Reuse, Repair, Socialize - Experiences in the capital region of Victoria with Repair Cafés

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After graduating from High School in Germany, I seized the opportunity to conduct an internship at the University of Victoria (UVic) in the department of Geography within the ongoing project “Mapping Waste Governance”, under the supervision of Professor Jutta Gutberlet.
This report originated from this internship.

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Content

1 Introduction

Humans strive to invent new technologies that enable them to achieve things they were not capable of before or ease certain aspects of their lives. This underlying technological process was observed and modelled by Kondratieff. In his model, each new cycle represents a major innovation, which shifts the main-focus of the industry towards a new product and production method. Kondratieff's model shows that the interval in which major innovations occur has become shorter. The las cycles consequences, the age of information technology, are unmissable.

Increasing material prosperity, not only in the "Western" world, but also in other parts of the world, most notably Southeast Asia, set as a necessity by the globally adopted capitalistic approach led to more people being able and/or willing to purchase items that go far beyond basic human desires. Vergara & Tchobanoglus (2012, page 5) argue "as people gain wealth, they tend to throw more away, and the materials discarded are more complex". In other words, through the diversification of our desires, we have created the need for more complex production to fulfil these desires, thus diversifying what we leave behind, namely our waste.

These two aspects: (1) decreasing time between two major innovations, as well as the number of inventions in one Kondratieff-Wave; and (2) increasing material prosperity, in conjunction with the paradigm of growth adopted by industrializing nations, (comp. Becker/Scheumann/Dietrich 2014, page 48). This paradigm puts pressures on those willing to reuse or to consume less than socially demanded. Casting the desire to consume less as anti-social, in the sense of actively working against a functioning society, has led to the increased rapid consumption within the global community. This results in an intensive and continues extraction of resources, which puts ongoing strain on ecological systems, and harms humans in those parts of the world that function as sources for materials, place of production, and place of dismantling at the end of devices lifecycles.

This report presents my findings regarding multiple aspects of sustainability and electronics. Firstly, I will look into Canadian initiatives brought into life in order to handle End-of-Life-Electronics (hereinafter called EOLE) in an environmentally sound manner. The Canadian organisation, Electronic Products Recycling Association (hereinafter called EPRA), coordinates its projects on a provincial level and is one of the biggest Non-Profit-Organisation (hereinafter called NPO) taking an active role in E-Waste management. To achieve a more in-depth comparison, I will focus on the provinces British Columbia and Québec.

Secondly, I'll propose two ideas to tackle ecological and social problems occurring over the lifetime of electronics. Ecological challenges include the excessive use of virgin resources and the high amount of resources used during periods of high production. The social dimensions of electronics include the exploitation of humans over the lifetime of electronic devices. Beginning with the extraction of resources in crisis-ridden countries, continuing with poor working conditions in manufactories in Asia, and ending with people in developing countries, mostly in Africa and South Asia, extracting recyclable components from electronics, which often involves burning them. Improvements have been made, for instance, self-imposed principals of not using noble earths and other resources extracted in crisis-ridden countries and the Basel-Convention, but are not sufficient enough to counter the abovementioned problems. Moreover, the ecological dimension can hardly be approached by these initiatives and require, first and foremost, the reduction of new items being introduced into our business cycle.

Thirdly I will refer to an emerging bottom-up movement spreading across the globe which brings citizens together to meet, exchange knowledge, expertise and sensitizes them about a seemingly forgotten activity: repairing. Repair Cafes offer a platform for people not willing to toss away malfunctioning goods, be it due to emotional bonds, or the will to keep resources out of the waste stream. The Repair Café movement will be examined by two approaches: First, the potential environmental benefits and second, the movement itself on the global, as well as on the local level.

2 Management of End-of-Life-Electronics in British Columbia and Québec

The amount of electronic devices sold fluctuates from year-to-year; global sales decreased 19.18 percent from 538.23 million units in 2014 to 435 million units in 2016 (comp. statista.com). It is important to note that this downfall does not imply, that we, as a global community, are experiencing a trend towards responsible consumption. Rather, electronic technology has improved over the past few decades in regards to weight, power consumption, and the reduction of harmful materials, like heavy metals (comp. Electronics Product Stewardship Canada 2017, page 3-4). These improvements seem to justify the rapid consumption of electronics for parts of our society.

2.1 E-Waste Management in Canada

Canada's approach towards a responsible and environmentally-sound manner of handing EOLE does not rely on the federal government being accountable for collecting and dismantling electronic devices, and conducting public relation work. These tasks have shifted towards provincial and territorial governments, with the federal government participating through legislating the framework in which above mentioned activities are taking place (comp. Vossenaar/Santucci/Rammungul 2006, page 88). The results in multiple NPOs collaborating with provincial governments, with different levels of participation from retailers, manufacturers and the public.

In 2010, Canadian citizens disposed over 4,505,250 tonnes of non-hazardous residential waste (Statistics Canada 2010, page 16). This excludes certain types of waste for instance, waste that is managed by citizens through backyard composting and similar activities. Some waste therefore never enters formal waste streams in the first place. As well as non-residential waste which is defined as "[M]unicipal solid non-hazardous waste generated by industrial, commercial and institutional sources as well as waste generated by construction and demolition activities" (comp. Statistics Canada 2010, page 37). Adding the aforementioned non-residential waste, which makes up for approximately 45 percent of the total amount of non-hazardous waste entering the waste stream, Canada produced slightly more than eight million tonnes of waste in 2010. In British Columbia, paper fibre and organics make up for the biggest share, approx. 528,000 and 378,000 tonnes respectively. Unfortunately, data about e-waste is suppressed for most provinces, including British Columbia due to confidentiality concerns (Statistics Canada 2010, page 18), therefore making a comparison between the EPRA and government-issued figures impossible and prevents the ability to determine the share of NPOs like EPRA in a province like British Columbia.

Not only does the amount of waste diverted per capita vary from province to province, the amount of money spent to achieve this diversion also. Waste diversion is an essential part when it comes to the "how" of treating waste, both with and without an economic-consideration. For efficiently recycling materials, they need to be pre-sorted. Unsorted waste loses the ability to function as a viable resource for the business sector, as it creates higher expenses on the entrepreneurs' side.

EPRA, a NPO that runs recycling programs across Canada with stakeholders form the industry (comp. epra.ca), currently operates and manages programs in the Canadian provinces of British Columbia, Saskatchewan, Manitoba, Québec, Nova Scotia, Prince Edward Island, Newfoundland and Labrador and New Brunswick. EPRA has also managed the "Ontario Electronic Stewardship"-program since 2013 (Electronic Products Recycling Association 2016, page 2).

Electronic devices have become lighter overall. This is not only repeatedly mentioned, but often praised as the key-factor, sometimes as the only one, as an initiative aimed at reducing the ecological strain that electronic devices put onto the environment. As such, Craig Wisehart (2016), executive director of EPRA in Western Canada, states, "[…] lighter, smaller electronics are replacing the older, heavier electronics that we collected in the past. This is good news for the environment. Since "Reduce" is the first element of the "3R's" […]" (Electronic Products Recycling Association 2016, p. 6), the mentioned abbreviation "3R's" stands for "Reduce, Reuse, Recycle". The reoccurring trend of mentioning the reduction of weight and energy as being the only way to reduce greenhouse gas (hereinafter called GHG)-emissions roots from the following mentality: a significant reduction of new items being purchased and thus being recycled, conflicts with the business model of recycling facilities and retailers. This viewpoint is partially represented in organisations like EPRA, because of economic interests.

2.2 EPRA's Activities in British Columbia

In 2016, EPRA British Columbia collected over 19,500 tonnes of e-waste (about 4 kg per capita). This nineteen and a half tonnes of e-waste was dropped off at one of the 261 collection sites, which can be accessed within 45 minutes or less by 98 percent of BC's population. The relatively long time it takes to reach a collection facility can be explained by the low density of collection facilities of just 0.00027 EPRA-collection sites per km^2. It seems as if this does not affect EPRA and its partners in a bad way. One reason might be the excessive use of the automobile, which makes it convenient to transport goods over long distances. Additionally, EPRA is not the only organisation which offers recycling services. Surprisingly, only 75 percent of BC's population know how to handle EOLE in an environmentally sound manner (comp. Electronic Products Recycling Association 2016, p. 6). Lack of knowledge around EOLE may result in a large count of end-of-life electronics in landfills, where their contained toxins further harm the environment.

2.3 EPRA's Activities in Québec

In 2016, EPRA Québec presents similar figures. They collected almost 19,700 tonnes of electronics. In addition, more than 1,800 tonnes were collected for reuse. This additional program can only be found in Québec. Those 21,525 tonnes in total convert to an average of 2.4 kg collected per capita. All of these EOLE in Quebec were dropped off at one of their 966 collecting sites, resulting in a density almost three times as high compared to British Columbia's, with 0.00062 sites per km^2. Due to Québec's higher density of drop-off sites, 99 percent of the population can access collection sites in 45 minutes or less. The percentage of people knowing how to handle EOL electronics in an environmentally sound manner lays at 79 percent with the potential for the same abovementioned consequences.

2.4 Comparing British Columbia and Québec

Before further comparisons, it is useful to have some basic information about teach province. British Columbia has a total area of 944,735 km^2 and a population of 4.6 million. This results in a density of just over 5 capita per km^2 (wikipedia.org). Québec has a total area of 1,542,056 km^2 and a population of 8.1 million. This results in a density of almost 6 capita per km^2 (wikipedia.org).

Québec, while being over 63 percent larger than British Columbia, has not only a higher amount of recycling collection sites but, a higher density as well. Whatever the underlying reasons may be, it is reassuring to see the program, which started five years after the BC-recycling program, gaining popularity. On the other hand, having more collection sites does not benefit the goal of collecting as much EOL electronics as possible, which is made evident through the small margin between the tonnage of recycled goods in British Columbia and Québec.

In addition to its recycling program, EPRA-Québec has a reuse-program as well. Keeping still functioning electronics out of recycling facilities has multiple benefits. For instance, refurbished hardware can be sold at a cheaper price, while simultaneously saving GHG-emissions. Both of these factors may appeal to consumers. As a result, implementing reuse-programs into other EPRA-programs would be a pleasant development.

The discrepancy in the expenses per tonne between EPRA-British Columbia (1,019$) and EPRA-Québec (1,148$) occurs for two reasons: higher expenses for communicating with the population and high administration costs. Québec's expenses in those fields are approx. 3.5 million dollars and 2.6 million dollars respectively. They exceed BC's by far. The amount of 774,002 $ was spent on raising consumer awareness and 1.6 million dollars was spent on administrative tasks in BC. However, the money spent by EPRA-British Columbia on "direct operation" (Electronic Products Recycling Operation 2016, page 6) exceeds the amount EPRA-Québec has spent.

EPRA-Québec organized over 125 events in 2016 together with various partners. Those events are a great way to personalize the topic "Recycling and Reusing" and give people an opportunity to not only associate instructive messages with this, but a discussion based introduction into sustainable action.

3 Social Innovations tackling occurring problems with EOLEs

In the recent past, East and Southeast Asia have experienced population growth and rapid economic development. At the same time, "Western" countries have continued to consume in large quantities. This means on a global scale, there has not been a decrease in the extraction and usage of resources. Such decrease in consumption seems only achievable with the trigger of a societal "impact". This may take a variety of forms, and preferably originates from a socio-economic paradigm shift initiated from within society. This chapter will discuss examples of impulses that are sufficient enough to have a positive and lasting impact on social, ecological and economic systems.

3.1 Social and Ecological Effects of Electronics

The status quo for the social dimension of consumption trends can be described as follows: humans in Africa and Asia are being exploited to different degrees. For instance, their contribution to the global electronics cycle consists of extracting necessary resources for the production, manufacturing of products, and often the environmentally-damaging and health-risking dismantling of EOLE. Dismantling EOLE often involves openly burning them in order to regain margins of the used resources: fairly easily accessible metals. While improvements are being made in some regards, e.g. the Basel-Convention and self-imposed restrictions, often regarding the sources of the resources and human exploitation in Africa, other aspects, for example the working conditions in Asia, do not receive as much attention.
As for the ecological dimension, even though major improvements in power consumption and resource efficiency are being made, an increasing number of individual electronic devices are being manufactured and sold globally. Therefore, the potential environmental benefits are insignificant.

Solely looking at ecological and social dimension leads to the neglect of economic aspects, thus representing an incomplete discussion of sustainability under the common definition of sustainability represented by the triple bottom line.

3.2 Alternative Solutions to Reducing Environmental Effects of Electronics and the EOLE-Management

The ongoing discussion about the ecological impact of electronics mostly focuses on how to design items more efficiently. However, this should not be the centre point of the debate; attention should be given to the reduction of newly sold items and to an overall decrease in items in circulation. As stated in the article by Johannes Dietrich and Frank Becker (2011), *ReUse-Computer* –

Wiederverwendung hochwertiger IT-Technik als nachhaltige Nutzungsstrategie (ReUse-Computer – Reuse of high grade IT as sustainable strategy of use), the overstressing increase of manufactured goods, not only electronics, leads to a proportional increase of resources and energy expenses, which puts an enormous strain on the environment. Furthermore, purchasing a power efficient electronical device or other good, that seems to be ecologically wiser in one or more aspects, functions as a replacement for an operational device. Our constant strive to only use the most ecologically friendly product, ultimately results in a higher number of still usable pieces of technology being put out of use. The necessary overhaul of our approach towards a sustainable economy and sustainable consumer behaviour seems to just be entering the main stream paradigm with reused goods and share and repair movements acting as prime examples for that.

This raises questions about why the vast majority of people seem to see the only potential for consuming goods/electronics responsibly by using state of the art technology, instead of prolonging the life of an already used item. One possible underlying reason might result from people not being aware of the aforementioned problem, which is likely to be fostered by the newer-is-better mentality. It is remarkable how many people advocate for ecologically responsible behaviour own the latest, or one of the latest generations, of electronics. The, admittedly somewhat biased, stereotypical manifestation of this are young people strictly buying organic and local food as a mean to avoid conventional agriculture, while also being the ones sitting in a café with their new iPhone and MacBook (comp.: Becker/Scheumann/Dietrich 2017, page 378). However, this is not a problem exclusively reserved to young people. With an increasing level of technology present in our lives, e.g. so called smart homes, we tend to buy more and more devices we do not really need in the name of sustainability.

The preference towards the “state of the art” and the ideology that “newer is better” are socio-economic factors that contribute to the devaluation of most reusable products. In our growth-oriented economies, reusing is often seen as a hindrance for economic development, despite having a huge potential of generating jobs and monetary value. This way of thinking is the consequence of sticking with the extremely narrow definition of economic productivity, which focuses on the intersection of “market” and “innovation”; only innovation can thrive a market forward and a respectively sized market only exists because of technological innovations.
[comp.: Kann das Weg – oder ist das Re-use?]

	Reciprocity	(Re-) Distribution	Market	Barter
Renovation				
Imitation				
Exnovation				
Innovation				

Figure 1 Benefit of Re-Use of IT Hardware for Society and Environment - a German Business Case; Scheumann et al.; 2014; altered

The above shown matrix, compiled by Frank Becker (2008), plots four basic economic activities in the vertical axis against the economic-technological concepts examined by the German economist Niko Paech in the vertical column. This enables the matrix to map out different kinds of economic activities from a sustainability-related point of view. As I remarked today, most economic activities can be placed at the intersection of "market" and "innovation". When talking about transition movements, collective groups formed out of citizens, scientists, and institutions, both governmental, as well as scientific, are grounded in their efforts to push society and the economy over a threshold and into a new paradigm. On closer inspection, it becomes evident that this threshold represents two paradigms dictating how we interact with our surrounding through both economic activity and social relations. The hope is that "alternative" fields of economic activity are established or vastly extended to transition from one socio-economic paradigm to another. One social innovation that can be categorized under the "traditional" intersection and such "alternative" one, is the German Business "AfB", short for "Arbeit für Menschen mit Behinderungen" ("work for disabled people").

3.2.1 Possible Alternative in "Western" Countries

Before going onto describing "AfB" as a business model and as a factor in social transitioning, I will look further into their placement within the above matrix by Becker (2008).
Social entrepreneurships can be placed in a wide variety of panels depending on their characteristics. "AfB", as a case example, has been placed in the panels where "(re-) distribution" and "renovation", as well as "market" and "innovation" intersect with each other. The categories for the latter placement do not need to be explained since they are the standard description of economic activity. Nevertheless, the placement can be received as misleadingly since "innovation" does not refer to technological innovations, as defined within the paper, but to the innovative aspects of their

business model under the triple-bottom-line framework, as a brief talk with one of the authors reveals.

The other key intersectional elements are less common and therefore need to be defined: "*(Re-) Distribution*: Goods and services are collected in a determined relationship, stored (as far as possible for the item in question), and redistributed." (Becker/Scheumann 2014, page 9). "*Renovation*: The re-use or refurbishment of existing goods for the re-use or continued use." (Becker/Scheumann 2014, page 9). These definitions provide a brief explanation of AfB's business model, which itself is the reason for the abovementioned categorisation.
The German business AfB was founded in 2004 and manifests the concept of a "social entrepreneurship". Besides refurbishing sorted out hardware, which is often donated to them, they provide dignified job opportunities for people with disabilities who are often excluded from the majority of the labour market. Donated computers are being refurbished with an approximate reuse rate of 70 percent and sold to the private consumer sector. The remaining 30 percent of donations are dismantled and recycled afterwards if they cannot be refurbished. This keeps electronics out of landfills thus preventing and minimizing the environmentally harmful effects of EOLE.
[comp.: Benefit of Re-use of IT Hardware for Society and Environment – a German Business Case]

This leads to another benefit of reusing and refurbishing old electronics in the respective country of consumption: inducing occupation, especially beneficial for those who have been excluded from most parts of the existing labour market as previously stated4, which is a step towards closing the socio-economic gap within society. AfB as an entity not only advocates for equality but actively puts equality in place. Including, not only people with disabilities, but all marginalised people as active members and contributors to society needs to receive major attention from legislators, socially engaged organisations, as well as individuals creating a society, alike. AfB can serve as an example for others to further speeding up the transition towards a more sustainable global society, both socially, economically and ecologically.

3.2.2 Possible Alternative in the Global South

Besides having positive impacts within "western" society, social entrepreneurship is also beneficial to other parts of the world. Even with the Basel-convention, banning the export of EOLE to developing countries and governmental and/or industry enforced producer responsibility programs, EOLEs are still reaching places in Africa and other parts of the southern hemisphere. EOLEs often end up in landfills where locals gather either scraps parts still eligible for recycling by hand, or burn

electronics down to access metals used for manufacturing electronic components. Resource-recovery through burning is especially harmful to the environment since burning an entire item or even just parts of it inevitable means burning the used printed circuit boards (PCBs), which releases huge amounts of GHG and other toxic gases. This is both harmful to the environment and to human health (comp.: Postawa/Brandão/Rubin/Seliger 2009, page 3).

These procedures also harm people. For instance, people are exposed to major health dangers by, firstly, inhaling septic gases, and secondly, by spending multiple years working in landfills. Improving circumstances in "western" countries in many ways, won't result in major improvements in developing countries. That is, just because "western" countries keep spent resources, which may decrease the number of electronics sent to the Global South, thereby hindering people from dismantling them, does not mean we improve the lives of people involved in the electronics industry. On the contrary, it may even worsen their economic status and thus their living conditions. Therefore, it may even prove itself more beneficial to reproduce existing divisions of responsibilities, to a certain degree. Enabling people in the global South to conduct recycling in a more environmentally sustainable manner, while at the same time, minimizing the health risks and increase their recovery rate, thus increasing their revenue is a desirable option. If implemented correctly, this has the potential to contribute to the necessary relational shift between the global North and global South; from an exploitation-based relationship to a fair, cooperative one.

The tool in mind to facilitate this shift is the concept of "mini factories", which is a concept mentioned in the article, *Configuration of Value Creation Modules, instantiated in Mini Factories for Disassembly of Printed Circuit Boards* (Postawa et al., 2009). Their proposed concept incorporates the implementation of independent enterprises for "alternative income generation [compared] to open burning of e-waste for waste pickers" (Postawa et al., 2009, p. 4). Processing EOLE in such an enterprise would include the separation of still functioning electronics, which can be resold and thus reused, allowing for higher income and lower environmental impacts. This concept also includes building connections with NGOs and the government in order to build connections with larger metal refineries, thus giving the waste pickers an official character. [comp.: Configuration of Value Creation Modules, instantiated in Mini Factories for Disassembly of Printed Circuit Boards; Postawa et al. 2009].

3.3 Fair-Trade as a Concept for Electronics

A different, though equally interesting aspect is proposed in the already mentioned article by Scheumann and Becker. The authors advocate for transferring the already existing principle of Fair-Trade, commonly used in the food industry, into the IT manufacturing sector. Such intent would allow for higher wages and thus transforming the manufacturing jobs into more life-worthy and dignifying occupations. While this is still fairly uncommon, corporations that act with this in mind already exist. For instance, the Dutch mobile phone brand “Fairphone” is such a corporation; next to designing easily repairable mobile phones, they keep watching over the entire manufacturing process insuring just treatment and fair payment for workers (comp. fairphone.com). Increasing the quality of work available to people in Africa and Asia. The increase in quality of life of those involved in the production, impacts the consumer side as well. From a growth-oriented point of view, the downside to applying Fair Trade principles to a business is the rise in costs for both the company and the consumer (as the example of Fairphone shows). However, the same is true for Fair Trade groceries where it has shown that people are still willing to pay extra for responsible produced goods, indicating the potential for successfully implementing Fair-Trade into electronics industry. Further, a potential pleasant side-effect of Fair Trade electronics is a decrease in newly bought items; higher prices most likely discourages people from buying rather spontaneously and instead think twice whether a new item such as a mobile phone is really necessary.

The above presented options lead to an overall decrease in production rates and further down the line a decrease in goods, both raw materials and final products, in circulation. This, as previously mentioned, positively impacts released GHGs.

4 Global and Local Perspective on Repair Cafés

Repair and reuse are two concepts that have existed since humans started using tools and until not very long ago were very actively practiced concepts. In the recent past however, these capabilities have almost gone extinct and the impression of not being able to repair broken electronics and other goods has spread. Martine Postma countered this false perception with the invention of the Repair Café in 2009 (wikipedia.org). While she was not the first one to come up with the concept of repair-workshops, it was the first time, with the Repair Cafés foundation in 2010 (wikipedia.org), that these events had a uniform appearance and similar organizational structure.

The successive loss of the ability and willingness to repair ones' possessions, in conjunction with the already mentioned "newer-is-better" mentality, has resulted in the wide-spread trend, that items are discarded as soon as they break or have minor defects. The shift from preserving to replacing cannot exclusively be traced back to the "new-is-better" paradigm. Rather, it has become more difficult to repair items and even easy repairs are uncommon. Economic barriers are likely major obstacles as well, including both labour costs for repair services, as well as acquisition costs for spare parts. Another barrier is the lack of repair services available, which has been overlooked by consumers, activists and legislative support. Cheaper products also do not benefit the growth in popularity of perceiving repairing as a viable option.

Simultaneously, repairing and therefore caring for older items in general, is pushed out of society's collective memory and declared a social non-conforming action, which further strengthens abovementioned perception. Usually luxury products and other expensive items function as exceptions that acknowledge the norm.

4.1 Characteristics of Repair Cafés

Repair Cafés try to overcome these two barriers by offering a platform for individuals seeking the opportunity to prolong an item's lifetime by connecting them with people possessing the necessary skill-set to analyse and repair a wide variety of items. These skills require a high level of adaptively in order to deal with the diverse repair-requests; ranging from chairs, electronic appliances, textiles to basically any other possession: This does not mean a volunteer must have a wide-spread skillset. Rather, Repair Cafés always have multiple volunteers who complement one another's skillsets. The outcome is combining a variety of skills in one place that may not be available elsewhere. Furthermore, Repair Cafés have the potential to foster a differing awareness of a product's quality,

the consumer's competence and autonomy in the manufacturing process and thus a sustainable way of consuming goods (comp. Zentrum Technik und Gesellschaft 2017). An equally ambitus goal is the original aim of the Repair Café Foundation to help people to help themselves (comp. Röhr/Tunn/Shin/Ewinger/Lenk 2015, page 9). Achieving this requires volunteers to include teachings and explanations of their actions into their work-process, splitting up their responsibility between being able to fix and to teach simultaneously.

Communities in which Repair Cafés exist are responsible for nourishing progressive social engagement through participation. Without participation and community engagement, such projects would have to be forcefully continued, reducing their effectiveness and eventually their legitimacy. Evidence that support exists for Repair Cafés include (1) the Repair Café movement proved its longevity by existing since 2009 and (2) that the number of Repair Cafés being held globally is growing. This shows that citizens are willing to address the problem of irresponsible consumption and waste-generation, thus opposing the current socio-economic paradigm. The effort of repairing, or serious consideration of doing so, is mostly taken by elders who are still connected to the maxim of prolonging an items lifetime for as long as possible (comp. Charter/Keiller 2016, page 15); a comparable approach is consulting professional repair businesses.

Lack of knowledge is probably the main factor why people do not repair items themselves. More specifically, processes like miniaturization and the increasing complexity of products require an increasing level of knowledge about the product-specific mode of operation. All-round knowledge is not obsolete, but without more specific knowledge about a product or a product-category, repairing becomes very difficult. In addition to lack of knowledge, having inadequate tools to conduct a repair is also a barrier. Devices are not intended to be repair-friendly anymore. Rather, design choices such as using specific screws or strong adhesive, make it difficult to repair some items. In combination with the increasing complexity of items, the absence of repair manuals serves as yet another deterrent. The access to and need for repair manuals heavily depends on the product. There is no need for a manual in order to fix clothing, which heavily relies on experience, but when it comes to more complex and technologized appliances, repair manuals are often indispensable. Lack of repair manuals refers to the lack of information offered by the manufacturer which is often subsidized by third parties. Technology enterprises, such as Apple and the iFixit-organisation are examples of these circumstances. iFixit is open, wiki-based website hosting thousands of free-to-access repair manuals. Next to that, they're selling a wide range of tools and replacement parts as well (comp. ifixit.com). One creates obstacles that scare consumers away from repairs and

potentially hinder professionals during their repair-attempts, the other creates step-by-step manuals and offers them for free on an internet platform. In addition to hard-to-access repair guidance exists the lack of convenience and affordability of replacement-parts. Everyone who tried to replace a part of an aged item, be it a smartphone, a printer or a washing machine, has likely encountered this situation. And by all means, it is understandable choosing not to repair an item because of this. Why buying a new print head, if a new printer can be bought for the same amount of money or even less?

Finally, labour costs for repair services turn away people as well. This is especially significant because of the extremely low labour costs embedded into the production of items. This develops into a major flaw, when the repair itself is fairly simple but replacements are not needed or affordable.
Addressing these issues should be a priority in future debates about increasing the social acceptance of repairing.

4.2 Ecological Significance of Repair Cafés illustrated in case examples

When discussing Repair Cafés, the question of their actual ecological impact must be addressed. Furthermore, when advertisers advocate for the purchase of newer, more efficient replacements, it brings into question whether it is always reasonable to conduct a repair.

Addressing this question, I resorted to Lifecycle Assessments for various products, created by staff and (former) students of the Technische Universität Berlin (Berlin Institute of Technology).

4.2.1 Desktop Computer and Laptops

As depicted in the paper *Abschied vom Abfall* by Becker/Scheumann/Dietrich (2014), reusing an old laptop or desktop-PC can save non-negligible amounts of GHG. To calculate the expected savings, the authors assumed an average lifecycle of four years for a business-laptop, following a second use-cycle of four years. Then the authors compared that model by replacing the four-year-old laptop with a new, more energy efficient one. The composition and length of the first and second use-cycle, which equals four years for both use-cycles, results in one of the highest achievable GHG-savings when compared to other scenarios (comp. Becker/Scheumann 2014, p. 6). The theoretical achievable reduction of GHG is 148.7 kg CO2 eq. which relates to 60 percent less emissions for a (business-) laptop; desktop-PCs have a lower saving of 106.3 kg CO2 eq.

Contrary to the following LCAs and other observations, the authors not only calculated the achievable savings, but the time it takes for "old" laptops or desktop-PCs to reach the same amount of emitted CO2 as the production of new laptops or desktop-PCs.

This finding is related to the popular claim that newer hardware is more environmentally friendly because of its higher level of power efficiency, This claim is not only bound to computer electronics, but is also found in the context of many other home appliances as well. With this in mind then, how long does it take, to mark the point from which onward, the newer device would be more environmentally friendlier?
The evidence shows that it takes the "old" device a surprisingly long time to reach the emission-level of their replacement. That is, after refurbishment, it takes approximately 16 and 6.5 years of usage for laptops and desktop-PCs respectively to reach the equilibrium. This, especially in the case of laptops, indicates that repairing these devices is worth the effort.
[comp.: Abschied vom Abfall]

4.2.2 DVD-Player

In the paper *Transformationsexperiment "Kiezladen"* (2015), students examine a standardized DVD-player, defined as a stand-alone device suitable to read a DVD, this brief definition includes DVD-players in TVs or computers. The data is from 2004 and some factors, like power consumption, have changed since then.

The cited study shows, that the production-process is responsible for about one third of the total emitted CO2 with 6.71 kg CO2 eq. in relation to the total Global-Warming-Potential (hereinafter called GWP) of 19.81 kg CO2 eq. The usage of the device has a far bigger impact with 13.1 kg CO2 eq. being almost twice as much as the production.

With around one-third of the total GWP concentrated in the production stage, one should try to repair a DVD-player rather than replacing it. As with many electronic devices, the age of the broken device, as well as the energy efficiency of a possible replacement, play a non-negligible role in the decision to repair. Unfortunately, the paper does not provide information on whether there is a point in time, from which replacement would make more sense, or rather whether such tipping point exists at all.
[comp.: Transformationsexperiment "Kiezladen]

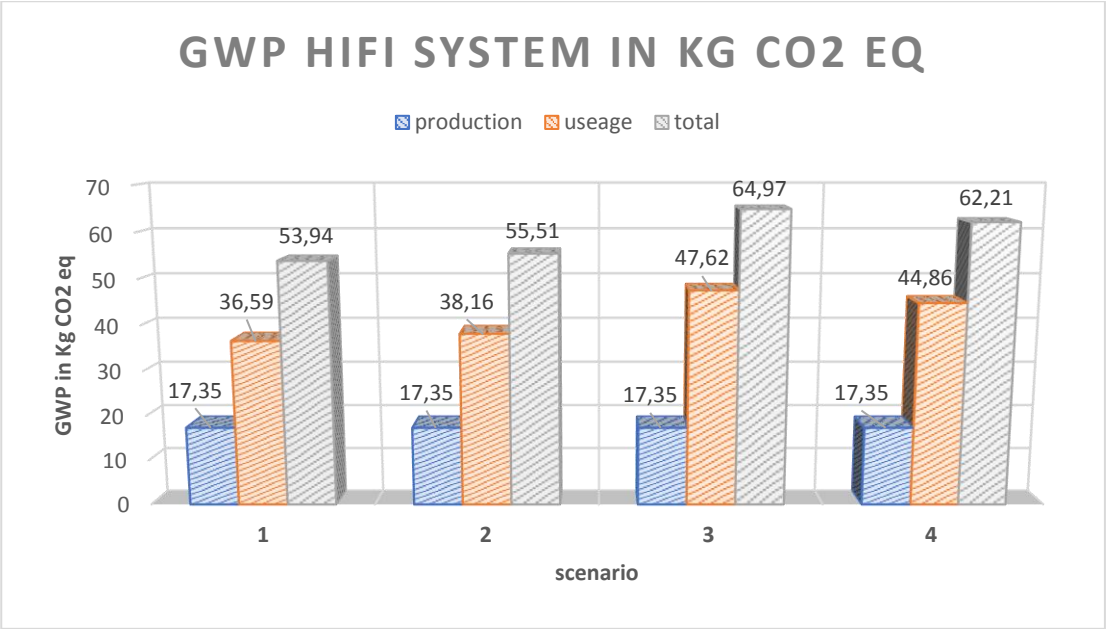
4.2.3 Compact HiFi system

A compact HiFi system is defined as a stationary device which integrates various inputs, has an amplifier in its enclosure, is capable of CD-playback, and receiving VHF-signals. The speakers can be integrated as well, or be separated and connected via a cable or an alternative data-transmitting technology. It excludes all off-grid drivable devices and such with an integrated digital TV-receiver.

The four different scenarios presented, distinguished by their differencing modes of operation, put varying emphasis on the role of each mode, while the production's ecological impact remains the same. As depicted by the graph below, the share of usage exceeds the share of production in every scenario by a large margin. In the first scenario, which has the lowest GWP, the emitted CO2 while using the device exceeds the GWP of producing it by more than the factor two, with 36.54 kg CO2 eq. and 17.35 kg CO2 eq. respectively.

It can be assumed that improvements regarding reduction in CO2 emissions along with other environmentally impactful aspects over the devices' lifetime have been met. Other aspects, like the acidification potential, play an overwhelming role in the case of a HiFi systems, thus making repairing it a viable option.

The given data is from 2004, which means any improvements to date are not included and it is therefore not possible to state by how much the composition has changed.
[comp.: Transforamtionsexperiment "Kiezladen"]



Graph 1 data: Transformationsexperiment "Kiezladen"; table 4, page 27

4.2.4 Vacuum Cleaner

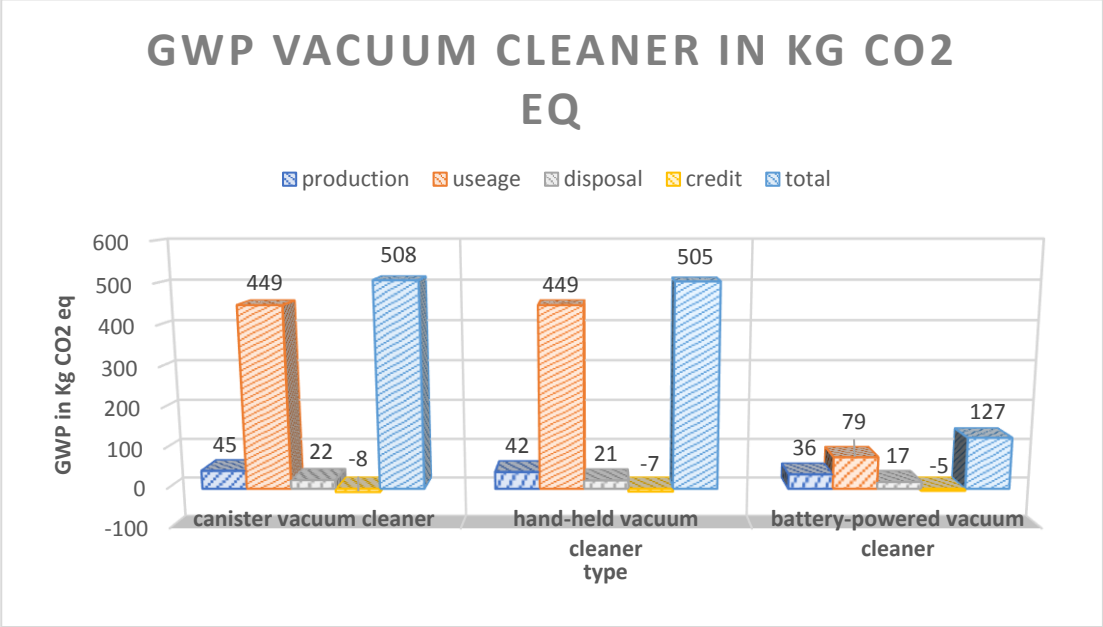
This data for vacuum cleaners is from 2013, which makes conclusions slightly more reliable. The study from which the presented data originates, defines a vacuum cleaner as an item that functions as a cleaning device, has a built-in motor that sucks air in and in the process of doing so, picks up dust and small objects. The air gets filtered, and the picked-up dust and dirt is stored in a container. The study differentiates between three types of vacuum cleaner: canister vacuum cleaners, hand-held vacuum cleaners and battery driven hand-held vacuum cleaners.

The canister vacuum cleaner has a total GWP of 508 kg CO2 eq., the production contributes 45 kg CO2 eq., the usage 449 kg CO2 eq. and the disposal 22 kg CO2 eq. Extreme gaps between emissions associated with different phases of a vacuum cleaner's lifecycle are easily notable: A canister vacuum cleaners' production makes up for less than 10 percent of the total CO2 emission, whereas the usage of such device is responsible for about 88 percent.

A hand-held vacuum cleaner has a total GWP of 505 kg CO2 eq. The production makes up for 42 kg CO2 eq., the usage for 449 kg CO2 eq. and the disposal for 21 kg CO2 eq. This draws a similar picture compared to the previous type. While CO2 emissions are lower overall, the gap between the stage of production and usage is even more extreme.

The battery-driven vacuum cleaner not only emits less CO2 overall, 127 kg CO2 eq. in total, the discrepancy between production and usage has shrunk down significantly as well with 36 kg CO2 eq. and 79 kg CO2 eq. respectively.

Generally, canister and hand-held vacuum cleaner should be replaced with a battery-driven one. Obviously, it has to be taken into consideration how old the broken vacuum cleaner is and whether or not it would be replaced with aforementioned battery-driven vacuum cleaner in the first place. Lastly, the effort or complexity of the repair, if feasible, has to be considered as well.
[comp.: Transformationsexperiment "Kiezladen"]



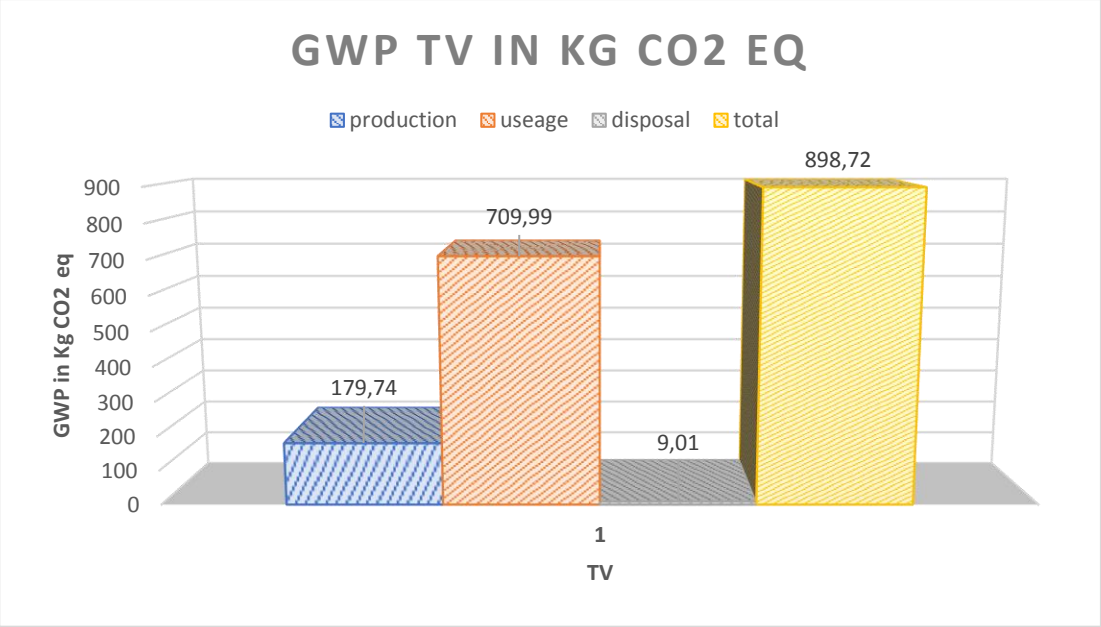
Graph 2 data: Transformationsexperiment "Kiezladen"; table 11, page 33/34

4.2.5 Television

As for TVs, students relied on data from 2003, which was published in a magazine in 2004 (comp. *Transformationsexperiment "Kiezladen" 2015).* A specification of the device "TV" is neither given by the students, nor the authors. This is not concerning since a TV is easily distinguishable from devices like monitors. Just like the students, I had to approximate the percentage points of each part which results in a rounding error of +0.02 percentage points in my case. Additionally, I summed up the production, assembly and shipping into one category.

The total emitted CO2 amounts to 898.72 kg CO2 eq., the production contributes with 179.74 kg CO2 eq., the usage adds 709.99 kg CO2 eq. and lastly, the disposal adds 9.01 kg CO2 eq. These figures cry out for the recommendation, that one should replace a broken TV with a new one. However, the authors mention that major improvements regarding the devices power consumption have been made. Hence newer models should not be replaced while significantly older models, like cathode ray TVs should be. They assume there has not been major improvements regarding the production's environmental impact in the meantime, thus increasing its share to around one third.

As short side note: If one would like to cut down a devices' power consumption and thus choses to buy a newer TV, it's likely this device will not save any energy as people usually opt for larger displays when purchasing new TVs.
[comp.: Transformationsexperiment "Kiezladen"]



Graph 3 data: Transformationsexperiment "Kiezladen", page 34

4.2.6 Alarm Clock

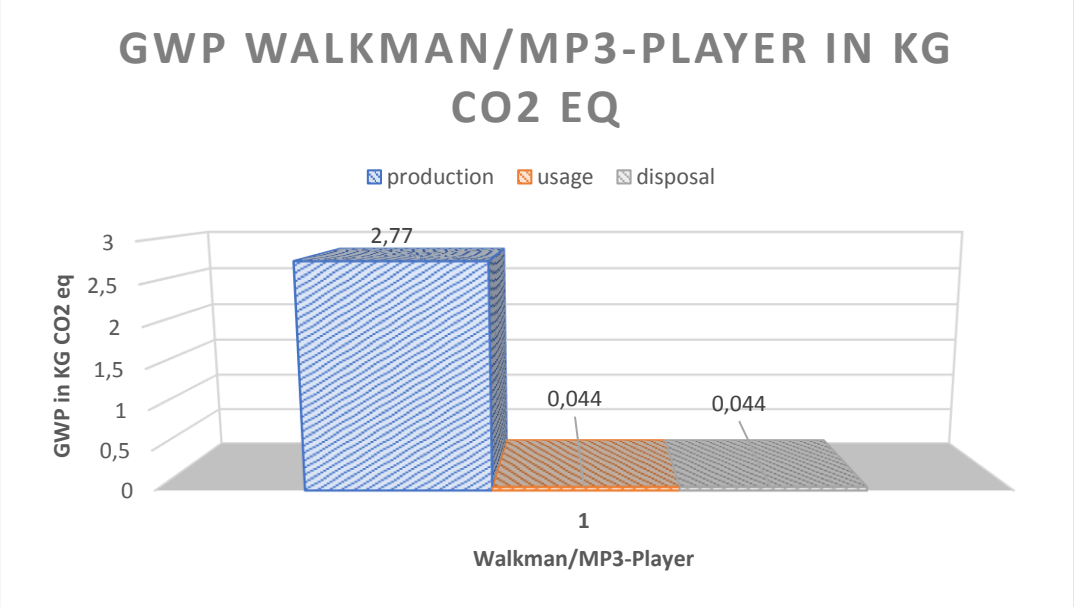
While the paper states presents data published in 2011, no figures are actually presented. The data exclusively looks at the lithium-ion battery inside the alarm clock. This however, does not prove beneficial because the cited study partially relies on assumptions and the variety of observed battery types is not as diverse as it could have been the case.

Thus, it is not possible to give a well-founded answer. I can only assume that a repair should save at least a small amount of CO2, as well as the required resources needed to manufacture a new product. Most importantly to note from this study is the use of rechargeable batteries, since they are environmentally less impactful.
[comp.: Transformationsexperiment “Kiezladen”]

4.2.7 Walkman/MP3-Player

A Walkman, more generalised: stand-alone devices suitable to store and play audio-files digitally, but are not commonly used anymore. This is because smartphones or mobile phones in general are capable of audio-playback. Today, the main target group for such devices is most likely “audiophiles”, who are on the look-out for devices capable of delivering high-class audio quality.

Assuming, that no major improvements regarding the environmental impact of each phase of the lifecycle have been made, a repair-attempt should be conducted since the share of production and assembly make up 97 percent of the total CO2 emissions. If the Walkman/MP3-player would get replaced with an already existing device like a smartphone, repairing loses its environmental benefits.
[comp.: Transformationsexperiment “Kiezladen”]



Graph 4 data: Transformationsexperiment “Kiezladen”; figure 10, page 31

4.2.8 Backpack

Students created a lifecycle assessment using the software “GABI” for backpacks. When observing their results, one has to keep in mind, that their access was restricted to a student version of “GABI”, which does not include all examined materials. The chance that the examined values differ from the actual values is very likely.

This does not change the fact that backpacks do not emit any environmentally impactful gases/matter during usage. One should always try to repair a backpack which avoids a total of 3.1 kg CO2 eq. being emitted.
[comp.: Transformationsexperiment “Kiezladen”]

4.2.9 Headphones

The LCA for headphones was self-conducted and thus comes with a higher degree of inaccuracy. While one can save just 0.95 kg CO2 eq. by repairing headphones, the students emphasize that one should conduct a repair nevertheless; the reasons being the low weight and high quantity in circulation and the ease of repair, as the most common flaw is a damaged cable.

It’s important to note, that the LCA most likely relates to wired in-ear headphones. The benefit of repairing likely transfers to Bluetooth headphones as well, especially since they combine more than just the speaker into the headphone, resulting in a more difficult repair.
[comp.: Transformationsexperiment “Kiezladen”]

4.2.10 Hand-held Food Processor

Like the previous two items, the LCA for a hand-held food processor was conducted by the students themselves. In addition to the mentioned inaccuracy, only the production and shipment have been integrated into the LCA. This is because, as stated by the students, due to high fluctuations in the device’s power consumption when comparing different models.

With a possible saving of 4.9 kg CO2 eq., repairing is a viable option and should be considered each and every time. Exceptions could embrace circumstances when the broken food processor is

an old model and would be replaced with a more power-efficient one or when the repair exceeds a certain degree of complexity.
[comp.: Transformationsexperiment “Kiezladen”]

4.2.11 Suitcase

An experiment on the lifecycle of suitcases was also conducted by the students. The foundation for their research was whether repairing a suitcase (replacing a broken wheel) is ecological worthwhile in contrast to buying a new, lighter suitcase. This has been complimented by the condition that the suitcase is mostly used for air-travelling. Due to this strict problematization, the answer is limited in its generalizability and heavily depends on the use case.

The “new” suitcase consists of more environmentally harmful materials, hence the “new” one has a higher GWP of approx. 6.6 kg CO2 eq. then compared to approx. 5 kg CO2 eq. for the “old” suitcase. The difference in weight between the “old” and “new” suitcase, 2.3 kg and 1.22 kg highlights the impact certain design choices can have on an items environmental impact.

In order to answer the aforementioned question, the students plotted the gained saving by replacing the wheel against the production of a new suitcase, and included occurring emissions during air-travelling. The calculated amortization-distance is 1,339.94 km; that is marginally longer than the air-line distance Vancouver ↔ San Jose (1,327.19 km). As a result, the students conclude, that repairing the old suitcase is not ecologically worthwhile.

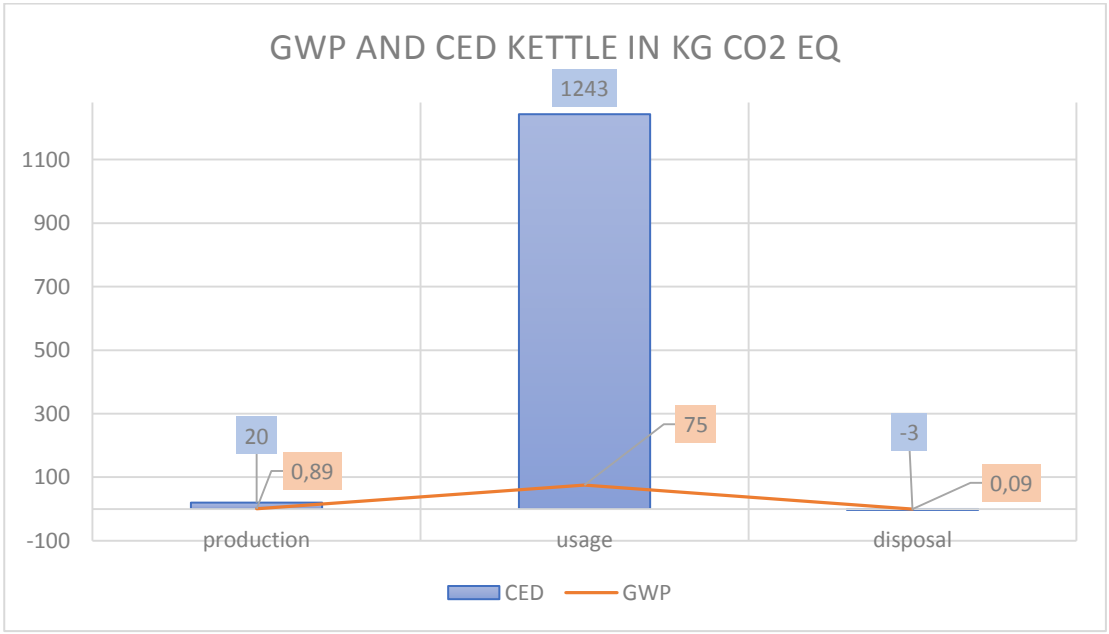
While the initial question is interesting and needs to be asked, there seems to be a major flaw with the recommendation of replacing the “old” suitcase with a new, lighter one. Concluding that the short amortization-distance renders the “old” suitcase more harmful when used for flights exceeding the 1,339.94 km-mark, neglects the wide spread customer-behaviour of maxing out the weight-limit to its fullest. I suspect, a lower starting weight often gets compensated by packing more into the suitcase, making the advantage of having a lighter suitcase meaningless.
[comp.: Repair Café 2.0]

4.2.12 Kettle

Examining the possible advantages of repairing a kettle, the students relied on data from 2009 which was published in the context of a study that looked at the hundred environmentally most impactful products. A kettle is defined as an electrical kitchen appliance, which is suitable to quickly heat up water inside a pot.

Due to its mode of operation, a kettle has an unusually high power-consumption; wherefore I include the power consumption next to the GWP. The total GWP is 76 kg CO2 eq. with the production making up for 0.96 % (0.73 kg CO2 eq.) and the usage for 98.68 % (75 kg CO2 eq.). Disposing adds just 0.16 kg CO2 eq. (0.12%). The technical simplicity of a kettle is assumedly one of the key reason why the GWP during its production is low.

The accumulated energy expenditure's shares are similarly distributed. The production makes up for 1.43 % (18 MJ/a) and the usage for 98.6 % (1,243 MJ/a); solely the disposal draws a different picture, granting a credit of 3 MJ/a due to "regained" energy by recycling.
These figures support the recommendation to not repair a kettle and rather buy a new energy-efficient one. However, should the replacement not be more energy-efficient than the one to be replaced, one should opt for the repair, since an environmental benefit would not be achieved in that case.
[comp.: Repair Café 2.0]



Graph 5 data: Repair Café 2.0; table 5.1 to 5.4, page 28

4.2.13 Toaster

The data for a toaster was published in the same study the kettle was and is defined as an electrical device that roasts bread.

The environmental impact in this case is accounted for by both accumulated energy expenditure (hereinafter called CED) and GWP, which is representative for an average use-cycle of three years. The total CED of a toaster is 1,420. 22 MJ. The production contributes 117.07 MJ to this, the usage 1,322.15 MJ, the disposal 9.26 MJ and recycling a toaster grants a credit of 28.27 MJ.
The global warming potential amounts to a total of 83.71 kg CO2 eq., with the production adding 6 kg CO2 eq., the usage 78.49 kg CO2 eq. and the disposal 0.72 kg CO2 eq. The recycling contributes a credit of 1.5 kg CO2 eq.

Similar to the kettle, buying a new toaster can prove more ecological worthwhile, given the case that the replacement is more energy efficient and durable and the one to replace already served a couple of years. Otherwise, one should opt for a repair, since no improvements would be achievable.
[comp.: Repair Café 2.0]

4.2.14 Trekking Bike

The students referred to a study from 2012 which observed the CO2-emission of a trekking bike with a total mass of 17 kg. The study differentiated between a bicycle with an aluminium and steel frame. Since both, aluminium and steel, materials are common to recycle, they’re granted a high recycling rate of 80 percent which explains the high credit for disposing/recycling the bike.

The production of a bike with an aluminium frame is responsible for 139 kg CO2 eq. and its disposal grants a credit of 86.3 kg CO2 eq.; resulting in a total of 52.7 kg CO2 eq. A rounding error must have occurred in either the original study or during the students work, because the paper refers to a total GWP of 52.8 kg CO2 eq. Unfortunately, the recycling is not examined beyond the mentioned recycling of steel and aluminium components.

The bike with the steel frame has a total GWP of 46.3 kg CO2 eq. with production adding 82.5 kg CO2 and the disposal/recycling granting a credit of 26.1 kg CO2.

Since bicycles do not emit any GHG or otherwise environmentally impactful substances during their usage, nor do they need electricity in order to work, a repair is always worth it. E-Bikes, besides the necessity to recharge them, incorporate internal electronics and batteries, hence repairing would likely proof very beneficial.
[comp.: Repair Café 2.0]

4.2.15 Espresso Machine/Coffee Maker

The students took the data regarding an espresso machine/ coffee maker from a study published in 2009 which was conducted in the context of examining categories for eco labels.
Distinguished in the study are fully automatic coffee makers, coffee makers using pads, and a capsule coffee makers. Due to data's representation in bar charts, I will not present category-specific figures and stick to approximated total values.

A fully automatic coffee maker has a total GWP of 55 kg CO2 eq., while coffee makers utilizing pads have a slightly higher GWP of 58 kg CO2 eq.; the coffee maker with the highest GWP are those utilizing capsules. In this category, one can distinguish between capsules made entirely out of aluminium and out of plastic and aluminium. A capsule coffee maker using aluminium capsules has a total GWP of 75 kg CO2 eq. and one that uses capsules out of plastic and aluminium has a total GWP of 82 kg CO2 eq. All of the above-mentioned figures relate to a device that is rated as energy efficient with an expected lifetime of ten years for a fully automatic coffee maker and six years regarding pad and capsule coffee maker. The authors state that the share of the GWP while using a coffee maker is at least 88.21 percent. This relates to the fully automatic coffee maker and decreases when looking at the other types (comp. Abassi/Olbrich/Türhan/Tang/Kirchner 2016, page 36).

Examining energy inefficient devices, the GWP increases by approx. 100 kg CO2 eq. across the board and the share of usage increases to a maximum of 95.73 % at max (comp. Abassi et al. 2016, page 37). Because most CO2 is emitted during the usage stage, a repair is not a viable option in every case. Should the new coffee maker be more energy efficient and durable compared to the old one, it might be better to buy a new one. Additionally, one should opt for a fully automatic coffee maker since these have the lowest environmental impact.
[comp.: Repair Café 2.0]

When discussing Life Cycle Assessments it is important to keep in mind that they are not flawless, as the suitcase's LCA shows. When analysing and using third-party studies and statistics, the question of what the initial author's intention was needs to be asked every time. The same is true for what is not embezzled in the LCA. For instance, what kind of energy source was used for the computer-generated result? Welcomed additional information as part of a LCA is the amortization-time or -distance for each product as implemented in the review of Laptops and Desktop-PCs and the suitcase to give the reader an idea of the time-relation between two different options (repairing versus replacing). Lastly, one often neglected aspect is the priority to keep resources in the soil and stop the continuous extraction of them, even if the result is a higher power consumption or comparable outcome.

4.3 The Global Repair Café Movement

Every previously mentioned product-category has been included as a result of a mutual long-term university project with the *Repair Café Brunnenviertel* in Berlin. This includes the presentation of UTIL's results to the volunteers and others. This leads to a discussion on Repair Cafés including their internal structures, conducted activities and their popularity.
The global Repair Café movement continues to grow. A 2016 study about Repair Cafés, summarized in *The Second Global Survey of Repair Cafés: A Summary of Findings* by Martin Charter and Scott Keiller mentions a total of 1,040 Repair Cafés registered by the Repair Café organisation (Charter/Keiller 2016, page 1). This number has increased to 1,438 Repair Cafés in December 2017 (comp. repaircafe.org). This means that over the course of the past one and a half years, Repair Café International registrations increased more than 38 percent. While these numbers represent a welcomed increase, which most likely reflects the increased popularity and awareness among communities, one cannot conclude the exact increase of new Repair Cafés with these numbers. The Repair Café organisation can be perceived as a franchisor, unifier and simplifier of the process required to establish a Repair Café. Moreover, since not every individual or group which is attracted to the idea behind Repair Cafés chooses to be part of the Repair Café movement, the actual number of initiatives is greater. This results in discrepancies and some alluded problems. For instance, in Ireland, where just two Repair Cafés were listed on the Repair Café International website, the Repair Café Ireland website listed eight Repair Cafés (comp. Charter/Keiller 2016, page 1-2). This results in an uncertainty of whether the increase in newly opened Repair Café is greater or lower than 38 percent. This number depends on how many newly registered Repair Cafés have been established recently, which newly registered Repair Cafés were already established, and only then decided to become part of the Repair Café "franchise". Nevertheless, there's an

indeclinable increase in the popularity of Repair Cafés shown by the increase in volunteers attending each session from nine to ten and probably more importantly, a greater increase in visitors from an average of 19 in 2014 to 29 in 2016.

To achieve a better "understanding [of] the importance of environmental, social and ecological drivers […] for participation […]" (comp. Charter/Keiller 2016, page 2) the Centre for Sustainable Design (cfsd.org.uk/) undertook a second survey on the Repair Café movement. In their survey, they received answers from 317 Repair Cafés. The vast majority of respondents stated, that they see themselves as a founder/organiser of a Repair Café. An overwhelming number of participants are well educated and hold at least a bachelor's degree. The share of women participating in Repair Cafés is below the share of men, with 42 percent and 58 percent respectively. This rate however, is slightly more balanced compared to the 2014 study. Along with those key demographics, the geographical distribution of the respondents is another interesting aspect. The authors remark that "Repair Café International" lists Repair Cafés from 25 countries. However, responses were only recorded from ten countries, all located in Europe and North America. Two possible reasons for this data could firstly be the high country-count in Europe, and secondly, the awareness of such franchisors was not greatly expressed outside of "Western" countries. Out of the ten countries reflected in the collected data, Canada came in seventh place with four Repair Cafés having participated in the survey, followed by Switzerland and Austria with three and two participating Repair Cafés respectively.

When asked "why participate in a Repair Café?", the four answers to which the respondents agreed the most were as follows: over 90 percent either strongly agreed or agreed with the statement "To encourage others to repair"; "To encourage others to live more sustainable"; "To provide a valuable service to the community"; "To be part of the movement to improve product reparability and longevity".
All these responses indicate a base of participants with a democratic/free knowledge-accessibility influenced way of thinking and the willingness to put general interests above their own. This goes hand in hand with the two most denied answers: "To make new business contacts" and "To learn how I could use my skills to setup a small business"; both of which are more self-focused compared to the abovementioned answers.

Repair Cafés are mostly citizen-driven innovations. This bottom-up approach has the potential to foster a stronger emotional connection between an individual person and the initiative itself, as well as ensuring that the staff truly supports and sympathises with the underlying idea of Repair Cafés.

Additively, the surrounding community most likely shows a stronger support for Repair Café that originated from itself rather than being put in place by an outside entity.
The majority of the respondents stated, "their" Repair Café was either founded by an "informal group of motivated individuals" or by "one motivated individual", with approximately 46 percent and 43 percent respectively agreeing to those statements.

Proving that Repair Cafés are no one-day wonders, but long-lasting projects, 75 percent stated the Repair Café operated for two years or less compared to 95 percent in 2014. Plotting the Repair Café's longevity against the manner of its foundation might allow for differing levels of support by the surrounding community to be uncovered.

Instead of emerging from seemingly nowhere and confronting citizens with a superior ethical attitude, Repair Cafés must rely on community-support. Close relationships with local citizens influences the Repair Café's ability to communicate with the wider community. The three most common ways of doing so are "word of mouth"; "social media" and each Repair Café's respective website. The word of mouth approach makes it extremely easy for people to connect with others in their neighbourhood and allows to foster local connections, which is especially important in the early stages of a Repair Café. The emphasis on social media as a communication channel reflects the goal of having a channel that allows for direct communication with a broader audience.
Other than that, social media also has the benefit of being a free platform for the creator and audience and also has the potential to have a tremendous reach-out.

We tend to overflow ourselves with information, especially on the internet. Activities undertaken by Repair Cafés to recruit new volunteers and advertise their services might not be as effective as originally planned. In order to be continuously noticed by consumers, constant updates and reminders are most certainly a requirement. Nevertheless, the existing advantages seem to exceed the abovementioned drawbacks. Various communication channels allow for easy information exchange, as well as developing and fostering connections between different stakeholders.

4.3.1 Items brought to Repair Cafés

The survey also asked participants what products are commonly brought to Repair Café sessions. Answers given were congruent with the student-examined product-categories and include,

“Small Kitchen Appliances” (the most common product-category), which includes food processors, followed by “Household Appliances”, e.g. the vacuum cleaner and “Lamps/Lighting”. The least common items are categorizable as electronics: “TVs”, Games Consoles” and “IPOD/MP3/MP4”. Either due to the unpopularity of repairing electronics or because Repair Cafés are likely to be incapable to repair them, electronics accumulate at statistical bottom. The cause most likely roots in the inability of Repair Cafés to repair certain items due to missing tools and/or knowledge. The dissemination of certain products logically effects the frequency with which a product is brought to a session. For instance, “IPOD/MP3/MP4” players, which have become less and less present because people use other devices instead (i.e. smartphones). Another non-negligible factor is the ease of transporting goods to Repair Cafés. For instance, one might opt not to repair a larger item because of the burden of transporting heavy or bulky furniture or big TVs without the certainty of a successful repair.
The overall trend of items at a repair session has shifted from non-electrical items towards electrical and electronical appliances. This trend could be a consequence of an increasing awareness about the high environmental impact that these devices have and the low costs related to a repair.

Repair Cafés activities exceed beyond the repair asset. For example, upcycling, the process of creating something, be it useful or for aesthetics, out of items considered useless or waste, with different levels of complexity, creativity and creation/remodelling, plays a surprisingly important role in the Repair Café movement. Most commonly, upcycling projects relate to modifications of clothing.

Other upcycling activities include repurposing spare parts as replacements or as additions to other items. This can further reduce the already low costs for Repair Cafés and takes care of the unnecessary discard of products.

4.4 Local Repair Café Movement

Narrowing the focus to the CRD of Victoria, shows once again, a similar share of the respective categories brought to repair sessions [interview with organiser and observations during local Repair Café session]. Interviews with organizers also raise the question of how active members are and how much their actions are publicly expressed.

For the time being, Victoria and its surrounding municipalities are home to four Repair Cafés, though only three of them are currently active. These include “Fairfield Repair Café”, “Repair Café

Victoria", and "Repair Café Sooke". While the first two are registered by the Repair Café foundation, the latter one operates under the umbrella of the "zerowastesooke"-movement which in itself is a sub-organisation of the Transition Town movement (transitionnetwork.org), known as "Transition Sooke". Repair Café Saanich, registered by the Repair Café movement, is currently on hold due to organizational challenges and it is unclear if this Repair Café will become active again [source: mail exchange]. Additionally, "Repair Café View Royal" and "Repair Café Colwood" can be found online. Those however, were one-and-done events and are extremely unlikely to get converted into regular occurring Repair Cafés.

The cooperation between nearby Repair Cafés as mentioned in the Repair Café-survey can be found here in Victoria. This cooperation hinges on the joint web presence of the Fairfield, Victoria and Saanich Repair Cafés. As a self-conducted interview with the Repair Café Fairfield organiser revealed, the main reason for the collaboration was the goal to ease the planning both by the visitors, as well as the organisers, through coordinated event planning. The cooperative nature extends to the point of helping others to start a new Repair Café, as a chat with one co-organiser of the Repair Café Sooke revealed.

During an interview with a "Repair Café Fairfield"-organiser, another aspect became evident. The main motivation for participating in a Repair Café as a volunteer is beyond wishing to help others live a more sustainable life or cutting down emissions but addresses the will to offer their skills to others without any further intentions. This leads to the conclusion, that the notion what a Repair Café is differs from what the Repair Café Foundation has in mind. However, it shows that any efforts for something, whatever it might be, can occur outside a linear causation chain. Keeping this in mind, the real-world target group of certain projects or movements can be significantly larger than first anticipated.

4.5 Awareness about Repair Cafés on the UVic Campus

A rapid assessment had been conducted on the UVic campus in order to get a sense about repair habits and whether the participants were familiar with the Repair Café concept. I mainly targeted students, staff and visitors participated as well.

Because of its small sample size, this survey is not representative to draw conclusions about the overall circumstances, but provides some inside. Further, the questionnaire might contain certain flaws that could affect its capabilities of depicting correlations. It is also worth mentioning, that the

rapid assessment has been conducted with a pilot study version and a slightly adjusted version, in order to ask why the participants chose repairing over buying the same item again and not what the malfunction was.

When asked how often they replace various items such as electronics or furniture, a foreshadowing trend occurred: The bigger an item becomes, the rarer the owner renews this item. This can be seen by observing the cycle in which smartphones, laptops or desktop-PCs and TVs are renewed. 28 out of 50 people stated, that they replace their "old" smartphone with a new one every two to four years. Moreover, one tenth of the participants do not hold on to their phones for more than two years. The cycle extends to four to ten years regarding laptops and desktop-computer; TV's get replaced every four to ten years and only occasionally kept longer. A decisive factor could be how frequent one presents the product to the public. Since possessions such as smartphones often function as a measure of status, they "need" to be replaced more regularly than something like a TV, which is never presented to the public. The renovation-cycle of bicycles and cars, being similar to the one of TVs, does not contradict this assumption. Next to not being major status artefacts anymore, these items also require larger monetary investments.

With 79 percent answering "yes", a majority of participants confirmed that they have chosen to repair something or let a professional repair a product for them. Mentioned products mostly included electronics. This is a creditable finding since repairing electronics results in high GHG-savings, as previously mentioned. Unfortunately, reasons for choosing to repair versus replacing were not given by every respondent, even with the overhauled questionnaire. The given reasons usually referred to the defect the device had. When answered as intended, "cost" was the most dominant reason for not buying a new device, the idea of not wasting an entire device or preserving a quality appliance was only mentioned, with some interpretive clearance, five times.

Participants were also asked whether they knew what Repair Cafés are, if they had already participated in one, and if they would participate in one being held on campus.
39 participants had never heard of Repair Cafés and out of those who did, only a fraction ever visited one. This means, outside of the still small bubble of people directly or indirectly connected to Repair Cafés, there's no broad awareness of such initiative. This is especially surprising given the case that the CRD of Victoria has a fairly high density of Repair Cafés. Answers to the last question, which read "whether or not they would be willing to visit a Repair Café", were mixed, as half of the participants approved, one did not answer the question the other 24 disapproved.

4.6 The First Repair Café on the UVic Campus

In correlation with my internship at the University of Victoria, the supervising professor and I settled on a plan to organize and conduct the first ever Repair-Café on campus.

On Jan. 9, 2018, prior organisation came to a final product: the first Repair Café was held on campus in the faculty for Geography. Over the duration of three hours, approximately 20 people dropped in and participated either by bringing something to repair or to chat with attendees about sustainability and repair related topics. Instead of the expected high visitor count linked to a high visitor fluctuation, we experienced, compared to the high number of people who saw the Facebook-posts, low visitor counts. However, attendees were keen to participate in the repair-act, learnt how to fix similar malfunction in the future and, as abovementioned, often stayed long after their original requests were tackled to participate in the discussions.

During the long-term organisation, I created a Facebook-page meant to serve as one communication channel for the event. It was used to regularly communicate updates regarding the event itself or to publish new advertisement. This proved itself to be a double-sided sword. On one hand, our final announcement for the Repair-Café was shown to approximately 5,200 people and was clicked by 280. However, compared to these figures, the actual event saw a low visitor count, which indicates a superficial recognition from those who saw this post. Additionally, we reached out to the campus newspaper and published a brief announcement, we do not have any numbers at all about how many actually saw our announcement. Nevertheless, it proved itself helpful as one attendee emphasized he only showed up because he read about the Repair-Café in the newspaper, "Ring". In an effort to contact people directly, we also send out a listserv to people that were directly or indirectly linked to my internship and thus might be interested. A broader listserv might proof itself very efficient since e-mails do not bombard oneself with information as social media platforms like Facebook do, but are wider spread than newspapers.

Results were not limited to repaired goods, potential cross-faculty activities such as guest lectures were brought up by some attendees, namely collaboration between the faculty for Geography, Business and Mechanical Engineering.

For potential future events, it is extremely important to consider the most adequate location of the Repair-Café and make early advertisement for it. Due to lack of time, we had to stick with a room

inside the Geography department which was adequate for the size, but lacked the centrality required to be more appealing to others.
[comp. Gutberlet/Katerndahl 2018]

4.7 Conclusion

As I briefly touched upon in the last two chapters, the continuation of the Repair Café project on campus would be great. Whether this happens within classes, related to research questions, or continued as a social engagement project does not matter.

What would be desirable, is the cooperation with and between local Repair Cafés. I imagine the "lending" of volunteers to proof beneficial for both the organiser(s), as well as the Repair Café. The former does not have to worry as much about the recruitment for volunteers and the latter one might gain popularity due to the cooperation.

On a larger scale, Repair Cafés might be suited to assist initiatives in sensitizing citizens to the need for a responsible and more sustainable handling of their used goods. Organisations like EPRA would not be suitable partners, since their cooperation with large enterprises like Apple, Samsung, and HP erase the commitment it takes to drastically reduce emissions and goods in circulation. Furthermore, if Repair Cafés are seen as a tool for a transition to a post-growth society, support needed to be disassociated of growth oriented companies.

5 Appendix

Age: _____ Are You ☐ Student ☐ Professor ☐ Other: _____

Faculty: _____

Residence: ☐ Saanich ☐ Central Saanich ☐ North Saanich ☐ Colwood

☐ Victoria (City) ☐ Langford ☐ Oak Bay ☐ Esquimalt ☐ Sooke

☐ Sidney ☐ View Royal ☐ Metchosin ☐ Other: _____

How often do You, on average, buy a new Mobile Phone?

☐ < 2 years ☐ 2 – 4 years ☐ 4 – 10 years ☐ > 10 years

How often do You, on average, buy a new Laptop or Desktop-PC?

☐ < 2 years ☐ 2 – 4 years ☐ 4 – 10 years ☐ > 10 years

How often do You, on average, buy a new product of other kinds?

e.g. TV	☐ < 2 years	☐ 2 – 4 years	☐ 4 – 10 years	☐ > 10 years
e.g. Bicycle/Car	☐ < 2 years	☐ 2 – 4 years	☐ 4 – 10 years	☐ > 10 years
e.g. Furniture	☐ < 2 years	☐ 2 – 4 years	☐ 4 – 10 years	☐ > 10 years

Have you ever had a device repaired? ☐ Yes ☐ No

If yes, what kind of device and why?

Kind of Device (e.g. Dishwasher)	*Reason for choosing to repair it over replacing it with a new item*
Kind of Device (e.g. Smartphone)	*Reason for choosing to repair it over replacing it with a new item*
Kind of Device (e.g. Table)	*Reason for choosing to repair it over replacing it with a new item*

Have You ever heard of Repair-Cafés and/or know what they are?

☐ Yes ☐ No

Have you ever participated in a Repair-Café?

☐ Yes, ____ times as ☐ Client ☐ "Fixer"/Volunteer ☐ Organiser

☐ No

How did you hear about it?

☐ Social Media ☐ Friends/Family ☐ Newspaper ☐ Other: _____

Would you like to know more about this/participate in one?

☐ Yes ☐ No

Revised Questionnaire used in the rapid assessment on the UVic campus

Picture 1 First Repair Café at UVic; photo: Jutta Gutberlet

Picture 2 First Repair Café at UVic; photo: Jutta Gutberlet

Picture 3 First Repair Café at UVic; photo: Jutta Gutberlet

Picture 4 First Repair Café at UVic; photo: Jutta Gutberlet

Picture 5 First Repair Café at UVic, organiser Jutta Gutberlet and Florian Katerndahl (l. to r.); photo: Kyle Artelle

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