A SUSTAINABLE COMPUTER REUSE JOURNEY

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ABSTRACT

There is growing interest in how e-waste can be reused, before being recycled, within organisations that produce a lot of computer-based e-waste. However, unless the time is taken to plan a sustainable model of reuse with an organisation then the default course of action is often to send batches of e-waste to be recycled because of limited resources. In this paper, we describe how a model of reuse was created at an educational institution in Dunedin, New Zealand, and discuss the first attempts to implement that model. The issue of sustaining the resources needed for the reuse of computer systems into the future is highlighted, and an approach to reusing computer systems within the confines of those resource limitations is presented. We expect this model to be useful in supporting approaches in future rounds of computer reuse.

Keywords: recycling, reuse, e-waste, computer systems, sustainability, sustainable models, sustainability education

INTRODUCTION

This paper presents a "computer reuse" model of repurposing computer systems for further reuse before recycling. Through combining this model with a "pop-up" approach to the implementation of the model, a sustainable approach to repurposing computers at Otago Polytechnic has been achieved. This approach has been shaped by necessity as resource restrictions have modified what we can do. The approach is presented as a sustainable solution for an environment where these same restrictions exist.

BACKGROUND

It was estimated in 2017 that New Zealand produced around about 95 kilotonnes of e-waste annually (Baldé et al., 2017). The Dunedin City Council (DCC) has set a priority on take-back schemes for computer waste in order to improve what is done with e-waste. (DCC, 2019). The initiative for repurposing computer systems and related equipment at Otago Polytechnic is not new. There has been a number of attempts at setting up projects for the repurposing of computer equipment but none of these projects have been sustained beyond a year or two.

Our journey towards a computer reuse model began about four years ago, when a staff member opened the door of a storeroom in D Block at Otago Polytechnic to discover a number of computers stacked in there. When he asked why the computers were stored there, he was told that they had come out of some of the D Block computer rooms but no one had the time or physical space at the moment to do anything with them. He stood

and looked at those computers and felt frustrated that we were in the situation where computers that still could be used by someone were depreciating in a storeroom. When he voiced his frustration, he discovered that everyone else involved shared the same frustration but the lack of a sustainable model for reusing the computers meant that nothing was being done.

The computers would eventually be sent to an e-waste centre to get as much of the components/materials recycled as possible.

THE NEED FOR A MODEL

Even though the recycling of e-waste provides a way of both reducing harm in the disposal of harmful substances and reusing materials, it does not decrease the rate of consumerism. In his article for *Forbes* titled "Recycling Is Not The Answer To The E-Waste Crisis", Vaute (2018) states "recycling is first and foremost a removal from circulation, and therefore an implicit incentive to produce and buy new." Understanding this does not lessen the need for responsible recycling of e-waste and meeting the related challenges but it does highlight the need of longer life cycles for electronic equipment. Vaute (2018) goes on to identify that in order to "produce less to pollute less" we need to give electronic equipment second and third lives. The challenge is how to balance that with keeping good quality of life for consumers.

We formed a group consisting of two lecturers, a system administrator and a third year IT student in order to try to find a solution. After some discussion, we came up with a model of the possible flows of computers/parts within a computer reuse project (see Figure 1). Even though the model proposed an ideal way of operating that we were uncertain if we could achieve in its entirety, it gave us a framework from which we could start.
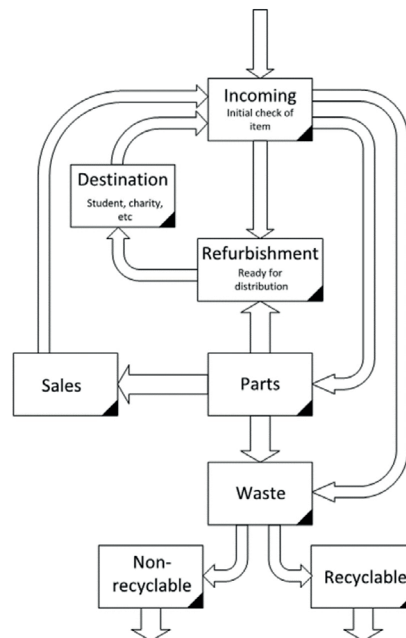

Figure 1. Computer Reuse Project Model – Possible Flows of Computer Systems/Parts

MODEL DESCRIPTION

The model (Figure 1) begins with an incoming computer system that is checked for the possibilities of reuse. The decision is then made to do one of three things: (1) the system is refurbished with an operating system and other software to be donated, (2) if the first action is not possible then the system is stripped for parts, or (3) the system becomes e-waste.

If the refurbished system is to be donated then the person receiving the computer system is given the option of returning the system once they have no use for it. This encourages not only a "second life" for the computer system but possibly a "third life" or even a "fourth life". This will continue until there is no more demand for the system to be refurbished.

Before the system is considered waste, it is examined to see if any parts are still useable, either to refurbish an existing system or for someone else to use. If there are useable parts then those parts may either be used to repair systems for refurbishment or given away/sold. The possible selling of parts would be a way of recouping some of the costs and improve the financial sustainability of the proposed model.

Finally if reuse is not possible, then the system/parts would be considered waste and would be responsibly recycled where possible.

FIRST IMPLEMENTATION OF THE MODEL

Even though we had created a model, we now needed to consider how we would implement the model in our context. We realised that we might not be able to implement the whole model at once and that we needed to start focussed on what is the most important first. Otago Polytechnic has Ō Mātou Whāika ā-Rautaki (Our Strategic Goals) which state that we want to "Lead the way in sustainable practice" (Otago Polytechnic, n.d.). This includes operating sustainably and encouraging both our students and our community to operate sustainably. We therefore set a focus on getting the computers refurbished and out to the community as soon as possible, and to involve some of the IT students at Otago Polytechnic. We decided that selling refurbished equipment within our first undertaking of the model was too complicated to implement.

We then identified four important resources needed to implement a computer reuse project in a way that was sustainable. These four resources were space, labour/time, equipment and funding. We set out to get commitment from students to provide the labour/time for the project. We found that even though many students would give a verbal commitment to volunteer, not all would actually do the work unsupervised. We therefore got commitment from one student to run the volunteers and make sure the work was being done, however most of the time he did the work himself. We already had equipment for doing the work, as the students already work on computers as part of their course work. We decided that we would operate a zero budget and work only with donated resources and volunteered time. The biggest barrier was therefore space. We explored different options and at one time got an offer of a house at Otago Polytechnic but then got the offer retracted, as the space was needed. We went on a search all around the local campus and quickly discovered that we could get no commitment on space to do the work. In 2017/2018 we managed to get temporary spaces, firstly in an unused office and then in a student project space that was not being fully used at the time.

We could only successfully operate in this manner due to all the work that has already gone on at Otago Polytechnic to have structures in place that support sustainable project initiatives. The actual gifting of the computers is relatively simple due to the Standard Terms of Gifting that already exist. (see Figure 2).

Standard Terms for Gifting

When you accept any items gifted from Otago Polytechnic you agree:

1. That those gifted items cannot be sold, traded or otherwise parted with for the profit or benefit of yourself or the organisation you represent; and

2. That the gifted items are given without warranty or undertaking from Otago Polytechnic as to their condition or fitness for any purpose

3. That any electronic information found to be on the items will be deleted, without being read, shared, copied or manipulated in any way.

Figure 2. Standard Terms for Gifting- Otago Polytechnic

By the end of 2018, we had refurbished over 90 computers in the two year period, and these computers were being used by all sorts of organisations and individuals not only in the local community but also elsewhere in New Zealand and our Pacific neighbours.

"POP-UP" IMPLEMENTATION OF THE MODEL

At the start of 2019 we faced the same issue of not having a permanent space for the repurposing of the computer systems. We realised that this is probably going to be the reality for the near future and both the resources of available labour and space would constantly change from semester to semester, as our cohort of students and available rooms changed. We therefore decided to have a "pop-up" approach to implementing the model where we would see what commitment we can get from the students and at the same time make use of whatever space is available to us in the immediate vicinity of where the computer systems are stored. If either of these resources is not available in a particular semester then we will simply not run the project during that semester. By understanding this and constructing our processes around this approach, we are able to commit where and when we can in a manner that is sustainable into the future.

CONCLUSION

We have given away 46 computers so far in 2019 and though the potential is there to do more, we now have a sustainable approach to computer reuse that can be adapted to whatever resources are available. We have not yet fully realised our original model, as we have not yet achieved an income stream to provide a financial fund for the project. However, through using existing resources we have managed to continue to operate on a zero budget. In the time that we have been running this project, other projects have started up within Otago Polytechnic and the surrounding community where e-waste is being reused before recycled. We have already started exploring how we can better work together with some of these projects and pool limited resources. This project only works due to the individuals across Otago Polytechnic who volunteer their time to this project and through the support of the wider community. The students involved are learning what it means to be a sustainable practitioner and are now being challenged about how we can all further improve our sustainable practices. This project can only be described as a win-win-win-win for all involved: Otago Polytechnic, the students, our community and our environment.

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