What UTS Does With Its Old Computers and What They Should Do

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ABSTRACT: The aim of this research report was to take a look at the understated issue of computer disposal and see how the University of Technology, Sydney deals with it. Then we take a look at how the general population in NSW deals with this issue. With the growing number of computers that are reaching the end of their usefulness, the issue of computer disposal becomes more of a problem. Computers are made up of hazardous materials and should not be dumped in landfill. However, most people in Australia are unaware of this problem and generally do not know of other places to get rid of their computers, aside from giving it to other people. Options are considered - even when the computers are donated, the receivers must be responsible for its disposal, and eventually these also end up in landfill. There is therefore a need for learning institutions to teach their students about this important issue and attempt to raise awareness so that we can learn to deal with the problem.

INTRODUCTION

As IT professionals or rather soon-to-be IT professionals, we are expected to live up to and uphold certain standards. People expect certain characteristics from us. This article is to show you in an organised manner the various problems that were found when researching the topic; the various facts surrounding the problem; the opinions of various people that included IT professionals, staff members and the occasional lay person; the corresponding policies and attitudes of the state government regarding this issue; and lastly, the various feasible solutions or suggestions offered by members of the group, IT professionals as well as other students in the university. This article was written by the authors collectively as a group as part of a project required for a subject entitled "Information Technology Professionals and Society" that is lectured by Dr. Laurel E. Dyson.

METHODOLOGY

The authors tackled this topic's research in a methodical and objective manner. The majority of us were unaware of ways and means to go about the research, and this was dealt by collectively engaging in an initial brainstorming session that included possible keywords to use when researching material on the internet. Most of the initial research was conducted on the internet using tools such as search engines like Google. Websites that were pertinent to our research were recorded and allocated to a group member for further research. Whenever possible, people were contacted and given surveys to complete. These findings were again recorded and analysed in an objective manner. The emphasis for the survey was to gauge awareness and not to collect statistics. People from different professions, companies and even ages were contacted and surveyed. University staff like lecturers, professors, program leaders and administration staff were contacted for the survey. Students from different faculties around the campus were also approached and surveyed. The UTS Asset Control Officer as well as the UTS Mail Supervisor were contacted and interviewed about their roles and views on the issues under research. Corporations like Dell who propagated information about recycling methodologies [DLL04] were contacted and were asked for more information than that was present in their websites. They pointed us towards a company called HMR Sydney who was also contacted. Funnily enough, HMR gave us the number for Dell when asked for more information on Recycling and Redistribution of Old Computers. The representative was also not very sure and confident about their methods about recycling and redistribution and seeing that they deal with recycling of computers, this seemed very disturbing. But this section is about our unbiased methodology, not about our findings.

THE PROBLEM

Rising Number of Computers

Computers have most steadily found their way into a commonplace existence in the homes of much of the world's first-world population today. They form the backbone from which many businesses now operate, and have now become a tool that many office workers would not function efficiently without them. Australian homes and business currently buy over 2 million computers a year, and they throw out just as much if not more than they buy every year [ABC03]. In the 2000/2001 fiscal year, it was estimated that 110,000 computers were purchased in the area under the jurisdiction of the Inner Sydney Waste Board [DEC01] whereas the population of the area covered was 277,000. Approximately 50,000 computers were put in Inner Sydney landfills over those twelve months; only 6,000 others that were disposed were recycled properly.

Computer - Break-up

Computers are generally made up of a variety of hazardous materials as well valuable resources. A short list of these components [SVTC99] includes but is not limited to:

- Nickel-cadmium batteries

- Mercury switches

- Polychlorinated Biphenyls in capacitors

- Arsenic as a doping agent in transistors

- Glass from Cathode Ray Tubes

- Lead in solder, as well as lead lining in CRTs to prevent radiation

- Gold and palladium in switches and connectors

- Copper wiring and circuitry, as well as alloys or coatings

- PVC coated wire and computer housings

- Iron in steel frames and parts in motors

Generally, hazardous materials cannot be recovered and cause potential harm to the environment. Some of the valuable resources used in computers such as inert metals gold and copper should be recovered due to their value alone.

Environmental Hazard

Some of the components in computers are a hazard to the health of its environment after they are no longer in use [SVTC99]. A few of the highlights include:

- Beryllium maintains electrical conductivity well and is used to strengthen electrical connections; however it is now classified as a known human carcinogen that causes lung cancer.

- Cadmium in semiconductors is known to accumulate in the human kidneys over the course of many years and causes highly toxic poisoning which may be irreversible.

- Chromium VI is used as corrosion protection and as a hardener for steel frames in computers but more importantly, it is extremely toxic.

- Lead has been well documented as a health hazard since it was banned from usage in fuel for automobiles. It affects all critical parts of the human body, as well as hindering its development and causing chronic effects on other organisms.

- Mercury in its inorganic form transforms to methylated mercury in our waterways. Both directly via our water supply and indirectly through the food chain, mercury is a hazard to our vital organs.

- Phosphor coatings in CRTs also contain other rare earth metals and direct contact causes a great toxic hazard.

- Materials such as PVC or PCB produce harmful dioxins when burnt at a certain temperature and cause lethal harm to those who breathe in the fumes, which are then released into our atmosphere.

The main concern about the improper disposal of computers is that leaving them in a landfill will potentially allow some of these hazardous components to escape into our environment via routes such as our water ways. The impact of computer components as a hazard to the whole of the local environment has been clearly demonstrated through the case of Guiyu, China [SVTC02]. In December 2001, the Basel Action Network, in conjunction with Silicon Valley Toxics Coalition and Toxics Link (India), investigated the area of China that had become a recycling centre for electronic wastes. It was estimated that after the dumping of electronic waste in those towns, a year passed before the groundwater was contaminated. The level of contamination was enough to necessitate the delivery of fresh water from a supply that was about 30km away. The investigations revealed that the lead levels in the water supply was 190 times the levels prescribed by the World Health Organizations (WHO) Drinking Water Guidelines and the sediment was found to contain 212 times the level required for it to be deemed a hazardous waste. This of course, is only a part of the many other pollutants and toxins found in Guiyu in excessive levels. While this may be the extreme end of the scale, it is no doubt representative of the potential risk we face in dumping our own computers.

Waste of Resources

Computers contain valuable inert metals which can be reused and are of great value on their own. These include gold, silver, copper, platinum, palladium, nickel, iron and tin which all have a 70-99% recycling efficiency [MCC96]. These metals cost a lot of valuable resources to extract them from the ground and as well as in their purification processes. So why should we put them back into the earth then? Other materials used have extremely low recovery rates due to changes they undergo in the manufacturing process. These form a lot of the junk in our landfills, and their improper disposal would have dire environmental consequences. An outline of recycling methods is outlined in another section of this report.

Ways TO GET RID OF COMPUTERS

Dumping and Landfill

Resource NSW [DEC01] estimated that in Inner Sydney, 44% of corporate computers and 49% of domestic computers were dumped in landfills at the end of their lifecycle. This is the solution that is not only legal and but also the easiest in the disposal of computers. Of course, this is only if you were to ignore the responsibility involved after knowing the potentially damaging affects these actions may have.

Storage

A great many computers are left lying around in storage. Studies by Resource NSW [DEC01] indicated that 50% of computers are left in storage. This only serves to delay the inevitable – they must be disposed of somehow. They are usually either left for scrap parts for other computers, or they just gather dust. Many domestic computer owners are known to build up a collection of older computers and generally end up disposing them through waste services offered by the council that dump them in local landfills.

Offload to another Company

One common management technique is to offload the responsibility wherever possible. In this case, it is possible to shift responsibility for computer disposal to another party. Companies like Dell have take-back initiatives. You can be forgiven in assuming that they will take care of the disposal or recycling process responsibly. A representative of Dell's recycling program in NSW stated that they receive an average of around 150 computers for recycling a month, or about 1,800 computers a year. Considering that the Inner Sydney region alone purchased over 110,000 computers in the 2001 year, the success rate would be under 2% even if it were based on the number of computers sold 3 years ago. There are obvious flaws in Dell's recycling program rendering it unable to make a great difference. One reason may be the amount of fees incurred by a company taking their old computers to Dell for recycling. When dealing with a large number of computers, Dell charges $1.20 for every kilo after the tenth monitor (the average CRT monitor would currently hovers around the 15kg mark).

Just by recycling 20 monitors, a company is already forced to pay $360 to Dell to get rid of something Dell might be able to refurbish and more importantly - resell. This is not a great incentive for large organisations looking for avenues to recycle their computers and it is possibly this reason that Dell's recycling program does not have much success – although it may be argued that any success in recycling is good for the recycling cause. Of course Dell does not do any of the recycling themselves. They do not own the required machinery to safely recycle computer products. Their main purpose is to gauge the usefulness of the product to determine whether the item can be salvaged and resold. The computer items are then shipped off to their current recycling partner – HMR. HMR specialises in the recycling of electronic waste. They have special machinery for the dissemble process. Their goal is to minimise the use of landfills – however their first priority is, like Dell, to estimate the value out of refurbishing and reselling the computer. HMR also happen to be one of the only two major centres in Sydney that take in electronic goods and have the dissemble equipment to recover resources from them safely. Computer owners in Sydney are just simply not aware that there is a place in Sydney that does recycle computers. The problem in this case comes down to a lack of awareness, and is highlighted in a later section.

Leasing

When a company leases computers from a corporation such as Dell, the computer still belongs to the lessor. The responsibility of disposing the computer is then up to the lessor. From a financial perspective, this is great for businesses because they never even have to deal with it. This in their books is an asset. However, in many cases it is not entirely feasible to have all the computers within the organisation leased from a company such as Dell. In some organisations, full ownership of computers is a necessary and therefore leasing is not an option.

Donating

Donating computers to people unable to normally afford them is a positive and very humane thing to do. This touches on the problems of the Digital Divide where some people are disadvantaged due to their lack of computer ownership and experience. The advantage for an organisation to donate a computer to a person who cannot afford their own is that the computer's remaining lifetime is not wasted and also that someone else can benefit from this act of generosity. This is all well and good; however the problem that arises here is that the responsibility for the disposal of the donated computer then falls upon the person receiving the computer. There are no initiatives in NSW and especially in Sydney that donate computers as well as look after its safe disposal on behalf of the person receiving the computer after they have exhausted any need for it. Consequently it can be assumed that a majority of donated computers simply end up in a landfill afterwards.

Reselling and Auction

Companies like Dell seek to profit from any computer goods that are still useable. They neither recycle nor dissemble the computer themselves but instead offload that responsibility to HMR. By the same concept, it would not be any worse for a company or a computer owner to sell their computers and profit from it. This, of course, is under the assumption that the computer is still able to be of some use. The original computer owner is no longer responsible for the disposal of the computer, and has shifted the responsibility and profiting from it at the same time. Again, a computer won't simply disappear when the next owner is done with it; the problem of its proper disposal still remains.

Dissembling Computers and Recycling

What is to stop more recycling companies to join the fight against electronic waste? The main problem is health and safety. It is simply not as easy as breaking it all up into bits and throwing them into a melting pot. Because of the various components that contain toxic substances that prove detrimental to a dissembler's health, meeting the health regulation standards in Australia is not easy and ultimately proves to be quite expensive. Places that ignore the health issues involved, as evidenced in Guiyu, are able recycle computers for much a cheaper price while their workers are exposed to materials that have adverse effects on their health and the environment around them. HMR and MRI are the two major recyclers in Sydney that openly attempt to recycle computer products. They first dissemble the various components and have specialised equipment to break up the rest safely, such as a CRT crusher that safely breaks CRT tubes, separating the various parts into further categories such as glass, ferrous and non ferrous materials which can then be further processed and recycled.

SO WHAT DOES UTS DO WITH ITS COMPUTERS?

Central Point of Control

It is a concern that a majority of students and staff do not know what happens to the computers at UTS. Many of them are also unaware of who would know the answer. UTS places the life cycle of their computers under one central point of control and they have assigned this responsibility to an Asset Control Officer who is responsible for keeping track of all the computers in the university. When a staff member requires the disposal of an old computer, they would contact the computer department of the faculty who would then usually collect and pass on the old computer to the asset control officer. Staff members are therefore unaware of the entire process involved, leading them to make assumptions based on the method of computer disposal at UTS. The Asset Control Officer often has meetings with other members of UTS staff every few weeks to decide upon the best course of action required in the disposal of those computers. They usually follow a general policy that covers a majority of the assets that they need to dispose of and which will be discussed in the subsequent subsections.

Donations – Computers with Negligible Monetary Value

Computers that are considered well beyond the requirements of the average PC user today are considered to have negligible monetary value. In 2004, the Asset Control Officer takes this to automatically include the Pentium II level desktop computers. These are currently donated to the Wesley Mission for refurbishment who in turn donates them to needy charities and others who cannot afford to spend the money for a new one but would do well with one. UTS has a scheme whereby students unable to afford computers and are disadvantaged by the lack thereof are able to sign up onto a waiting list for a free computer. These computer donations only include the computers considered to have negligible value and are no longer needed by the campus. Ownership is transferred wholly to the student who meets the eligibility criteria upon receipt and is then responsible for its subsequent disposal.

Resale – Computers with Monetary Value

The UTS Asset Control Officer usually finds that while no-one the university no longer has need for a certain computer, that the computer is still of some monetary worth. These computers are advertised for sale and UTS is then able to make a profit from its disposal. The computers are sold with full ownership of the computer to the buyer and UTS is no longer responsible for how its disposal.

Leasing

UTS also lease some computers from Dell. Dell is therefore fully responsible for the life cycle of these computers. Once a leased computer reaches the end of the first stage of its life cycle, Dell seeks to either refurbish and resell it, or send it off to HMR for recycling. UTS therefore have no responsibility in this matter.

A MATTER OF AWARENESS in everyone

Who Knows

One of the most worrying problems is that most people simply do not know anything about computer recycling, and are content with their computers ending up at a landfill. Those that are aware simply do not know how to go about it. When having the topic brought up to them and explained, we have found that many people think it is a great idea to recycle computers and want to know more about the various avenues for the recycling of computers. At UTS, information regarding the disposal of computers is scant and difficult to find. Searching through the website for information regarding this is difficult and cumbersome. Ironically, any information regarding this can be found when searching using the keywords "General Waste Disposal". This easily demonstrates the reason why most staff and students at UTS have no clue regarding the proper disposal procedures of computers.

Who Cares?

Many attempts have been made to introduce awareness about computer recycling by the state government, and most of these have failed and even been forgotten. One prime example of this is the 'Recycle IT!' pilot campaign that was launched by the NSW environment minister in conjunction

with the Australian Information Industry Alliance and Resource NSW. This pilot program for the local computer owners in Western Sydney ran between 15 November 2002 and 31 March 2003. It is easy enough to find information about this program being launched, however one year later it might as well have been forgotten. Such campaigns have not even been initiated at the university, leading the authors to wonder at the apparent lack of interest for this topic from the general public. Again, this is because of a lack of awareness among the staff and students.

General Legal Requirement

Unlike other countries like the U.S., it is not a legal requirement that a computer owner must dispose of their computer properly within a set of guidelines. While there are laws that state computers are a hazardous waste due to levels of certain chemicals within them, they are not enforced in the local population and only the export of them for anything other than reuse is prohibited by the Hazardous Wastes Act of 1989 [DEH04]. Because of this, computer recycling is a topic that is generally ignored as there is no requirement to do otherwise.

Lack of Incentives for the general population

One reason stopping many people from recycling their computers is that there are no incentives. Dumping your computer in the landfill or having it collected as a part of council waste services will involve less effort than bringing it to the nearest computer recycling centre or paying to get it picked up and delivered there. The incentives need to involve awareness – that improper disposal contributes to the deterioration of our environment. Of course, it would be great if the government offered a small rebate on your next computer for computers sent to a recycling centre, or if it even made it interesting by offering small prizes. Even if it increased awareness by making the scheme more attractive it would do no harm, such as the scheme to phase out analogue phones by having a take back scheme would last a while in people's minds thus increasing awareness and thereby lessening its impact on our fragile environment.

CONCLUSION WITH RECOMMENDATIONS

In concluding this report my group would like to make the following recommendations to help dispose of this problem. These are suggestions that have been compiled by us from our own ideas and from ideas mentioned to us by other students and IT professionals. These ideas are also the most feasible ones that we came across.

Policies

In 2002, the University of Western Australia decided to adopt a computer disposal policy [UWA02] that specifically outlines steps that should be taken in order to dispose of a computer. They based this on a similar policy outlined by Alan Gay of Oxford University in 2000. This also covers the need for removal of important data before having it leave the University's possession. It would be wise for UTS to follow suit, and have a specific computer disposal policy that is available for viewing by any UTS staff and students so that they know what happens to computers in the University and are more aware of the end of the computer life cycle. They currently have a sustainability policy under which the disposal of computers is undertaken, but a specific policy regarding this matter would be beneficial.

Educating the Staff

Staff should be educated through implementation of this policy so that they are made more aware of the importance of what they do with their computers. The staff would also be reminded of the need for data removal as that too is an important issue that is beyond the scope of this report.

Educating Students – The Future of IT

While the practices within the industry today in regards to computer disposal are not able to reach a common standard, it is possible that the students of today may be taught the importance of computer recycling as they enter the industry and be prepared for it. With this in mind, we suggest that UTS educate their students from their very first year on the facts regarding computer disposal. This is to counter the problem of lack of awareness that is abundant in the IT industry.