An Environment for Electronics Repair

What's Happening in Skåne?

The “fixer movement” in Skåne is beginning to apply the community repair organisation model to electronics repair through free workshops, but is at an early stage of development. There are just two regional organisations providing community electronics repair opportunities - Repair Café Malmö (in the City of Malmö) and Fixatill (in the City of Lund) - but their work is being watched and supported by a network of regional actors.

Repair Café Malmö is an NGO started in May 2017 that hosts electronic repair cafés twice a month. Fixatill is a community repair project run by the municipal waste department that hosts a textiles and general repair space, but has organised one electronics repair workshop and plans to do more. Both organisations' events are hosted in municipality supported cultural spaces that also host bike kitchens, “makers spaces,” and other community projects like waste education initiatives and food cooperatives. Partnerships with municipalities and local academic institutions help provide networks, knowledge, and exposure to foster growth of such electronics repair organisations.

These organisations can learn from established community repair organisations like bike kitchens and fix-it centres. For example, these have demonstrated the importance of accessible and visible locations, client-friendly operating times, diverse communications and outreach strategies, and occasional special events to attract new audiences.

However, there are differences that make community electronics repair more difficult than conventional repair. Electronics are highly variable in design and complex to understand, diagnose or fix. This requires more specialised expertise and tools to support community

electronics repair compared to things like bikes, textiles or furniture repair. Further, many electronic products are designed to be difficult to open and have limited repair information available - even the experts must search for product-specific information depending on the brand and model of a product.

This suggests that the communicated expectations of community repair should also be adjusted. Attendees should expect a fun learning environment through working on the puzzle of electronics repair - but with an understanding that the functional repair rate will be lower than the more reliably repaired bikes and textiles.

Regional and global learning networks can help improve the learning and repair levels of electronics repair. For example, repair organisers often encourage participants to use online resources during repair events, such as the website iFixit, which contains 20,000+ repair guides and receives about 115,000,000 visits annually.

Do they Contribute to Sustainability Goals?

While the level of repaired products is lower than in other repair spaces, there are broader benefits of community electronics repair. These organisations work in unison with government and academia to raise awareness about electronic waste and to normalise repair activities over the culture of consumption. Community repair is meant to encourage thought and conversations about the nature of electronics waste society, with a long-term goal of making repair accessible to consumers.

“These repair cafes work toward our goal of making it easier for citizens to do the right thing” -City of Malmö

Community repair aligns with social sustainability goals as well. Participants are sharing knowledge, learning new skills, and investing time for repair instead of just buying new products. This supports a new economy and those with less

financial means to currently afford private repair or new purchases.

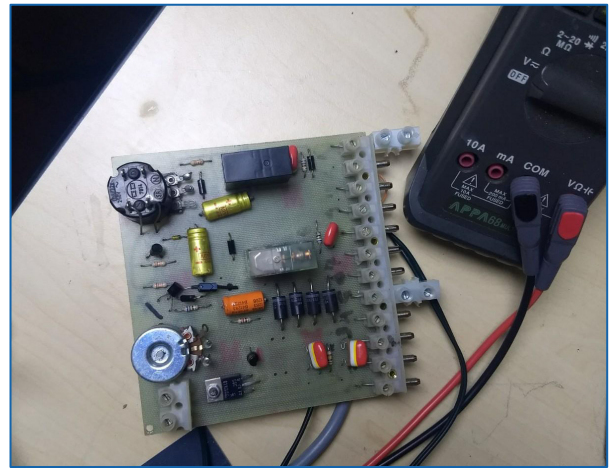
Connecting with local networks can strengthen the environmental and social benefits of the electronics community repair organisations. The electronics repair workshop in Lund, Fixatill hired Mr. Saber to facilitate its repair activities. Mr. Saber runs an electronics repair shop but is focused on community education. As a former physics teacher, he recognises the gap in skills and awareness that must be addressed for a circular economy. Through internship programmes that teach young people electronics repair skills, and by sharing his knowledge through community repair workshops, he hopes to contribute to the fixer movement. Importantly, he sees community repair not as competition but as education that is necessary to raise awareness of repair – which improves the market for local repair businesses like his.

“About 30 percent of the equipment we throw away can be repaired by a simple way, maybe changing one part” - Noori Saber.

So, community repair seems to be a promising component of the necessary shift to a circular economy. As they become institutionalised in cities the direct repair numbers are expected to increase. Meanwhile municipalities are recognising the benefits of fostering electronics repair through providing space, exposure and funding through environmental and cultural programme. Surveys in the Skåne region show a growing willingness to repair electronics, and community repair organisations can help to address barriers of knowledge and cost.

Yet in order to have a real impact on extending product life spans and changing consumption behaviours, it is important that these repair spaces expand their audience. Typical attendees are already aware of consumption and electronic waste issues (and thus already seek out such

opportunities). Integrating electronics repair events into spaces with a larger reach may help cities to provide better exposure. Public libraries and schools are great places to start, as they have steady communities already focused on learning and engagement to some extent. This has proven successful for community electronics repair elsewhere and would provide visibility to attract new attendees.



While the emerging scene of community electronics repair differs from existing repair activities, there is a developing network of public, nonprofit, and some private support for these spaces, that provide a welcoming landscape for further development. If these groups can work together to position electronics repair in the existing culture of community organisation and consumption practices, then electronics repair is likely to accelerate circular economy practices.



Summary

Looking at the Skåne region as a whole, it seems community repair organisations have a role to play in developing a circular economy. Community repair provides support and education for extending product life spans, as well as, social benefits. However, the complexities of electronic products suggest a different set of expectations for community electronics repair compared to conventional products like bikes, textiles, furniture, etc. Though it may be tougher to repair each product brought to electronics spaces, if fostered, their impact can include raised awareness of the right to repair and overconsumption and better access to product information. However, this will require continued strategic support for community repair organisations and of electronics in particular. Along with policy development for better product design and resource recovery programmes, these spaces can help consumers contribute to a better economy.

Recommendations

- Continue supporting electronics repair spaces and events.
- Utilise existing community spaces like libraries or schools for new audiences.
- Increase communication and social media coverage. Share the impact!
- Focus on social and community aspect to draw attendance (create nice spaces to be!).
- Scale up! Gather data and plan strategically

References

1. André, H. (2018). Resource and Environmental Impacts of Resource-Efficiency Measures Applied to Electronic Products. Thesis for the degree of licentiate of engineering, 1-4.
2. CE100. (2016). Empowering Repair. Ellen MacArthur Foundation.

- <https://www.ellenmacarthurfoundation.org/assets/downloads/cc100/Empowering-Repair-Final-Public1.pdf>
3. Chapman, A., Arendof, J., Castellana, T., Thompson, P., Willis, P., & Espinoza, L. et al. (2013). Study on Critical Raw Materials at EU Level. DG Enterprise And Industry, 5-16.
 4. Charter M., Keiller S. (2014). Grassroots Innovation and Circular Economy: A Global Survey of Repair Cafés and Hackerspaces. The Centre for Sustainable Design
 5. Culture of Repair.
<https://www.cultureofrepair.org/variations-on-a-theme-the-vision/>
 6. Restart Project
Fixometer .<https://therestartproject.org/fixometer/>

LOCAL GOVERNANCE OF COMMUNITY REPAIR ACTIVITIES

How to Support Community Repair Organisations? Recommendations for Municipalities

By Stefanie Berendsen & Sofia Cavalleri

Repairing personal belongings is rare in today's throw-away-society. Yet, changing consumption attitudes is crucial if we want to restore our planet's health. Prolonging a product's life through repair is the sustainable choice: it decreases waste generation as well as the need for raw materials.

But repair activities do not only have environmental benefits, repairing as a community activity brings citizens together and helps them save money for new products. While the environmental, social and economic benefits are widely recognised, most citizens still throw away their broken products than take action.¹

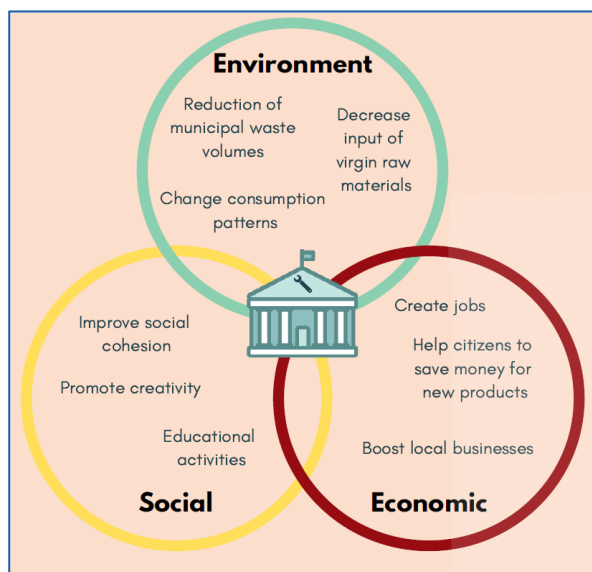
To promote the practice of repairing, community repair organisations (CROs) are popping

up all over the world. Since 2009, for example, more than 1600 CROs under the Repair Café umbrella have been established. The Repair Café umbrella is an example of an international platform promoting the foundation of local community repair activities.² By providing space, tools, and knowledge, CROs aim to empower citizens to repair their products giving them a longer life. CROs raise awareness about the importance of repairing while integrating it into the community life. To reach these goals, CROs follow different strategies and organisational systems. Yet, they are facing similar challenges related to operating smoothly and having an impact.

Today, many municipalities pursue a set of sustainable development goals in their local agenda, such as waste reduction, social cohesion, environmental education, or changing their residents' consumption patterns. Municipal action plans are largely informed by national and international agenda. In Sweden's national waste plan, for example, repairing is highlighted as a key strategy to increase resource efficiency.³

Since municipalities are closer to the citizens' daily lives, they play an important role in reaching targets. As CROs mostly operate on a local scale, municipalities emerge as a key stakeholder. The development of CROs is dependent on the governance modes chosen by the municipality.

Thus far, municipal governance of CROs has received very little attention in academic litera-



Integrating community repair activities as opportunities for municipalities.

ture. Therefore, it is important to investigate how CROs are governed: *Are repairing initiatives supported, restricted or even initiated by the municipality? How are interactions currently characterised and what could be improved in the future?*

To answer these questions, our team investigated the relationship between municipalities and different CROs in three cases: Trento (Italy) and Lund and Malmö (Sweden). The analysis is based on data acquired from literature review and interviews with representatives from municipalities and CROs.

Based on the analysis, we will provide recommendations to both CROs and municipalities to maximise the benefits of community repair.

This research builds on literature on the municipal governance of urban sharing organisations (USOs). For USOs, several modes of municipal governance have been identified in the literature: self-governing, governing by provision, governing by enabling and governing by authority.⁴

USOs and CROs have many common characteristics: both concepts aim to increase resource efficiency and pursue environmental, social and economic goals. Since sharing and repairing are relatively new concepts for municipalities, they often lack governance expertise. This framework has been adopted for the case of community repair and further developed to better understand the relation between municipalities and CROs.

Modes of Governance: Municipalities & CROs

Governing by Initiating

By initiating repairing activities for citizens, the municipality owns the project, it comes up with the idea, carries all responsibilities and leads as the main stakeholder. This governance mode could not explicitly be found in the literature on urban sharing organisations, so the framework has been modified.

This governance mode is recognisable in the municipality of Lund, specifically in its waste management department. One approach to reach a municipal waste reduction target of 2% is promoting repairing activities among citizens. The target led the waste department to establish the repair forum “FixaTill”. FixaTill runs a workshop equipped with tools and knowledgeable staff, providing citizens with the necessary infrastructure and skills to repair their broken belongings. The initiative also hires external experts, such as owners of local repair businesses, to run free-of-charge workshops on repairing special items like electronics.

Besides reaching waste reduction targets, the prospect of being a frontrunner municipality for community repair activities is a main motivation for Lund.

According to municipal staff, FixaTill is thus far very successful. Citizens show great interest, with many making frequent use of the facilities. The municipality is financing the project for another two years, with a possible prolongation depending on its success. The municipality measures the progress by keeping track of participant numbers and conducting surveys on repair attitudes. The Lund example shows that the local government can successfully act as the main initiator of repair activities, given that repairing fits their local sustainability agenda or connects to specific municipal goals. With initiating CROs like FixaTill, municipalities can make important first steps to spark interest in repairing among the public. This may result in spin-off CROs functioning independently.

Governing by Provision

In this governance mode, the municipality provides the CRO with certain resources or services. A provision for the CRO can be in the form of financial means, such as grants or payments of rent or salaries. Alternatively, a municipality can decide to support the CRO

with equipment, space for hosting activities or make other municipal resources available.⁴

For Lund, half of the funding necessary for the FixaTill activities (salaries, rent, equipment, workshops, etc.) comes directly from municipal funds, while the other half is provided by European Union funding (Interreg Europe).

A municipality can also act as funder by providing independent CROs with the financial means to start up their activities. In Lund, for example, the CRO “Electronicsmix” received a one-time grant. The independent CRO “Repair Café Malmö” received similar financial support from the municipality.

Besides providing funding for FixaTill, Lund municipality also acts as a host by making space and resources in their local community centre “Stenkrossen” available. A similar situation can be observed in the municipality of Malmö, where the Repair Café Malmö is regularly hosted in the municipality-owned com-

munity centre “STPLN”. The governance mode of provision is highly valued by all interviewed CROs.

Without the provision of grants and space, many CROs would struggle to exist in the first place. Yet, some CROs see it as a challenge to find out whether and for what type of municipal provisions they are eligible.

The interviewed CROs also expressed concerns regarding their long-term viability. Although it was repeatedly mentioned that the interest in CROs is increasing among citizens, many CROs lacked a strategy to provide for their future existence and anticipated growth. Some CROs suggested that it would be helpful if the municipalities communicated their long-term intentions more clearly.

Governing by Enabling

This governance mode is less resource intensive than governing by provision. Here, the



Municipal governance modes for repairing activities. Based on a framework developed for urban sharing organisations⁴ and adopted for community repair organisations.

municipality actively supports repairing activities by acting as a communicator, match-maker, or partner. This includes support in the form of co

ordination, communication, promotion, public education, awareness building, and facilitating partnerships.⁴

In Lund, the municipality encourages participation in the repair activities by promoting FixaTill through channels like the newsletter of the municipal waste company. It also encourages educational activities of FixaTill to schools and other institutions. Lund municipality acts as a promoter by communicating the efforts of FixaTill with other municipalities and relevant stakeholders. For example, Lund facilitates projects with the CROs in the nearby city of Malmö and research projects with universities.

The city of Malmö has also been emerging as an enabler for CROs, as repair aligns with the environmental goals of the city. Malmö has developed an ambitious Environmental Programme, aimed at making the city smarter and more sustainable in the next couple of years. The municipality's vision is to help citizens to make sustainable consumption choices. The Environmental Programme states that “[by 2020] consumption of material goods will have decreased. Malmö's citizens will maintain a high quality of life despite minimum use of resources”.⁵ This is why the city has become increasingly interested in strengthening its relationship with local CROs to change citizens' consumption behaviour.

The city of Malmö is also focusing on involving various actors to facilitate community engagement of CROs. For instance, schools and libraries have been identified as the main communicators, providing information to citizens about CROs.

As described, some municipal efforts to enable CROs can be identified in the case study municipalities. Yet, all CROs interviewed for this project indicated an even stronger involvement

of the municipality as an enabler would be essential for their viability. For example, the CROs value to be integrated into the municipality's network. By being connected, CROs hope to learn from other community organisations, strengthen their competences and set up collaborations.

All CROs mentioned that it would be helpful if their repairing activities were integrated into as many municipal departments as possible. Thus far, repairing is often perceived as an activity leading to environmental benefits, and thus mainly integrated into the waste or environmental departments. Yet, CROs also see themselves as beneficial when it comes to strengthening social cohesion, helping citizens prevent costs for new products, and bring out their creativity. Thus, CROs think that repairing has the potential to run like a red thread through different kinds of municipal departments.

Governing by Authority

With this governance role, the municipality uses its formal authority to restrict or regulate certain activities through laws and policies.⁴ The ability to pass their own formal regulations for local organisations is highly dependent on the national context.

When it comes to the operation of CROs in Sweden, the authority of the local governments is highly influenced by national or international regulations. For example, regulations dealing with health and safety are highly relevant for CROs, as their activities involve tools and electronic equipment. Health and safety regulations are, however, decided at the national level and merely implemented by municipal authorities.

The municipality plays a unique multi-scalar role, it both mirrors the needs of citizens and local actors and implements national goals through its municipal agenda. Yet, this status of the municipality is not always recognised by the independent CROs. When existing national regulations cause issues, the municipality is

identified as a first access point for complaints or ideas for improvement. CROs would welcome it if municipalities support them by acting as communicators for their struggle with national regulations.

In the case of urban sharing activities, some organisations expressed concerns about the lack of municipal regulations.⁴ USOs would actually welcome legal clarity, as it could help them prevent confusion and legal problems. None of the stakeholders interviewed for this project expressed similar concerns, but as CROs mature, similar issues might arise.

In some cases, municipal authority is more perceived than based on formal laws. For example, independent CROs that heavily rely on the municipality for the provision of funding, space or materials, may perceive existing policies as a limitation. An independent CRO in Malmö, for example, perceived the opening hours of the hosting community centre as a limitation.

Recommendations for Municipalities & CROs

Our analysis showed that despite the increasing integration of repairing into the communal life, there is still room for improvement for the governance of CROs. In the following sections we provide five recommendations to maximise the benefits that come with a lively repair community.

Recognise Opportunities of Community Repair

To boost community repair, it is crucial that municipalities are well informed about the environmental, social and economic benefits. Ideally, the municipality would investigate those for its local context and clearly state the opportunities in their local agenda and action plans. A common vision and clear targets, as in the case of Malmö and Lund can work as a catalyst for the development of CROs. Recog-

nition is a motivation for municipal departments, independent organisations or individual citizens to get involved.

A clearly defined vision and link to tangible

Trento's Repair Cafe: an Emerging CRO

The city of Trento ranks high among Italian cities for both quality of life and standard of living; emerging as a best practice example of smart and sustainable municipal planning.

Nonetheless, repair cafes have not been integrated in its environmental agenda yet. So far, a CRO is emerging in Trento as a grassroot, bottom-up phenomenon. Yet, the municipality has not been formally involved in its development.

The CRO was brought to Trento by the association "Carpe Diem" and the cooperative "Kaleidoskopio", which decided to visit a nearby CRO in Austria, and replicate the same idea in Italy. This year, Trento's Repair Cafe has attracted the interest of various important community organisations, increasing the number of its promoters.

In order to maximise the benefits of Trento's CRO, to the local community, it would be crucial for the municipality to get involved. By strategically governing the local CROs, the municipality could become one of their main supporters. The aim would be to transform the local CRO from a volunteer-run event happening twice a year to a permanent service. Currently, the CRO is forced to rely on a private café to host their activities. In the future, being granted access to a permanent space would be an asset.

For this, Trento could learn from the successful examples described in this report. The cities share many similarities, for example population size and being hosts of

targets allows a municipality to steer and maximise benefits. If a municipality is not proactive, there is a risk that commercial entities dominate repair opportunities for citizens. This can lead to exclusion of citizens and may force municipalities to follow a reactive strategy.⁴

Integrate CROs in more Municipal Departments

Many CROs feel that especially social, economic and cultural benefits are under-recognised. By only focusing on environmental issues, municipalities risk missing other potential benefits. Here, internal communication and promotion is essential for the municipality, repair activities ideally run “like a red thread” throughout the municipal departments.

Improving internal integration also enhances the role of the municipality as a communicator and matchmaker, which further supports CROs. For example, CROs could be integrated in departments dealing with business development, public education, culture, youth, and community care.

Clarity Regarding Available Support

Like many other local actions for sustainable development, community repair is just starting to attract attention. The municipality plays an important role in ensuring consistency by providing clarity regarding the availability of provisions. For example, by publishing clearer guidelines regarding funding opportunities and availability of space.

The municipality can actively identify contact persons and minimise confusion regarding administrative barriers. It is crucial that interested parties are well informed about their eligibility for funding or being hosted by the municipality.

In the case of Trento, for example, the existing CRO is struggling to establish contact with the municipality to identify how to be supported.

From the interviews, it is clear that especially in the start-up phase, municipal support can be the decisive factor determining the very existence of a CRO.

Even if a municipality cannot offer provisions in the form of grants or space, support through enabling is essential for the development of a CRO. Municipalities can offer networking opportunities, connect CROs with relevant players and offer communication channels.

Consistency and Long-Term Planning

Today, many CROs are still in their experimental stage, rather than being well-established organisations. The interviewed stakeholders expressed concerns regarding viability of CROs, because they largely lack a long-term strategy. Therefore, it is important that enthusiasm for setting up community repair activities is met with clear signals from the municipalities.

It is also important to provide clarity regarding regulations and policies that influence repair activities. As most of those are decided on the national level, municipalities can use their position to communicate with the relevant national and international institutions. This helps CROs to get their message across and lobby for regulations that support their activities.

It is crucial for a municipality, however, to minimise the risk of being too dominant in the long-run. A dominant municipality can slow down the development of independent CROs. This may become a problem in the long-term if the municipality decides to set different priorities.

When the municipality acts as the initiator, it is crucial to strategize early on about the transitions necessary to sustain CROs in their next development phase. Relevant strategies can include delegating activities, involving independent CROs and motivating citizens to take initiative.

Boost Repair Activities on All Scales

To cause behavioural shifts regarding consumption, it is important to establish repairing activities as “normal” beyond the borders of the municipality. Here, the municipality can use its network to communicate a new way of thinking about waste to a broad audience. For example, the municipality can host networking events, or invite CROs to be part of the school curriculum.

As discussed, many regulations, policies and action plans relevant to CROs do not directly fall under municipal authority. For example, laws that regulate the right to repair or eco-design principles fall in the responsibility of national or international institutions. It is therefore important that the municipality uses its network and authority to communicate the challenges of CROs to relevant stakeholders.



Summary of recommendations for future governance.

Conclusions

There is no doubt that fundamental shifts in consumption behaviour are necessary to reach

sustainable development goals. This research has highlighted the importance of collaborative relationships between municipalities and local repair organisations. We hope that both CROs and local governments will find the recommendations useful when designing their strategies to promote community repair.

While this research has offered first insights into this topic, but greater efforts are needed to deepen our understanding on how community repair can flourish in the future.

All stakeholders are needed to invest in successful relationships and we hope this project has presented inspiring examples for constructive collaborations.

References

1. Ellen Mac Arthur Foundation. (2016). Empowering Report. Retrieved from <https://www.ellenmacarthurfoundation.org/assets/downloads/ce100/Empowering-Repair-Final-Public1.pdf>
2. Potsma, M. (2015). *Weggoien? Mooi niet!* (1st ed.). Samenwerkende Uitgevers Vof.
3. Naturvårdsverket – the Swedish Environmental Protection Agency. (2013). Together we will gain from a nontoxic, resource efficient society The Swedish Waste Prevention Programme for 2014 to 2017. Retrieved from <http://www.naturvardsverket.se/Globalmeny/Sok/?query=978-91-620-0000-0&Naturvardsverketpn=2>
4. Zvolska, L., Lehner, M., Voytenko Palgan, Y., Mont, O., & Plepys, A. (2018). Urban sharing in smart cities: the cases of Berlin and London. *Local Environment*, 1–18. <https://doi.org/10.1080/13549839.2018.1463978>
5. Malmö City Council, 2009. Environmental Programme for the city of Malmö 2009-2020. Retrieved from <http://malmo.se/download/18.6301369612700a2db9180006227/Environmental-Programme-for-the-City-of-Malmo-2009-2020.pdf>

LIST OF ABBREVIATIONS

BAN	Basel Action Network
CRM	Critical Raw Material
CRO	Community Repair Organization
CWIT	Countering WEEE Illegal Trade
ECC-Net	European Consumers Centres Network
EEE	Electric and Electronic Equipment
EoL	End-of-Life
EPA	Environmental Protection Agency
EU	European Union
GPS	Global Positioning System
IT	Information Technology
NGO	Non-governmental Organisation
NRO	Non-profit Repair Organization
OEM	Original Equipment Manufacturer
SWOT	Strengths, Weaknesses, Opportunities and Threats
UEEE	Used Electric and Electronic Equipment
UK	United Kingdom
USA	United States of America
USO	Urban Sharing Organization
WEEE	Waste Electrical and Electronic Equipment Directive



THE INTERNATIONAL INSTITUTE FOR INDUSTRIAL ENVIRONMENTAL ECONOMICS (IIIEE)

Established in 1994 by the Swedish Parliament, the International Institute for Industrial Environmental Economics (IIIEE) is a leading international research and teaching institution pursuing strategic preventative solutions in sustainable development. As part of Lund University, the IIIEE offers graduate and postgraduate programmes in a multidisciplinary environment, focusing on pragmatic approaches to foster the transition towards an environmentally conscious society.

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ACKNOWLEDGMENTS

This year the MESPOM cohort 2017-2019 ventured into the fascinating topic of exploring reuse, recovery and recycling as strategies to keep critical raw materials in the loop and move towards a more resource-efficient economy. This insightful journey involved gathering and analysing grey and scientific literature, and collecting data through field visits and interviews with different stakeholders from five countries in Europe. This allowed us to acquire a comprehensive picture of the current situation concerning reuse, recovery and recycling of electronics and future outlook.

We would like to extend our sincere gratitude to Dr. Thomas Lindhqvist and Jessika Luth Richter of the International Institute for Industrial Environmental Economics (IIIEE) at Lund University, whose feedback and support guided us throughout this research process and report delivery. In addition, we would like to express our appreciation and special acknowledgment to the ten people we interviewed during this process. Their willingness to provide their time to actively engage in discussions, sharing their expertise and valuable insights on the topic, has been a vital contribution for this report:

Anne Kvithyld, Senior Research Scientist of the Metal Production and Processing Department, SINTEF; Rafael Martins and Francisco Veiga Simão, Co-founders of WEEE-DO; Laura Rodrigues, Co-founder of eVastum; Olov Källgarn, Environmental project leader, Municipality of Malmö; Vittoria De Mare, Association Carpe Diem - Trento; Dolores Öhman, Chairperson of the Board of Directors at Folktandvården Skåne; Matilda Öhgren, Manager, Fixatill; Louise Linne, Founder, Repair Café; Noori Saber, Founder, Electronicsmix.

The time, engagement and guidance provided by the above-mentioned people, have enriched the arguments presented in this report, and enlightened our experience during the process. We will always be grateful for their dedication.



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