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Trialling the Preparation for Reuse of B2C ICT WEEE in Ireland

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Keywords: Preparation for Reuse; Reuse; B2C; WEEE, ICT.

Abstract: The TriREUSE project investigated the potential of collecting B2C ICT WEEE for preparation for reuse in workplaces in Ireland. TriREUSE ran a series of WEEE to Work events where employees were incentivised to return their data-bearing devices (Laptops, Tablets & Smartphones) at these events where free data wiping and destruction were offered on all devices. The collected devices were returned to a certified Preparation for Reuse organisation where the devices were tested and assessed for their suitability for reuse using both technical and economic criteria. 283 kg of laptops, smartphones and tablets was collected from 10 events of which 60 kg (28%) was suitable for preparation for reuse. 64 (29%) of the data-bearing devices that were collected were successfully prepared for reuse. A further 308 kg of WEEE outside of the scope of the project was also collected during the events.

Introduction

The proper treatment of Waste Electrical and Electronic Equipment (WEEE) is high on the global agenda in concerns regarding resource efficiency and climate change (Baldé *et al.*, 2017). Promoting the lifetime extension of EEE is also considered of importance due to the use of numerous critical raw materials which do not emerge from recycling streams (European Commission, 2014). In addition, very high manufacturing energy inputs are required for these products, particularly for low entropy components (Zero Waste Europe, 2017).

Research has demonstrated that the scope for future improvements in efficiency of material production is limited (Allwood *et al.*, 2012; Gutowski *et al.*, 2013). Therefore, for a reduction in industrial emissions to contribute to the mitigation of climate change, a reduction in material production through strategies such as reuse and preparation for reuse that offset new production will be necessary. EEE reuse has been prioritised by a wide range of global policies and regulations as a prudent approach for conserving resources and reducing environmental pollution. Most of the legislation that regulates movement and disposal of equipment containing potentially hazardous materials recommends reuse. The European Commission have also commissioned research on the feasibility of including preparation for reuse targets in the WEEE Directive (European Commission, 2017). This study concludes that a universal target across all member states is not recommended but it encourages individual member states to pursue actions which support preparation for reuse of WEEE including targets (McMahon, Johnson and Fitzpatrick, 2019).

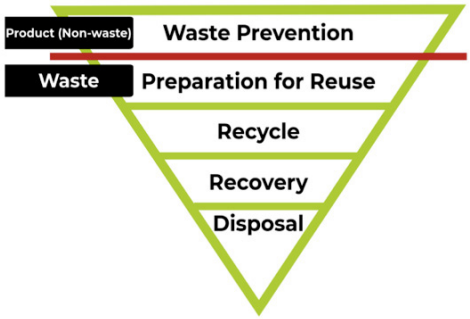

Figure 1. Waste Hierarchy.

Preparation for Reuse is a waste treatment option at the end of life of WEEE. ICT WEEE such as Laptops, Tablets and Smartphones can have a high intrinsic value and often do not present as WEEE (Angouria-Tsorochidou, Cimpan and Parajuly, 2018). Preparing for reuse refers to checking, cleaning or repairing and recovery operations, by which products or their components that would have become waste are prepared in a way so that they will be reused without any other pre-processing (Gharfalkar *et al.*, 2015). The time taken from end of use to disposal is a growing problem with EEE. The reluctance of consumers to dispose of EEE as WEEE is claimed to be

rooted in frugality, altruism and cleanliness (Casey, Lichrou and Fitzpatrick, 2018). Casey et al identified key stages in the WEEE divestment process in figure 2.

Figure 2. Critical Moment of Disposal (Casey, Lichrou and Fitzpatrick, 2018).

The potential for preparing for reuse and reuse has been highlighted in several studies. One study in Bavaria found that between 13% and 16% of WEEE was suitable for reuse and a further potential of 13% to 29% could be created through changes in collection, storage and treatment at collection points in the region (Messmann *et al.*, 2019). Another study in Denmark found that 22% of small appliances and 7% of monitors were fully functional and had the potential for resale (Parajuly, 2017). A study in Spain investigated the potential for preparing for reuse of small WEEE (sWEEE) and found that 67.7% of collected devices had the potential to be prepared for reuse through refurbishment and repair (Bovea *et al.*, 2016). All studies highlight the potential for increased revenue from a better preparation for reuse system.

Preparation for Reuse in Ireland

The process of becoming a "preparing for reuse" organisation in Ireland requires several steps to gain access to WEEE. Firstly the organisation must be approved and registered with the WEEE Register Society Ltd. The approval and registration requires waste collection and waste license/facility permits from the local authority, Preparation for reuse certification, at the moment the BSI PAS141 standard is required with the intention to migrate to EN 50614 in due course. The confirmation of working arrangements with compliance schemes and proof of indemnity insurance for preparing for reuse activities and a warranty policy is required for registration. An administration fee of €250 is also payable.

The TriREUSE Project

The TriREUSE project was created to trial the "Preparation for Reuse" of ICT WEEE throughout the Republic of Ireland. The trial was conducted using a series of collection events with a mix of public and private organisations. The collection events were undertaken in various workplaces from local government authorities, third level educational institutions, government departments and agencies and private companies. These workplaces were selected as a testbed to assess the willingness of employees to hand over their old ICT devices with a view to being reused after secure data destruction.

TriREUSE used these events to gather a mix of data-bearing devices (laptops, tablets and smartphones) to be "prepared for reuse". TriREUSE aims to facilitate and encourage consumers to dispose of EEE as WEEE by providing a work-based collection event in tandem with free data erasure and destruction.

The results from the TriREUSE project will enhance the understanding of how preparation for reuse of B2C WEEE can operate in Ireland.

Collections

Collections took place as "WEEE to Work" events which have been used previously to encourage people to dispose of their old or unused electronic devices. The TriREUSE project used the same methods to collect devices for reuse. The project undertook two public and eight private collection events from October 2018 to May 2019. They were run in collaboration with a mix of organisations, from Compliance schemes, Local Government Authorities, Educational Institutions, Government Departments and Multinational companies.

The object of the collection was to gather data-bearing devices. The decision was made between the project partner to focus our efforts on collecting Laptops, Tablets and Smartphones as they can have a higher resale value, contain many critical raw materials and traditionally suffer from low collection rates.

Data Protection

The implementation of the General Data Protection Regulation (GDPR) throughout Europe in May 2018 provided a point of reference to help leverage the incentive of free data erasure & destruction as part of the collection system. From speaking with employees and staff, it was evident that GDPR coverage provided a focus on what was happening to their data. All devices were issued with an identification number and the user could email our preparation for reuse partner if there was a requirement for a data destruction certificate.

WEEE to work

The collection events were promoted in several ways and were conducted over two day or one day events. The two day events comprised of an awareness day followed by a collection day. The one day events comprised solely of a collection day. The events were promoted using TriREUSE branded materials for posters and e-flyers in tandem with targeted Facebook and Twitter campaigns. A website was developed to disseminate the preparation for reuse message and its benefits. Video templates were used to personalise and publicise events for companies and organisations.

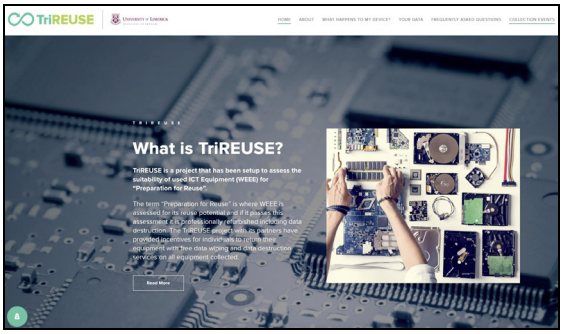

Figure 3. TriREUSE website screenshot.

Figure 4. TriREUSE YouTube video screenshot.

Results

The devices that were collected were prepared for reuse at PhoenixRM, an authorised preparation for reuse organisation. Figure 5. presents the process flow for the collected devices.

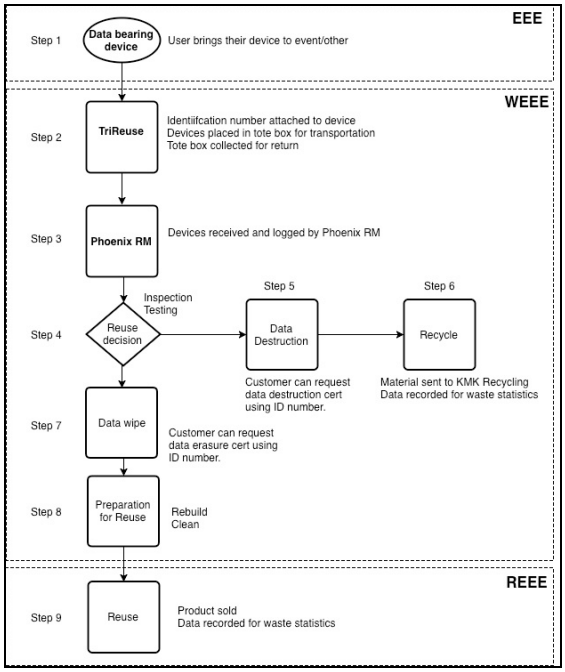

Figure 5. Process flow for TriREUSE.

As part of this preparation process, devices that were not suitable for direct reuse (minimal intervention) would be assessed for parts reuse as supply feedstock.

Device	Total	REUSE		RECYCLE		Total Weight (kg)
		No.	Weight (kg)	No.	Weight (kg)	
Laptop	93	18	38.34	75	159.75	198.09
Tablet	36	9	19.17	27	57.51	76.68
Smartphone	91	37	3.33	54	4.86	8.19
Total	220	64	60.84	156	222.12	282.96

Table 1. Devices collected, count and weights (UNU-keys, 2010).

Table 1. presents the devices collected by the number collected and weight. United Nations Univeristy (UNU) keys are used to assign an average weight to each device. UNU keys from 2010 and the corresponding weight values were assigned to each device type.
Figure 6, presents the number of devices collected with laptops representing 42% of devices collected with Smartphones representing 41% and Tablets accounting for 16%.

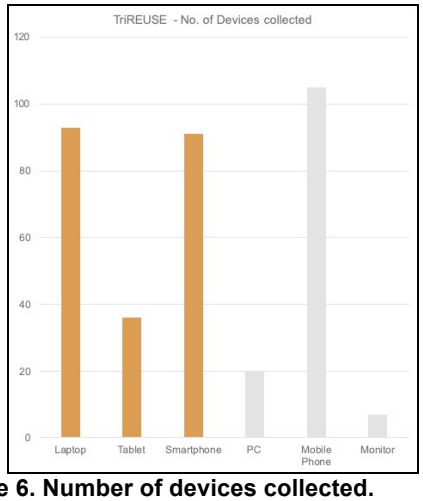

Figure 6. Number of devices collected.

Other data-bearing devices were received as part of the collection but have been omitted as they are not in the scope of the project. A total of 590.38 kg of WEEE was recorded from the collection. 282.96 kg of WEEE was within the scope of the project i.e. Laptops, Tablets and Smartphones. 60.84 kg of this WEEE was recorded as being prepared for reuse while the remaining 222.12 kg went for recycling. Devices that were outside the scope of the project went for recycling (307.42 kg). Figure 7 presents the total weight collected per site. Site E had the largest amount of WEEE collected by weight.

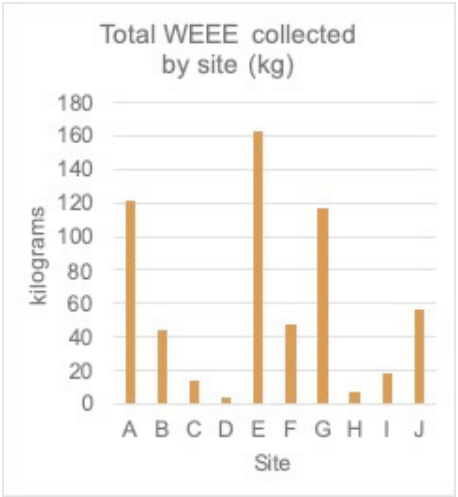

Figure 7. Total WEEE collected by site (kg).

Figures 8, 9 and 10 present the reuse and recycle device quantities collected per site.

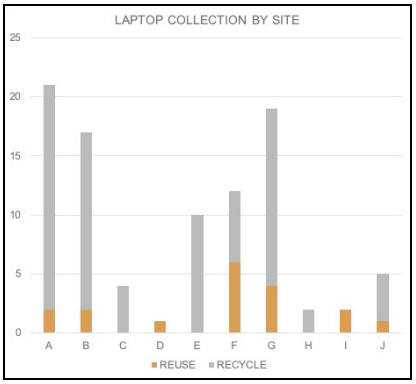

Figure 8. Laptop Reuse/Recycle per site.

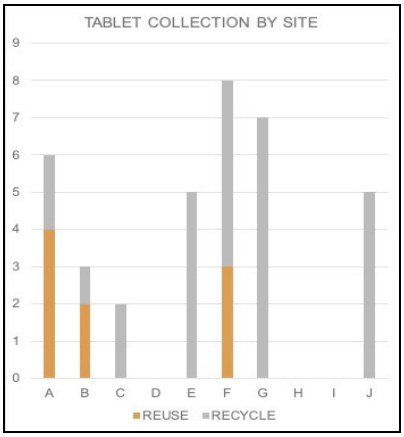

Figure 9. Tablet Reuse/Recycle per site.

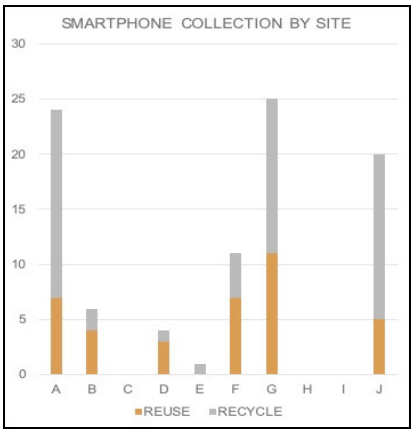

Figure 10. Smartphone Reuse/Recycle per site.

29% (64) of the data-bearing devices (laptops, tablets and smartphones were prepared for reuse. An analysis was carried out on the kilograms collected per person (8 private collections) in Figure 10.
Site E had the best return of WEEE with 0.09kg with a workforce of 400 approx. An average of 0.03kg was collected from staff at all events. These results can help to inform the basis of a benchmark for targets for future events,

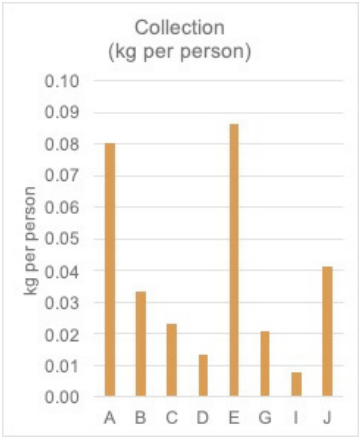

Figure 10. Collection kg per person.

Findings & Discussion

The objective of the TriREUSE project was to trial the preparation for reuse of B2C ICT WEEE in Ireland. The trial consisted of operating a series of collection events at public and private organisations. The project employed incentives to encourage and create awareness around the concept of reuse and preparing for reuse. The trial allowed people to dispose of their devices safe in the knowledge that their data was being securely destroyed/erased as per industry standards. The findings from the project are summed up below;

1. Higher reuse rates were achieved than from regular WEEE collections (29%).
2. On-site promotion from CSR, IT, Facilities and Employee Volunteer Programs (EVP) of awareness and collections days improves collection rates.
3. High returns of typically difficult to collect devices. Providing a free data destruction & erasure service increased takeback.

There were several outcomes from trialling the reuse of B2C ICT WEEE in Ireland and these are listed below;

1. Secure data destruction/erasure provides an incentive to owners to return devices.
2. It created and raised awareness of the concept of “reuse”.
3. It promoted reuse before recycling for IT equipment.
4. Idenitifed potential source of feedstock for reuse.
5. All devices will contribute to targets either through reuse or recycling.
6. Potential for Preparation for Reuse certified organisations to continue collection events.
7. Collaboration with all stakeholders yielded the best return of devices.

The outcomes of this project indicate that there is a potentially a large and untapped resource which should be managed by certified “preparation for reuse” providers. We would recommend that IT Asset Disposition (ITAD) become Preparation for Reuse organisations to enable them to conduct B2C WEEE to Work collections in tandem with existing B2B collections. This could increase takeback of B2C WEEE and have benefits for greater returns for future targets for reuse and recycling. The TriREUSE trial provided evidence of how a preparation for reuse collection of B2C ICT WEEE might work. A regular collection service would encourage users to dispose of unused and unwanted data bearing devices sooner.

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References

Allwood, J. M. et al. (2012) Sustainable materials: with both eyes open. UIT Cambridge.

Angouria-Tsorochidou, E., Cimpan, C. and Parajuly, K. (2018) ‘Optimized collection of EoL electronic products for Circular economy : A techno-economic assessment’, in Procedia CIRP 69. The Author(s), pp. 986–991. doi: 10.1016/j.procir.2017.11.020.

Baldé, C. P. et al. (2017) The Global E-waste Monitor 2017 - Quantities, Flows, and Resources, United Nations University, IAS – SCYCLE, Bonn, Germany. doi: ISBN 978-92-808-4556-3.

Bovea, M. D. et al. (2016) ‘Potential reuse of small household waste electrical and electronic equipment: Methodology and case study’, Waste Management, 53, pp. 204–217. doi: 10.1016/j.wasman.2016.03.038.

Casey, K., Lichrou, M. and Fitzpatrick, C. (2018) A Community-based Social Marketing Approach for Increased Participation in WEEE Recycling (ColectWEEE). Available at: http://www.epa.ie/pubs/reports/research/waste/research262.html.

European Commission (2014) Report on critical raw materials for the EU, Report of the Ad hoc Working Group on defining critical raw materials. Available at: http://ec.europa.eu/enterprise/policies/raw-materials/files/docs/crm-report-on-critical-raw-materials_en.pdf.

European Commission (2017) Report from the commission to the European Parliament and the Council on the re-examination of the WEEE recovery targets, on the possible setting of separate targets for WEEE to be prepared for reuse. Available at: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52017DC0173&from=EN.

Gharfalkar, M. et al. (2015) 'Analysis of waste hierarchy in the European waste directive 2008/98/EC', Waste Management. Elsevier Ltd, 39, pp. 305–313. doi: 10.1016/j.wasman.2015.02.007.

Gutowski, T. G. et al. (2013) 'The energy required to produce materials: constraints on energy-intensity improvements, parameters of demand.', Philosophical transactions. Series A, Mathematical, physical, and engineering sciences, 371(1986), p. 20120003. doi: 10.1098/rsta.2012.0003.

McMahon, K., Johnson, M. and Fitzpatrick, C. (2019) 'Enabling preparation for re-use of waste electrical and electronic equipment in Ireland: Lessons from other EU member states', Journal of Cleaner Production. Elsevier Ltd, 232, pp. 1005–1017. doi: 10.1016/j.jclepro.2019.05.339.

Messmann, L. et al. (2019) 'Potentials of preparation for reuse: A case study at collection points in the German state of Bavaria', Journal of Cleaner Production. Elsevier Ltd, 211, pp. 1534–1546. doi: 10.1016/j.jclepro.2018.11.264.

Parajuly, K. (2017) Circular Economy in E-waste Management - Resource Recovery and Design for End-of-Life. Univeristy of Southern Denmark.

Zero Waste Europe (2017) Embodied Energy- A driver for a circular economy?