E-WASTE AT MEMORIAL UNIVERSITY OF NEWFOUNDLAND: MOVING ALONG THE RUBBISH IS NOT TAKING OUT THE TRASH

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E-Waste at Memorial University of Newfoundland: Moving along the rubbish is not taking out the trash

by

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ABSTRACT

Electronic waste (e-waste) as a research subject is relatively new. Studies of electronic waste have tended to focus upon what are termed 'end-of-life' issues around discarded electronic devices. What has developed in the last decade is primarily a story of rich countries dumping their unwanted electronic equipment on the unsuspecting poor in developing countries, with serious environmental and human health impacts resulting. This thesis challenges this simple narrative by examining the practices of electronics disposal at a Canadian university. This examination of disposal practices illustrates both that the simple narrative emerging from current e-waste research is problematic because not all that is discarded becomes waste, but also because mandatory electronics recycling is likely to shift negative environmental and occupational impacts related to electronics disposal from one place to another rather than ameliorate them.

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List of Abbreviations and Symbols

BAN	Basel Action Network
CRT	Cathode Ray Tube
ENGO	Environmental Non-Government Organization
EPA	Environmental Protection Agency
F.I.R.E.	Finance, Insurance and Real Estate
FTP	Follow-the-practices
FTT	Follow-the-thing
IC&I	Industrial, Commercial and Institutional
IT	Information Technology
ITAD	Information Technology Asset Disposal
LCD	Liquid Crystal Display
MSW	Municipal Solid Waste
MUN	Memorial University of Newfoundland
RRA	Resource Recovery Act
US	United States

INTRODUCTION

Introduction

This thesis is about e-waste. E-waste is typically presented as the detritus resulting from the use and thoughtless disposal of electronic equipment. E-waste is framed as an unavoidable outcome of the increasingly short lifecycle times for electronic products like cellular telephones and personal computing equipment. Stories in the popular media continue to reproduce this narrative as one that involves rich countries of the north dumping electronic trash on the unsuspecting poor in the global south (see for example CBC News 2008; CBC News 2010a; CBS 2008; CBC News 2010b; PBS 2009). And the narrative offered by the media is a part of the story of electronic stuff, to be sure; but it is not the whole story. I do not mean to claim here that this thesis does offer the whole story. Instead, I want to tell a different story about electronics and what happens to equipment that is no longer wanted and needs to be moved along. The rationale for wanting to tell this story is grounded in the wealth of studies being published by universities about e-waste, and the dearth of studies being conducted about universities and e-waste. Said another way, if scholars agree that e-waste is a problem (some do, some do not), what is our contribution to the problem? Specifically, regarding my school and my geographic region, there is little data that exists regarding the amounts of e-waste that are produced by institutions like Memorial University of Newfoundland (MUN) in a given year (cf. PHA Consulting Associates 2006). In order to make a contribution to this poorly understood area, I used the following questions to guide my study:

- What does MUN define as electronic waste and how much electronic waste does MUN produce on an annual basis?
- What are the institutional practices that transform electronic equipment assets into waste?
- How do these practices of disposal at MUN constitute broader geographies of waste and value?
- What are the 'conduits of disposal' (N. Gregson, Metcalfe, and Crewe 2007a) that Memorial employs to divest itself of its assets and how do they work?

The rationale behind choosing MUN as the main site for this work is as follows. MUN is the largest university in Atlantic Canada. It is located in the province of Newfoundland and Labrador, a jurisdiction that has only recently developed a legal framework for the management of discarded electronic equipment. This framework has not yet been fully developed into a formal electronic waste management system (for full details see Government of Newfoundland and Labrador 2012). Because the legal framework for the management of discarded electronics is still in development where I live (in terms of its implementation as a management program), the outcome of discarding electronics is not certain. That is, a governing framework does not fix the status of electronic objects on discarding as waste or otherwise. This leaves open the possibility to do different things with our electronic discards.

Moreover, while the insights presented throughout this thesis were drawn from a particular location (MUN), the insights presented here about practices of divestment

(taken broadly, I will unpack this in more detail later in the thesis) travel. That is, MUN is not a unique institution in terms of its size and the amount of IT equipment turnover that goes on at MUN. There are many sectors including finance, health care, and government that might offer institutions of similar size, with similar IT usage patterns. This is not to say that conducting a similar study at different institutions might yield similar results in terms of what kinds of waste and how much, but instead that my seemingly simple research questions would likely illustrate equally complex sets of practices that materialize more than just electronic waste. However, before I make any claims about electronic equipment disposal at MUN and why this is a problem because e-waste is being created, I needed to establish what was actually happening at my own school. What follows is the story of how I did this.

Thesis Organization

This thesis is organized into three main chapters situated between an introduction and a conclusion. Broadly, each chapter aims to answer an overarching question. In the first main chapter, I ask the seemingly simple question of 'what is e-waste'? In the second main chapter of this thesis I wrestle with the question of why counting the amount of e-waste produced in a given place (I use MUN as the place, but the argument holds for many places and jurisdictions) is problematic. In the last main body chapter of this thesis I rephrase a question asked by Frank Ackerman in the title of his 1996 book "*Why Do We Recycle*"? Here, the organizing question is not why do we recycle, but instead when

should we recycle? The reason for organizing this work around these questions is related to my theoretical framework, and the work of Annemarie Mol in particular. Mol is a Dutch ethnographer and philosopher, and in her 2002 book The Body Multiple she describes her approach to research as praxiographic. That is, Mol insists on attending to practices. Mol states that: "...in practices objects are *enacted*. This suggests that activities take place – but leaves the actors vague. It also suggests that in the act, and only then and there, something *is* – being enacted" (pg. 32, 33). This notion of practice enacting things is key to my work, because this idea destabilizes the popular notion of e-waste being axiomatic category of materials, which is "the most rapidly growing waste problem in the world" (Puckett et al. 2002, 1). Instead, by taking a praxiographic approach, the possibility is opened up that spent electronic equipment might be enacted as e-waste, but it may not. It may be donated for re-use. It may be thrown in the landfill, enacted as "bulk garbage", as it is described by the City of St. John's, NL ("Curb It Recycling St. John's, Newfoundland: Curbside Bulk Collection" 2010).

The point here is that if we insist upon studying the equipment that has been sent overseas for recycling and publishing that this is *the* problem, then we as scholars are enacting that set of practices as *the* problem. But again, this is not the entire story. My aim with this thesis is to interfere with the typical narrative around e-waste by illustrating that we do different things with discarded electronics, and that by focusing on one particular issue and designing solutions for one particular issue, we may create other problems or unintended effects. Instead, by engaging with multiple practices leading to multiple enactments of electronic discards as both waste and value, but also as rubbish,

we might be better able to parse out which practices are problematic and which are not. Furthermore, by engaging with practices of discarding and moving things along, I am able to highlight the value of Thompson's (1979) covert category between waste and value, the rubbish category. That is, the typical narrative around e-waste suggests that electronic equipment moves from that which is being used and valuable, to that which is discarded as waste. However, when we attend to practices in an institutional setting, Thompson's rubbish category is not only enacted through practices, but it is a crucial placeholder category that sees goods at MUN move not only from value (as assets) to waste, but also back to value, again depending upon practices.

Literature Review

Chapter Two of this thesis contains my literature review and an outline of my theoretical framework. The purpose of this chapter is to bring together two separate literatures. On one hand, I will provide an overview of the diverse e-waste literature, a body of work that has benefited from contributions by scholars, environmental non-government organizations, environmental consulting firms and government organizations. In this section of the literature review I aim to illustrate that the idea of electronic discards as waste is a relatively new idea, and that the some of the early work around electronic discards framed this stream of material not as waste but as potential value to be recovered. Said another way, discarded electronic equipment is, and always has been, enacted in multiple ways. It is appropriate then to ask, if not answer, the

question of what e-waste is. Is it waste, value or rubbish? Is it all these things? My argument in this chapter is that e-waste is more than one thing, but less than many (Mol 2002, 55). It is an issue of environmental justice, as well as environmental and occupational health and safety. However, e-waste is also about data security. It is about the increasingly necessary protection of private and proprietary information that is stored within some types of electronic devices. Furthermore, e-waste is about the recovery of valuable materials such as precious metals. Taken together, the e-waste literature is a diverse literature that addresses all of these issues, however they are typically addressed as singular problems. However, as I attempt to demonstrate throughout this thesis, these problems are relational and it is not easy to pull them apart. That is, if MUN decides that placing surplus IT equipment in the local landfill is no longer an acceptable fate (due to environmental concerns), recycling will likely be chosen as a 'better' option. However, there is little support in the literature that recycling electronic equipment has less impact on the environment than does landfilling the same equipment, particularly when the transportation and processing of electronic equipment to ready it for recycling is taken into account. If MUN decides to recycle equipment on the basis of data security, then there remain questions about the environmental impacts associated with protecting our information. E-waste then is not a problem, it is problem multiple. I will unpack this idea later in the thesis.

The e-waste literature will then be brought into conversation with a broad literature that I will call 'waste studies'. This literature contains contributions from anthropology, sociology, geography and history. I have also included in this literature

key selections on the topic of recycling, a cornerstone idea when discussing e-waste as problematic or a potential opportunity. The waste studies literature must be brought into conversation with the e-waste literature in order to push the e-waste literature forward. That is, waste studies scholars have adopted and developed several approaches to the study of waste that I argue would be of tremendous benefit to studies of e-waste. For instance, waste studies scholars tend to approach waste as something that is the outcome of a process, rather than an act (N. Gregson, Metcalfe, and Crewe 2007b). This is a departure from studies of e-waste that tend to focus upon post-disposal practices, informal dismantling, industrial materials recovery or environmental and occupational health issues related to the toxicity of electronic discards. More simply, where e-waste studies are generally concerned with 'what the problems are', waste studies scholars have tended to study 'how things are done'. This notion of the practice of wasting as a process rather than a thoughtless act is one that studies of e-waste can benefit from, as historically those doing the wasting and the practices that they employ have largely been taken for granted. There are two important points to make here. The storyline (cf. Hajer 1995, 62) of environmental and occupational injustice as they relate to electronic discards, while no doubt a serious issue, may not be the largest problem created by the disposition of unwanted, unused or non-functioning electronic equipment. Furthermore, by attending to the practices of wasting, and taking the approach that discarding things is a process and not an act, then there exists the potential to intervene in advance of equipment being aggregated and shipped to the marginal poor in developing countries.

Memorial University Currently

In this chapter, I contrast the current surplus asset disposal system with practices that I encountered both as a participant observer as well as through interviews conducted across the university campus in 2009. In this chapter, I offer an answer to one of my research questions regarding how much e-waste MUN produces in a given year, but more importantly I show that collecting data from archived disposal records in order to answer this question provides at best an incomplete answer. Furthermore, as waste studies scholarship has shown, practices of disposal are bound up in producing and reproducing the identities of those who are doing the disposing (N. Gregson, Metcalfe, and Crewe 2007b). This is a theme that also shows up in the literature that is specific to recycling. At MUN, what I demonstrate is that this claim about disposal being bound up in the production of identities is at work on many levels, from the individual to the departmental level to the institution as a whole. Simply put, some people are aware of and use the surplus asset disposal system, some are not and do not and then there are examples in between.

The take-home message in this chapter is that while I did collect approximately 5600 disposal records pertaining to the moving along (N. Gregson, Metcalfe, and Crewe 2007a) of electronic equipment, and I did sample these records (see Chapter Three), this numerical exercise should be read with an important caveat. That is, certain practices are being recorded while others are not. It is difficult to determine how much of the moving

along of electronic equipment is represented by the disposal record archive and how much is moved along with no record to consult. This is precisely why an engagement with practices should be a focal point for studies of e-waste. The moving along of electronic equipment enacts more than waste. It enacts rubbish, it enacts value and it enacts identities. The moving along of e-waste is a story about more than just how much stuff is trashed every year and what should be done about this trash at the very last opportunity.

Memorial University in the Future

After providing a snapshot of the disposal of electronic equipment at MUN currently, in Chapter Four I offer a speculative narrative of what future electronics disposal at MUN might look like. This narrative, while speculation, is grounded in fieldwork that I undertook in Ontario visiting several electronics recycling facilities. My speculative mode is further grounded by an announcement made in the February 2012 issue of The Gazette, a MUN campus publication, which alerted the campus that Apple Computers was coming to MUN to collect and recycle St. John's e-waste. The article outlined that this event would happen in May 2012 (it did not) and that all collected equipment (from both the public and the campus community) would be sent to a recycling company in Mississauga, Ontario to be recycled.

In this chapter I take the reader along as we follow-the-thing (FTT). This method of social science research has been used to study various commodities (see for example Cook 2004; Cook and Harrison 2007a; Cook 2006; Dwyer and Jackson 2003; Kleine 2008; Long and Villarreal 1998; Ramsay 2009), and more recently it has been both employed to conduct studies of waste and used as a discussion point for waste studies (see for example Nicky Gregson 2011; N. Gregson et al. 2010; N. Gregson, Crang, and Watkins 2011). In following e-waste in Chapter 4 as it moves from the MUN campus to a recycling facility in Ontario, I show that while following things is a useful method in order to establish the trajectory of wastes and establish what happens to things when they are discarded, making 'thingness' the focus of study is problematic. Instead, I follow Mol and suggest that we engage with the practices of e-waste recycling rather than the thingness of e-waste itself. By attending to the practices of e-waste, researchers are able to open up spaces of enquiry that allow for the ongoingness (cf. Lepawsky and Mather 2011) of recycling as an activity. That is, scholars can follow things as they come apart, are transformed and remade. In addition, they can follow and engage with the knock-on effects of materials coming apart, being transformed and remade, be they economic, environmental or something else that may be completely unintended. I end the chapter with an open question, paraphrasing Frank Ackerman, who penned the book "Why do we recycle?" (Ackerman 1997). Rather than ask why though, I offer that by engaging with practices and ongoingness (cf. Lepawsky and Mather 2011), a more appropriate question might be "When *should* we recycle?"

Methods

My initial research questions were developed under the overarching question of how things that are waste in one place become value in another. I was interested in how waste becomes waste. I knew that because I was interested in an institutional setting, some of these processes were formalized through policy but I wanted to see how these policies were enacted in practice. To this end, I needed to speak to those who were ridding themselves of electronic equipment, those who were able to authorize such activities as well as those whom actually move the items in the process of what Gregson et al term "moving things along" (Gregson, Metcalfe, and Crewe 2007a). The logical result of these decisions was the adoption of a mixed methods approach that employed both quantitative and qualitative components.

The quantitative component of this research was a simple document collection exercise. Memorial University of Newfoundland (MUN) keeps disposal records for all institutional assets that are disposed of. I gained access to these records and collected approximately 5640 disposal records pertaining to the disposal of electronic equipment specifically. In order to determine what counted as electronic equipment I consulted the Nova Scotia electronic waste regulation, as Newfoundland and Labrador had not yet formally defined the equipment that counts as electronic waste. I chose the Nova Scotia regulation because it was suggested to me during one of my interviews that Newfoundland and Labrador would likely follow what Nova Scotia was doing (see

Chapter 3). A representative sample of the collected documents is reproduced here in Chapter 3. This document collection presented three key challenges to this project, and these challenges highlight the importance of a need to more fully engage with the processes of disposal rather than the act itself. First, in analyzing the documents collected and sampled for MUN, it became clear that the categories that the Nova Scotia regulation has adopted to identify equipment that will count as electronic waste upon disposal are not particularly useful or informative. The Nova Scotia phase 1 and phase 2 equipment categories group wide ranges of items that are materially quite different. For example, one category includes laptop and desktop computers and peripheral equipment. This category allows one to make some very general statements about what is being disposed of, but it makes items that vary in size (and as a result in material composition) from a desktop computer tower to a mouse essentially equivalent. Secondly, when a list of departments that had reported disposing of electronic equipment was compared with a complete list of organizational units that comprise Memorial University, only 50 percent of such units have ever filed the paper required to dispose of institutional assets. Third, the quality of the documents collected varied from complete disposal forms to forms that were incomplete or filled out in a way that did not communicate clearly what was being disposed of. That is, these forms help to enact waste in particular ways. In other words, while the surplus asset disposal form suggests that all things being disposed may still hold some value (as assets that might be sold, repurposed or donated), the practices around this process enact this equipment much more as waste than surplus assets (things that fail to sell at auction are sent to the local landfill, for example).

For the qualitative portion of this research, I used several standard research methods including semi-structured interviews, unstructured interviews, non-participant observation and participant observation. The basic design of this research was modelled on the 'follow the thing' method (Cook 2004; Cook and Harrison 2007b). The interviews that I conducted can be divided into two types, those that I would call formal interviews and those that I would call informal. For the formal interviews, these are interviews that were set up via email or telephone in advance where I had introduced myself, as well as the project, in advance of the interview. However, as my research took place on campus I was often able to speak with people casually in a 'spur of the moment' way and some of the information that I will include in this thesis was collected in these less formal situations and conversations. For the formal interviews, a "problem centred interview" style was used (Scheibelhofer 2008). This style of interview combines both a narrative style interview in the early stages of the interview with a more structured style of interview in the later stages of the interview. For example, one might start out by asking a participant to describe their experiences using the campus disposal system for IT equipment. After hearing the views of the participant we can then ask some more specific questions regarding how much equipment they dispose of, or where they store equipment declared as surplus. The benefit of this approach is that the interviewer does not 'steer' the interview in the early stages, however a drawback is that this style of interview requires a skilled interviewer in order to encourage the interviewee without unduly affecting the content of the interview (2008; 412). This technique was used for 17 formal interviews carried out across the campus at MUN during the summer of 2009. Further to the conducting of interviews, I also made a decision in advance that I would

not record them. The majority of the participants that I interviewed formally for this project were 'elites', that is "they are [...] clearly in a position of power and raised social stature" (Stephens 2007, 205). As a result, I made the decision to make detailed field notes for each interview and reconstruct the interviews after they were conducted. This decision was made in order to facilitate free discussion of the issues around electronic equipment disposal at MUN. One negative aspect of this is that no matter how detailed one's field notes are, taking exact quotes from participants is difficult using this method. For this reason, where necessary I have summarized accounts given by participants and not quoted people directly.

Lastly, I engaged in both participant and non-participant observation. As a participant observer at our school, I helped dispose of electronic equipment. As a non-participant observer I visited several electronics recyclers located in southern Ontario, Canada in order to better understand how and where the electronics being disposed of in Newfoundland might be routed and processed in the future, since there are presently no such facilities present in Newfoundland and Labrador.

In the next chapter I will illustrate how these various enactments of electronic waste and electronic scrap are brought into being through the practices that I observed and discussed at Memorial University of Newfoundland. Here we will see how disposal practices enact this equipment in various ways and how these enactments create and sometimes gesture towards particular geographies of waste and value. This chapter will also outline why a focus on practices, or a praxiographic approach (following Mol) may

be preferable to a follow-the-thing method. In the subsequent chapter we will continue to challenge the follow-the-thing method by examining what I term the information-material nexus. That is, while the materiality of electronics can be a toxicological and environmental hazard when these devices come apart, there is another set of hazards that are potentially mobilized when some of these devices refuse to come apart. These hazards are not just material however, they are also very much about information.

Conclusion

This chapter aims to introduce the topic of e-waste and some popular framings of this subject, and to situate my thesis within this body of work. I aim with this thesis to begin to bridge two literatures, the e-waste literature on one hand and the waste studies literature on the other. I began this project by asking some seemingly simple questions about how much equipment my own university disposes of in a given year and where this equipment might go. These seemingly simple questions though led me to re-examine my subject, and to ask what is e-waste, why is counting e-waste problematic and when should we recycle e-waste? In asking these questions, I try to offer a different story of e-waste. Here, I offer a story that is not about one group taking advantage of another, nor is it a story offering a solution to a pre-existing problem. Instead, I answer the question of how much equipment MUN disposes of in a given year, and I answer the question of where this equipment goes. But in doing so, I show that the disposal of electronic equipment at MUN does not create a neat, tidy singular output that is e-waste.

LITERATURE REVIEW

Introduction

This project is about electronic waste. It is about the institutional collection, aggregation and management of discarded electronic equipment. More broadly, it is about the categories of waste and value. My research contributes to two distinct literatures, and I aim to create a linkage between these literatures. On one hand, my research speaks to the literature around electronic waste and it contributes by offering a glimpse at the volume of e-waste produced at a medium sized Canadian university and how institutional policy and practice aid in the production of waste. On the other hand my research speaks to a literature that I will call 'waste studies'. The waste studies literature is a diverse literature that has developed through the work of scholars in anthropology (e.g., Thompson 1979), sociology (e.g., Zsuzsa Gille 2007), geography (N. Gregson, Metcalfe, and Crewe 2007a; N. Gregson, Metcalfe, and Crewe 2007b; Nicky Gregson and Crang 2010) and history (e.g., Strasser 1999). Both of these literatures have been enormously influential to my thinking and my work. This chapter aims to bring the e-waste literature into conversation with the waste studies literature and show that both literatures can offer each other valuable ideas and approaches. The electronic waste literature can benefit from considering the disposal of electronic waste as a process rather than merely a thoughtless act. The waste studies literature can benefit from the electronic waste literature by grappling with the issue of multiplicity (cf. Mol 2002) as it relates to e-waste. That is, the waste studies literature has long been fascinated with the way that

stable objects move into and out of the categories of waste and value (see for example Thompson 1979). More recently, this attention to stable objects has become a point of criticism and an opportunity to push this literature forward (see for example N. Gregson, Watkins, and Calestani 2010; 2010). The e-waste literature (including my own research) can help to inform the waste studies literature as electronic waste is problematic both when the material that comprises the equipment comes apart (via the release of toxic constituents) and because sometimes this equipment refuses to come apart (presenting a data security problem).

At the outset, this project might appear to be a simple exercise in counting and reporting. In that sense, it may seem that this project would not differ greatly from the broader discourse around e-waste, a discourse that is largely focused upon the amounts of e-waste 'out there', and why this fast growing waste stream is problematic (see for example Puckett et al. 2002; Schwarzer et al. 2005; Johnson 2008; Herat 2008; "Climbing the E-waste Mountain" 2005). But this is not my project. This will not be another story about mountains, tsunamis or the growth of streams. Instead, I wish to suggest that perhaps a part of the problem of e-waste is the way that it is studied. That is, perhaps there is another way to study e-waste. At present, the majority of the work done around e-waste is related to volumes of e-waste. From here the move is typically to show how these volumes of waste are shunted to the poor for inappropriate handling and disposal (see Puckett et al. 2002 for the watershed study on this), or how these volumes of waste represent a lost opportunity to recover value through materials recovery (see for example Castro and Martins 2009; Cui and Zhang 2008; Macaskie et al. 2007). But these

stories about e-waste are missing something that the waste studies literature has been saying for some time, that all that is discarded is not moved directly into the waste stream (see for example 2007b; 1999). Because this is so, it might make sense then not only to engage with the evidence of electronic equipment that has already been discarded, but to attempt to try and engage with the processes of discarding, disposing, ridding or moving along. This is where my study is different. Of course I am interested in the question of how much electronic equipment at MUN is discarded, but more importantly I am interested in the question of how this is done in practice.

To that end, this thesis will engage with the material outcomes of the disposition of electronic equipment from a Canadian university, but it will also engage with the practices that bring this material (as surplus at MUN) into being. By engaging with the practices of moving along that which is no longer wanted, what becomes apparent is that, as Gregson et al (in particular here see 2007b) have shown, these practices produce more than just waste. The practices of moving along that which is no longer wanted create a stream of material, some of which is waste. Some equipment is moved on to others who continue to use it. Some equipment is donated, other equipment sold at auction. But in addition, the practices that produce a stream of materials to be moved along also produce (in part) and reproduce the identities of those who are doing the discarding. From individual people, to departments to the entire institution of MUN, we are not merely what we move along, but we are *how* we move things along.

In fact, the previous sentence is the crux of the argument that I am presenting here. Typical studies of e-waste are sure that there is a thing called e-waste, and these studies present e-waste as an axiomatic category of materials. And this is precisely where I want to interfere. That is, I suggest that we take seriously the question of what e-waste is. Is e-waste a category of materiality that presents us with a materials recovery problem? Should we focus on recovering as much valuable material as possible from this stream of waste (i.e., gold, platinum group metals)? Is e-waste an occupational and environmental toxicology problem? Should we focus upon the control of flows of this stream of materials internationally, protecting the marginal poor from receiving materials that they did not generate? Should e-waste producers be responsible for managing their own e-waste? Is it a data security problem? Should all e-waste be shredded in state-of-the-are industrial recycling facilities? What is e-waste? What is the e-waste problem? In answering all of these questions, one thing becomes clear. E-waste can be thought of as more than one, self-evident thing. And this is a problem, because the literature around e-waste rarely questions what e-waste is, and rarely engages with the multiple nature of e-waste as both a thing multiple and a problem multiple.

There are two critical points to this work. First, in typical studies of e-waste, the fact that things get thrown out or trashed is taken for granted. What is of prime importance in these types of studies is how much is trashed. These types of studies tend to gloss over the fact that moving things along is messy, and that not all that is moved along is trashed. Because this is the case, the 'size' of the problem of e-waste (via the amount of electronic equipment that is being discarded) may rarely be reflective of

reality. Moreover, building solutions to 'the e-waste problem' based on these types of studies might be building solutions (via recycling and materials recovery infrastructure) to a problem that is only partially enacted in practice. I am not saying here that vast amounts of electronic equipment are not manufactured, sold, used and discarded in the world year after year after year. Of course this happens. But to assume that all that is used and discarded is trashed goes against years of work in the field of waste studies that states that this does not, in fact, come to pass. My own research bears this out as well. Yes, there is a sizeable archive of disposal records for MUN, which I was granted access to, but as I show in the next chapter, what this archive actually represents is an open question.

In order to illustrate how these two literatures can benefit each other I will proceed in the following manner. First I offer a simple theoretical framework that will underpin my entire thesis. I unpack this below. From my theoretical framework, I provide a thematic review of the e-waste literature, highlighting how particular practices enact e-waste as particular (and quite different) things, rather than a monolithic and problematic single category of stuff. This notion of multiplicity is crucial to my work, and also crucial to the e-waste discourse because it is difficult if not impossible to tease out one problem related to the disposition of electronic equipment from another. For instance, if data security is the problem with disposal of electronics, and the wholesale shredding of equipment is the most effective way to ensure data security, then there are risks of environmental contamination (above and beyond just energy consumption and pollution related to the transport of e-waste to recycling facilities, see Chapter 4) from the

act of shredding equipment and releasing toxic substances from equipment. Similarly, if environmental justice is considered the primary problem and a wholesale blockade of shipments of discarded electronics to developing countries is put in place, then how do the marginal poor in developing countries access equipment that will allow them to connect to the Internet? Next, I review the waste studies literature and demonstrate that not all that is discarded is waste, and that the discarding of stuff is best thought of as a process rather than an act. From here I show how each of these literatures have valuable concepts that can benefit the other. I conclude this chapter with a suggestion about why these two literatures, taken together, might aid in the formation of a surplus electronics management framework at MUN in the future. I also provide a preview of Chapter 2, a snapshot of what happens to surplus electronic equipment at MUN currently.

Theoretical Framework

A simple theoretical framework underpins this thesis. This simple framework is based upon the marriage of the work of two scholars. Primarily I draw on the work of Annemarie Mol, a Dutch ethnographer who describes her work as empirical philosophy. In particular I rely on her 2002 book *The Body Multiple: ontology in medical practice* (2002). To this work I add the 1979 work, Michael Thompson's *Rubbish Theory: the creation and destruction of value*. In one sentence, my theoretical framework is as follows: things (such as used electronic equipment) can be enacted as waste objects, or rubbish objects or valuable objects via particular sets of practices, and these same things

can move from one category to another (i.e., from value to waste, from rubbish to value, etc.) through further rounds of particular practices.

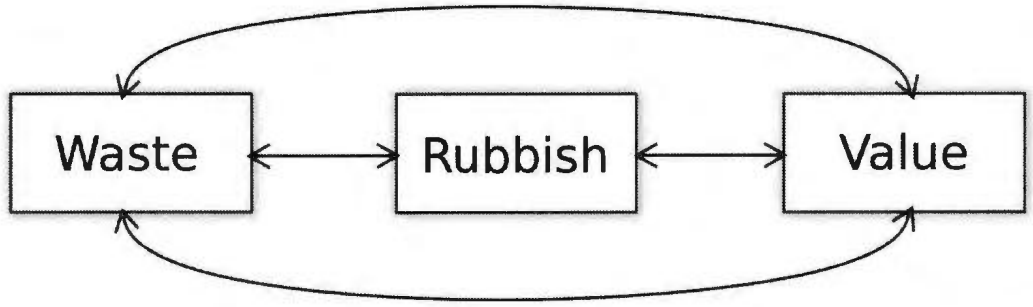

Figure 1: Illustrated theoretical framework. Arrows indicate practices that move objects from one category to another.

As shown in Figure 1 above, the rubbish category exists between waste and value. The rubbish category contributed by Thompson is crucial to my work and my argument. Thompson describes the rubbish category as a placeholder for those objects "of zero and unchanging value" (1979, 9). The fundamental argument of my thesis is that while the dominant storyline (cf. 1995) around e-waste is that of used electronic equipment being sent to developing countries to be dismantled by the marginal poor, electronic equipment rarely moves from that which is valuable directly to that which is waste. In many instances, no-longer-wanted electronics are moved not from the category of value to that of waste, but rather to the category of rubbish. Said another way, e-waste is not a forgone conclusion, the logical and necessary outcome of the usage and discarding of electronica. However, in much of the literature around e-waste, e-waste itself is presented as an unavoidable result of the use of electronic equipment. This thesis aims to illustrate that even in a university setting, where there is a large amount of information technology

equipment turnover, what happens to used equipment is not a certainty and e-waste does not necessarily result.

The Development of E-waste[1]

Electronic waste is a growing problem. Much of the literature around electronic waste frames waste from electronics in this way, but this was not always the case. In fact, it was not so long ago that disposed electronic equipment in the United States was not seen as a problem, but rather as a solution to the perceived garbage crisis. That is, arguments were beginning to surface in the late 1960s and early 1970s that electronic scrap (as it was then termed) was an opportunity to help solve 'the problem of rubbish' (see for example "Novel Solutions to Trash Problem" 1968; "Solutions Sought for Problem of Rubbish" 1968). The diversion of electronic scrap from landfills would serve two beneficial purposes. First, it would mean that this equipment would not end up in local landfills and therefore ease the burden on overtaxed landfills across the United States. Secondly, it was known that much of the electronic equipment that was being disposed of was precious metal bearing and therefore this material could be recovered and reused. That is, there was value to be recovered here. The appearance of newspaper articles supporting precious metals recovery from electronic scrap ("Novel Solutions to Trash Problem" 1968; "Solutions Sought for Problem of Rubbish" 1968; "The Scrap

[1] The historical view of the development of the category of e-waste that I offer here is partial and situated. As a student in North America I have focused upon the development of the category of e-waste, how this category has developed in North America and why this category is problematic and how North America is implicated in e-waste as a problem. The category of e-waste has a different history of development in North American and in Europe, and I have chosen here to focus on the jurisdictions that will most strongly impact the location of my own university.

Heap Bonanza" 1970) was closely followed by scholarly work attempting to outline ways in which value (as valuable materials) could and should be recovered from this portion of the waste stream (see for example Greene 1970; Kleespies, Bennetts, and Henrie 1970; Dannenburg, Maurice, and Potter 1972; Kenahan et al. 1973; Mungovan 1974; Wallace 1974; Spendlove 1977; Dunning Jr 1978).

This framing of waste from electronics as an opportunity for the recovery of value and a partial solution to the wider waste crisis is indeed a very different understanding of this material than is that of the more recent e-waste literature, which frames e-waste primarily as a hazard. There are factors that might account for this very different understanding of waste from electronics, and attentiveness to practices here may help identify some of these factors. For example, 1970 was an important year for the United States in terms of the environment and waste management more specifically. This was the year that the United States Environmental Protection Agency was created. From the US EPA website:

> "Born in the wake of elevated concern about environmental pollution, the U.S. Environmental Protection Agency opened its doors in downtown Washington, D.C., on December 2, 1970. EPA was established to consolidate in one agency a variety of federal research, monitoring, standard-setting and enforcement activities to ensure environmental protection ("EPA History | About EPA | US EPA" 2012)"

Also in 1970 in the United States, the 1965 Solid Waste Disposal Act [Public Law (Pub. L.) 89-72] was amended by the Resource Recovery Act (RRA). The Resource Recovery Act "provided the Environmental Protection Agency (EPA) with funding for resource

recovery programs." ("The Office of Health, Safety and Security" 2012). In a sense, 1970 is a pivotal year in the United States in terms of how concern for the environment is institutionalized, but also it was this year that instituted the partitioning of solid waste into sub-categories. The discursive shift from waste to resources via the RRA amendment is an important moment to recognize, as we now have the recovery of resources from solid waste as a federal institutional goal in the United States. This goal to recover resources might partially explain the work in the early 1970s by the US Bureau of Mines to establish effective methods to recover precious metals from electronic scrap (Singleton and Sullivan 1973; 1973; 1973; 1974; 1974). The literature around electronic scrap may have been born in the 1970s but it continues up to the present day, however, it should be noted that the terms e-scrap and e-waste are now used more interchangeably. For example, the largest electronics recycling industry conference in North America is titled "E-Scrap" (see www.resource-recycling.com) but as my attendance at this conference revealed, the use of the term e-waste is quite common in expert presentations and industry marketing material.

Another point needs to be unpacked here. In the early 1970s, as the EPA website reminds us, there was an elevated concern about environmental pollution. One fraction of this problem was thought to be the disposal of post-consumer solid wastes in the United States, a concern that in part sparked interest in electronic scrap in the first place. The US EPA notes that between 1960 and 1970 the amount of solid waste generated in the United States increased from 88.1 million tons to 121.1 million tons ("Municipal Solid Waste in the United States: Facts and Figures | Municipal Solid Waste | Wastes |

US EPA" 2008, 1). This increase in the amount of waste generated is often attributed to the notion of the United States as a "throwaway society" (see for example Bernheim 1992; Lee 1990; Page 1981; Spiegelman and Sheehan 2006). What is often lost in this reference to a throwaway society is that this is a somewhat a-historical picture that is being painted. As historian Susan Strasser (1999) reminds us, the 'default setting' for life in America prior to 1900 was re-use and recovery of materials. People had to be trained into this throwaway behaviour; it is not and has never been a historical given that the United States is a throwaway society. I mention this to illustrate that the notion of the recovery of value from wastes was not an innovative maneuver, but rather a call to return to a practices and behaviours that were at one time the norm. More broadly as we will see in the next section, the move from electronic scrap to electronic waste can be thought of as a shift towards modernity. People had to learn to think about things not as finite resources that might be mended and re-used but as things to be disposed of and replaced. Similarly, while electronic scrap frames waste from electronics as a source of opportunity and potential recovery of value, electronic waste views this same material as disposable electronic gadgetry, and this disposable gadgetry becomes problematic when it is improperly handled as waste.

This framing of waste from electronics as potential value that may or may not be recovered has continued on until today. This framing of waste from electronics also appears in the more recent e-waste literature, particularly in literature appearing prior to 2002 (see for example Gloe, Muhl, and Knothe 1990; Dhara 1991; Roy and Whelan 1992; Kreft 1993; Allen and Behmanesh 1994). These articles however, are in the

minority as the dominant themes within the recent electronic waste literature revolve around technical fixes to the e-waste problem, toxicology studies and environmental and social (in)justice (see for example Chen et al. 2010; Guo et al. 2010; Herat 2007; Ivanus and Babaita 2008; Lim and Schoenung 2010; Jiang, Shi, and Chen 2010). This understanding of waste from electronics is clearly quite different from that of value recovery and the partial solution to a problem, but what accounts for this difference? To answer this question, we must shift our gaze momentarily from the post-consumer realm to the realm of production.

As early as the 1980s, a literature appeared around the potential health hazards associated with working in the microelectronics industry (LaDou 1984; LaDou 1986; LaDou 1983), although this literature focuses upon the production and manufacturing practices of electronic equipment rather than the dismantling of equipment. At roughly the same time, the environmental non-government organization called The Silicon Valley Toxics Coalition was formed. This group was formed in response to the discovery of toxic contamination of the groundwater in Silicon Valley, pollution resulting from the production of microelectronics components in the area. This literature is critical to the formation of the current e-waste discourse as the conflation of the microelectronics industry with hazardous and toxic chemicals and metals might be considered a forerunner to the contemporary understanding of e-waste as harm and hazard. There are two things to be noted here. First, the research relating the production of microelectronics to hazardous and toxic materials was carried out in the United States, the same place that the electronic scrap literature was born. This is worth noting because while we have

evidence here of the association of microelectronics and harmful materiality, there is no mention of other countries. That is, the problem identified at this time is a localized problem specific to one region in the United States – a distinct spatialization of the issue. While contemporary literature around e-waste often positions the e-waste problem as a problem of rich countries dumping their unwanted refuse on the marginalized poor, the initial 'problem' of the harmful materiality of electronics was not associated with their wastes, and nor was it associated with developing countries. In the 1980s, it was not the flow of materials and material objects from one country to another that was problematic, but rather the flow of chemicals on a much smaller scale that was identified as the problem. Secondly, this literature suggests that contrary to an opportunity to solve a problem and recover value, electronics are linked with harmful effects (at least during production).

While attention mounted during the 1980s and 1990s to the potential environmental and human health costs that underwrite the production of many microelectronic devices, there was a concurrent perception that regulations were tightening with regard to the disposal of hazardous wastes in general (Palmer, Oates, and Portney 1995; Ladou and Lovegrove 2008). One result of this perceived tightening of regulatory frameworks for the disposal of hazardous waste, coupled with the increasing acknowledgment that electronics contained harmful substances was the cost to dispose of electronic devices was rising. This increased cost of disposal was avoided by employing what the Basel Action Network (BAN) termed "hidden escape valves" (Puckett et al. 2002, 1)in order to dispose of this equipment in a low-cost way. These hidden escape

valves are more commonly known as developing countries. In view of the work of scholars like Jennifer Clapp (see for example 2002), the extent to which these 'escape valves' are (or were) hidden is certainly debatable, but nevertheless, this watershed publication by the Basel Action Network could be considered the report that delivered electronic waste as it is now commonly understood to the world today. There are several things happening here that are important. First, we have the discursive shift from electronic scrap as potential partial solution to the garbage crisis, to electronic waste as a problem. Second, we have the shift from the production of electronics as hazard to the disposal of electronics as hazardous wastes. Third, with these discursive shifts there is a concurrent geographical shift from the continental United States to 'offshore' places like Guiyu, China.

With this discursive and geographical shift, we now have a very different electronic waste than the one that I contend we begin with back in the late 1960s. As I suggested in the introduction to this chapter, this contemporary understanding of waste from electronics as e-waste is partial. Much of the recent work around electronic waste recreates a history of scholarly work around e-waste that is partial and rarely acknowledges the early e-scrap contributions. The literature that I would term the contemporary e-waste literature (that created since the late 1990s) has its own short course of development, and the trend within this literature is where this chapter began: the oft invoked claim that electronic waste is a growing problem. This claim is almost ubiquitous in the contemporary electronic waste literature, but the way that this claim is unfolded helps us to outline the major themes in the contemporary literature. In 2002,

BAN focused attention on the dumping of electronic waste in Asia and some of the consequences of this activity (Puckett et al. 2002). In retrospect, the executive summary of this report reads like a roadmap for the contemporary e-waste literature, published since the release of BAN's 2002 report. It begins by claiming that electronic waste is "..the most rapidly growing waste problem in the world (1)." The summary then touches on the amount of e-waste being generated, toxicological issues, how industry as well as government and consumers are implicated in the problem, illegal export of e-waste and how 'recycling' can be framed as a solution when in reality recycling as a solution is debatable as the term 'recycling' is often interpreted in creative ways. While this report is certainly not free of a particular ideological stance – in particular a ban on the exports of e-waste without the consideration of what happens to those who depend on e-waste processing as a means of subsistence -- a great deal of the scholarly work on the subject of electronic waste has followed these themes quite closely.

Since the BAN report, the amount of e-waste being generated has been a popular topic of study, producing several scholarly as well as government and consultancy reports regarding how much e-waste might be out there waiting for management (Knight, Schneider, and Ingenthron 2008, see for example; Babbitt et al. 2009; Saphores et al. 2009; Saphores et al. 2006; Williams et al. 2008; Price and Kwan 2007). There is also a burgeoning literature specific to the toxicological issues that arise out of the improper handling or the informal recycling of electronic waste (see for example Guo et al. 2010; Jiang, Shi, and Chen 2010; Lim and Schoenung 2010; Brigden et al. 2005; Huo et al. 2007; Ma et al. 2009). More broadly, government, industry and individual consumers are

implicated in the creation of this waste stream. These consumer groups are often linked to the exporting of this waste overseas, and evidence of this has been uncovered in the form of equipment bearing government and industry asset tags. The consumption of electronics and related moral, ethical and legal disposal issues is reflected in what I would call the wider electronic waste management literature. This portion of the contemporary literature tends to address issues relating to the management of the export of wastes, recycling processes, the recovery of materials or the assessment of risk related to these various management issues (see for example Cleevely 2002; Roman and Puckett 2002; Macauley, Palmer, and Shih 2003; Spengler, Ploog, and Schröter 2003; Lehner 2003; Darby and Obara 2005; Kang and Schoenung 2005). Here we see that while BAN and many others since have framed and continue to frame electronic waste as a growing problem, it appears to be understood as multiple problems: it is at once an environmental and occupational health problem, a data security problem and a materials recovery problem.

This is not to suggest that the current framing of electronic waste as a problem and a hazard is the only way that the disposal of electronic equipment is framed. On the contrary, what we are actually seeing is a sort of return to the early framing of electronic scrap as an opportunity. This can be seen in the latest United Nations report "Recycling – from e-waste to resources" (Schluep et al. 2009), as well as in much of the recent work on electronic scrap (see for example Wronski and Luczak 2010; Ivănuş 2009a; Ivănuş 2010; Ivănuş 2009b). Recall, this approach to waste from electronics never faded entirely, it just took a temporary back seat to the younger and much different enactment

that is e-waste. What I have attempted to do here is to provide a narrative that briefly encompasses the chronological development of different notions of waste from electronics; on one hand framed as a solution and an opportunity for the recovery of value and on the other hand understood as a growing problem and a scourge. Both of these versions of disposed electronics, through literature as varied as legislation, environmental non-government organizations, industry organizations and scholars, position this equipment as "a self-evident category" *qua* waste (Gregson and Crang 2010, 1027). That is, be it electronic scrap or electronic waste, the scrap and waste are self-evident. It is a category of post-consumer material objects that need to be recovered, managed, and controlled.

The Waste Studies Literature

In the section above I have provided a chronological look at the development of a category of materials that have come to be understood alternately as electronic scrap and electronic waste. I suggest that this understanding of these materials can be explained by following Mol, who offers us the idea of enactment. For Mol, objects are enacted through practices rather than merely self-evident things. By thinking about the production of electronic scrap and electronic waste in terms of how they are enacted through practices, at least two seemingly distinct 'things' appear. As I have argued above, by focusing on the practices that enact electronic scrap we are confronted not with practices that are about hazards highlighting environmental and social injustice but rather

we are confronted with materials as a source of value. This enactment of waste from electronics however is interesting in that the recovery of value through materials recovery as electronic scrap appears to be specific to certain geographies. The marginal poor in places like India, China and Nigeria do not appear to have access to electronic scrap (e-scrap) according to sources such as Greenpeace (Greenpeace 2005; 2008), BAN (2002; 2005) and the popular media (see for example CBC News 2008; 2010b; 2010a; CBS 2008). E-scrap is an enactment of waste that is particular to developed countries. Said another way, the enactment of e-scrap has an associated spatiality that contributes to its identity as scrap rather than waste. That is, e-scrap can be thought to represent a geography of value and not a geography of waste. What is interesting about this geography of value is that it begets geographies of waste that are rarely part of the e-scrap literature. By this I mean that electronic scrap is enacted as the recovery of value vis a vis heavy industrial practices that are required to separate the complex assemblages of material that comprise electronic equipment back into constituent commodity grade materials. The smelting of shredded and separated portions of this equipment is deemed necessary to recover copper, gold and lead from these complex assemblages in large quantities. This activity though is not without its own environmental costs, which have been well documented (see for example Vanbellen and Chintinne 2008; Telmer et al. 2006; Hilts et al. 1998; Hilts 2003; Goodarzi, Sanei, Garrett, et al. 2002). When these activities are undertaken in developed countries on an industrial scale, this is enactment of waste from electronics is framed as responsible recycling. This is an excellent example of an imaginative geography. We rarely acknowledge the environmental negatives that necessarily accompany the economic positives with responsible recycling.

We imagine that we are doing the right thing, the responsible thing, but we sometimes fail to notice that there are negative outcomes as well as positive here. For instance, large industrial scale smelters are a necessary part of recycling e-waste. But these large-scale industrial sites are also notorious point-source polluters (see for example Goodarzi et al. 2006; Hou et al. 2006; Mayer et al. 2007). Additionally, there is some evidence to suggest that the environmental impact of transporting e-waste beyond a certain distance, any net gain in terms of environmental impact reduction via recycling is lost (cf. Barba-Gutierrez, Adenso-Diaz, and Hopp 2008). However, when this activity takes place in a small backyard operation in a developing country for the purpose of recovering small amounts of valuable materials this enactment of waste from electronics is seen as e-waste, an environmental scourge.

The various enactments of electronic discards as e-scrap and e-waste outline the foundation for my thesis work. When we imagine ourselves participating in activities such as responsible recycling of electronics we imagine materials recovery and the sequestering of potential hazards. We might further imagine that we are helping to curb the export of electronic waste to places that are ill equipped to handle this material. This geographic imagination though, also helps us to ignore the distances that our discarded electronic equipment might travel in order to be responsibly processed at an approved recycling facility. It further ignores the reputation that certain recycling facilities (i.e., smelters) have as environmentally contentious hotspots. Said more succinctly, when we imagine ourselves doing the right thing we sometimes may not understand the entire process and the geographies we make in enacting waste from electronics as responsibly

recycled electronic scrap. Furthermore, if we look at the enactment of waste from electronics resulting in electronic waste, we might fail to realize that while the practices of informal recycling of electronic equipment overseas is undeniably hazardous to both humans and the environment in some instances, it is at its essence, an attempt to recover valuable materials. However, for the marginal poor, the stakes might be higher in securing access to these resources, as they are way to subsist. This enactment of waste from electronics however, enacts a very different object than that of electronic scrap.

Mol's focus on practices that enact objects is similar to the work of Gregson, Metcalfe and Crewe (Gregson, Metcalfe, and Crewe 2007a; Gregson, Metcalfe, and Crewe 2007b) who offer a way to understand waste not as an axiomatic category of materials but as the outcome of a process. They offer the idea that there is a crucial difference between the process of discarding and the act of discarding. The process of discarding for this group of scholars is critical to the formation of identities rather than a thoughtless act that deserves no deeper consideration. More recently Gregson and others have focused their attention on waste as a process of objects coming apart (Gregson, Watkins, and Calestani 2010; Gregson and Crang 2010; Gregson, Crang, and Watkins 2011). This move seems to extend the focus on processes beyond the act of discarding and squarely into the realm of 'post-consumption' or post-disposal. This maneuver has clear benefits, as it allows for the consideration of the creation of value post-disposal, a move that problematizes linear models of directionality in terms of production, consumption and disposal (for more on this conversation see Lepawsky and McNabb 2010). While this extension of the focus on practices from pre-disposal to post-disposal

is important, particularly in terms of the study of waste from electronics and how they are enacted, the focus on things coming apart is somewhat conceptually limiting. The problem with focusing on the material 'unbecoming' of things in terms of waste from electronics, particularly in an institutional setting, is that when institutions such as universities and government offices discard electronic equipment, they rarely do so because it is falling apart or it has become technically obsolete. This equipment is often moved along as a result of administrative or fiscal policy while it is still in good working order and it is still recognizable as whole objects or pieces of equipment. While I agree with Gregson and Crang (2010) that a move to more fully engage with materiality is useful and that as scholars there is a vast territory of waste that has yet to be grappled with (they note industrial, agricultural and construction wastes specifically), a focus on the coming apart of objects is limiting to scholars of e-waste. Moreover, it is this stubborn refusal of some of the material objects of electronic waste to 'unbecome' in a material sense that has brought issues of data security into the spotlight. That is, when some electronic equipment is discarded it is not the materiality of the equipment that is insecure, it is the data stored in the equipment. Similarly, it is not the material 'unbecoming' that is to be avoided but rather it is the information that we might wish to keep private that might leak, escape or move out of the realm of our control. This presents an opportunity for considerations of the various enactments of electronic waste to add to the waste studies literature this will be examined in greater detail later in the thesis.

As Gregson et al (2007b; 2007a; 2010) have focused upon the production of waste as a process that necessarily precedes the act of discarding, sociologist Zsuzsa Gille has made a substantial contribution to waste studies by engaging with the wastes from production in socialist and post-socialist Hungary (2007; 2010). For Gille, the focus upon the wastes occurring as a result of production processes should be of primary concern, as decisions about how things broadly conceived are produced and what materials are used in order to carry out production highlight one way in which wastes are politicized. Further to this, she argues that while manufacturing inputs remain the sole domain of corporations and the cleanup of wastes remain the purview of municipalities and the broader public, the logical result of this dichotomy is that unintended negative effects related to disposal will continue to occur. This consideration of the wastes from production is one that is almost non-existent in the contemporary e-waste literature, as I have argued above. Gille also highlights the ways in which the ascription of potential value to materials considered to be waste can have unintended consequences, and this claim bears thinking about when waste from electronics is enacted as electronic scrap. As I mentioned above, the recovery of materials from electronic scrap is often enacted as a way to recover value and be kind to the environment through recycling. However these practices are contingent in developed countries upon heavy industrial processes that have a poor environmental record. So, while we are encouraged to recycle our discarded electronics, this activity is not without concomitant environmental costs and these environmental costs are rarely part of the discussion around recycling.

More recently, Samantha MacBride has questioned the very practice of recycling in her 2011 book *Recycling Reconsidered* (2011). This book illustrates through a series of chronological case studies that recycling, while being largely thought to be an environmental success, has largely been ineffective in moving society towards more sustainable waste management practices. The central argument for MacBride is that large corporate interests have actively fostered the notion that recycling is a grassroots activity that is focused upon a small number of materials, transforming meaningful materials recovery and throughput reduction into what MacBride terms 'busyness'. That is, as long as individuals and municipalities are responsible for the majority of the recycling efforts that currently take place, corporations who extract materials and manufacture products are free to continue extraction and production practices without having to implement more meaningful sustainability policies on an industrial scale. Because this is so, MacBride shows that the amount of materials recovered and recycled since the 1970s is a small percentage of the amount of materials extracted and consumed during the same period. In other words, recycling as it is currently done is more about keeping the public out of industrial practices of extraction and production than it is about sustainable waste policy.

The work of MacBride can be thought of as the evolution of the work of Ron Ackerman, who wrote the book *Why Do We Recycle* in 1997 (1997). This wide ranging book looks at recycling as a set of practices that are variously considered market driven, value driven and policy driven, and he provides numerous examples of each. Ackerman discusses and analyzes popular arguments for and against recycling, illustrating

ultimately that recycling as a set of practices does not exist in response to one single issue such as a perceived landfill shortage, or a solution to the problem of littering, but instead that recycling is bound up in economic, environmental and personal issues. Ackerman ultimately provides a prelude to the work of MacBride when he takes on the production of goods from corporations versus the production of material goods from modern households:

> "Most municipal solid waste consists of manufactured goods; the purchasers and users of these goods in homes, stores and offices have little say about material use in manufacturing, where the decisions that generate waste are made. While households in the past were intimately involved in production as well as consumption, today the yard and the kitchen are the only places where most American households produce material objects. Even these production processes are constrained by the available technologies and inputs, and by social pressures such as community standards about lawn care (Ackerman 1997, 165)"

Here we see not only a prelude to MacBride, but also a strong resonance with the work of Gille that I introduced earlier. For these authors of waste studies, the discarding of goods is one practice in a set of linked practices that make up disposal, wasting and ridding. These authors all highlight that while discarding is an important issue, the production or manufacturing of material goods is a critical part of the discarding story, and why the story of discarding is sometimes a story of negative environmental and human health impacts.

As shown above, various waste studies scholars have contributed to an understanding of waste not as a self-evident category of materials, but rather as the result

of processes or enactments. Waste from electronics as enactment is the way in which my work will proceed, and this aligns my work squarely with that of Gregson et al as well as Gille. The reason for this is twofold. First, the 'throwaway society' conception of the way that people discard things has been shown to be problematic via Gregson et al (2007b; 2007a) and the broader academic focus upon the process of discarding (see for example Hawkins 2001; Moser 2002; Strasser 1999). Secondly, as my work is interested in institutional settings, proceeding with the assumption that institutions throw things away without thinking about is easily refuted by the examination of disposal policies for various institutions. Moreover, as Gregson et al suggest, these waste disposal policies are rarely about the mere act of discarding institutional assets, they are in some ways about identity creation and management. It is in the interest of university and government offices to be seen as good corporate citizens.

In this sense, it is not just waste studies that have something to offer scholars of electronic waste, but it is also electronic waste that has something to offer waste studies. The taking apart of objects is unquestionably important and a focus on materiality 'unbecoming' is a useful way to think about wastes and waste in the making, but in terms of electronic waste it is conceptually limiting. Institutions employ many different "conduits of disposal" (Gregson, Metcalfe, and Crewe 2007b) to rid themselves of their electronic devices. These various conduits help to enact particular types of discarded electronic equipment that range from garbage to donation to the storage of equipment. A more generous reading of the term 'unbecoming', however, is of great potential value to the study of electronic waste as well as to the waste studies literature, and that of waste

from electronics as produced by institutions in particular. Taking the term 'unbecoming' to mean that which is not appropriate or not attractive is an appropriate term to use for institutions such as universities. These institutions have an interest in being (and being seen as) places at the cutting edge of technology. Here, electronic equipment may be shunted into the waste category because it is unbecoming in ways that have little to do with falling apart. This equipment might be at the end of an administratively imposed lifecycle, or it might be a victim of technological innovation (e.g., the move from Cathode Ray Tube monitors to Liquid Crystal Display flat-panel monitors). The process of moving things along in this sense has less to do with material unbecoming than it does to the becoming and maintaining of institutional identities (for more on waste and identity see Hetherington 2004; Gregson, Metcalfe, and Crewe 2007a).

Conclusion

It is my hope that my work can make a two-fold contribution, even if only a very small one. First, there has been some work done regarding the production of electronic waste at institutions such as Memorial University, but this work has been largely quantitative modeling work (for an excellent example see Babbitt et al. 2009). My work is less concerned with generating numbers of equipment being disposed of than it is with what these disposal numbers might mean and how we collect them. Said another way, I am interested in how the tracking of disposal information is done and what it might tell us about how we compose the problem of waste-value relations in the first place.

Secondly, my work makes extends a conversation between the electronic waste literature and the broader waste studies literature only recently begun (see Lepawsky and McNabb 2010). In the next chapter I will examine the practices of disposal and the data that I collected at my own school, Memorial University of Newfoundland. In the last chapter I will attempt to answer the call of Gregson and Crang (cf. 2010, 1026) to more fully engage with materiality and also problematize their recent interest in the way that objects as waste come apart and how and why this is worth thinking with and through.

MEMORIAL UNIVERSITY AT PRESENT

Introduction

This chapter will focus on the generation of rubbish electronics at MUN. I use the term 'rubbish electronics' rather than e-waste in this chapter intentionally. Recall from the previous chapter, I draw on Michael Thompson's Rubbish Theory (1979) to sustain my argument. Thompson offers a third category that exists between waste (what Thompson calls the Transient category) and value (for Thompson, the Durable category), called rubbish, which he uses as a placeholder category. In developing his theory of rubbish, the category of rubbish is critical, as this is the category that allows the transformation of objects of decreasing value (those things in the transient category, or waste) to move from waste to value. There are two key points to take away from Thompson's work. First, the framework offered by Thompson allows for the ontological status of things to change. That is, objects of value may degrade into waste. Or objects of value can degrade to the point of zero and unchanging value, that which he calls rubbish. However, under certain conditions, things can move from rubbish back to value. Secondly, Thompson's work suggests the possibility that things do not necessarily follow a nice, neat, linear trajectory from things that are new and valuable to things that are old and waste.

To the work of Thompson I add the more recent work of Annemarie Mol (2002) who describes her work as empirical philosophy. I detailed the work of Mol in the

previous chapter also, and the crux of her message is simple: practices enact reality. That is, things are brought into being through practices (see 2002, 32). By utilizing a framework that allows things to move in and out of the categories of waste and value via the rubbish category, and by further claiming that the way that these movements occur is through practice, I am able to problematize the common understanding of e-waste as a stable and axiomatic category of materials. Moreover, I am able to offer an alternative approach to studies of rubbish electronics that does not take for granted outcomes of practices that only create e-waste.

Said another way, the majority of studies conducted on the topic of e-waste have taken as their focus the amounts of e-waste being generated. These studies have been conducted by environmental non-government organizations (see for example Greenpeace 2005; Greenpeace International 2008; Puckett et al. 2002; Puckett et al. 2005), which have focused primarily upon the occupational and environmental impacts of the disposal of electronic equipment. Another twist on the theme of the amounts of e-waste being generated is studies outlining how much materials recovery might be possible (see for example Johnson 2008; Krikke 2008; Pinto 2008; Ivanus and Babaita 2008). While these selections from the literature have been of tremendous value to my research and my thinking, studies of e-waste focused upon large amounts of e-waste being generated (and then unpack why this is the problem either for negative reasons relating to occupational or environmental health, or to illustrate how opportunities for materials recovery might be increased, as two examples) tend to proceed on the basis of one assumption. This assumption is that all (or at least most) electronica that is used and then discarded is

moved into the waste stream where it will be rendered countable and deemed potentially problematic. However, much of the recent work of waste studies scholars shows us that this is often not the case. Instead, much of what is discarded or ridded is moved along (cf. N. Gregson, Metcalfe, and Crewe 2007a) in ways that demonstrate two things. First, the disposal of things is rarely a thoughtless act, contrary to the popular throwaway society myth. Second, there are many different conduits of disposal (cf. N. Gregson, Metcalfe, and Crewe 2007a) that are utilized to move things along in addition to the waste stream. The process of wasting, ridding or discarding is not simple, clean and one-dimensional. It is more than a mathematics problem, a toxicity problem or a materials recovery problem, as I demonstrate below.

Rather than providing a narrative here which illustrates how much e-waste MUN produces and why this is a problem, I make a different move. Here I engage with the practices that transfer electronic equipment from value to rubbish, and then from rubbish to waste or value. I then show how the management of rubbish electronics at MUN constitutes more than just a materials management problem where issues of human and/or environmental health and safety are involved. Instead, the ridding or moving along (cf. N. Gregson, Metcalfe, and Crewe 2007a) of rubbish electronics is also constitutive of individual, departmental and institutional identities. It is practices of ridding; wasting and moving along that offer what Gregson et al call an opportunity to 'materialize identities' (cf. 2007b, 682). What Gregson et al mean here is that, taking MUN as the example, the usage, turnover and moving along of electronic equipment is partly constitutive of the identity of MUN an institution. For instance, there is a need for MUN

to have available for the student body electronic equipment (computers, lab equipment, etc.) that is up-to-date because there is an expectation that students will be trained on equipment that will be relevant when graduates enter the workforce. Moreover, MUN must compete with other universities in order to attract and retain a healthy student population. Being technologically relevant is important here too. But this is only part of the story. MUN must also be responsible when it comes time to move along electronica that it is replacing, upgrading or refreshing[2]. The identity of this institution is constituted not only by what it acquires and stores, but also by what it discards and more importantly how it discards its surplus equipment (I will say more about the notion of surplus shortly).

Finally, identity is bound up in the ridding, moving along or wasting of some electronic equipment in one other critical way. That is, many current and recent electronic devices have the ability to store information in some type of memory. Because this is the case, and because MUN and institutions like MUN turnover large volumes of IT equipment, there is the possibility that private, personal or proprietary information may accidentally move off of the campus and out of the control of the institution. Here then, the materializing of the identity of MUN is also bound up in the protection of identities. Said another way, MUN is expected to handle potential material hazards

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[2] During my fieldwork, several participants referred to the MUN computer hardware standard (see "MUN University Policies: Computer Standards - Hardware" 2000) which allows MUN faculty and staff to replace computers every three years as the 'administrative refresh cycle' or just 'administrative refresh'.

arising from the use and disposal of electronic equipment appropriately, but there is also an expectation that sensitive information will be handled with the same degree of care.

In order to unpack the ideas that I have presented above, I proceed in the following manner. First, I will introduce the key tool used on the MUN campus any time that assets are being ridded, wasted or moved along. This tool is the Surplus Asset Disposal Form, which I will describe in detail below. I was granted access to the disposal records archive for the university and I collected approximately 5600 of these forms, as outlined in the methods section. A summary of the data that I collected appears below in Table 1.

Table 1: Summary of disposal forms collected. Asterisk indicates that disposal records noted multiple pieces of equipment being disposed of but no amounts were listed. These records were included here as single items.

	Laptop/ Desktop	Printers	Monitors	TV	Scanners	Phones	Fax	Cell/ wireless	AV playback /recording	MISC
2001					1					
2002										
2003	6*	2	1		2				5	2
2004	11	3	9	1	2		2		6	5
2005	134	23	62	1	3		2		12	7
2006	129*	29	95*	2	3				17	21
2007	57	7	27				1		3	6
2008	41*	14	28	1	3		1		5	3
2009	14		17	1					2	6
Totals	**392***	**68**	**239***	**6**	**13**	**0**	**6**	**0**	**50**	**51**
Projected 100%	3267*	567	1992*	50	108	0	50	0	417	425

From here I take you through the asset disposal form and outline the ways in which this form does particular work on the campus by coordinating activities related to the moving of things around and sometimes off of the campus. In the second part of this chapter I look at the ways in which the disposal form limits the ways in which assets being disposed of are made countable and documentable, and what some of the unintended consequences of these limitations are. In taking you through the disposal form, I will draw on the work of Bruno Latour who provides the notion of formatting (see Paris: Invisible City, Latour and Hermant 2006). That is, the disposal form can be read as a tool that formats both the people who have assets to declare as surplus on the MUN campus as well as the number of appropriate ways of disposing of these assets (or conduits of disposal cf. 2007a). By looking at the work that the form does explicitly as well as the ways in which the form limits the documentation of discarding practices on the MUN campus, I show how the disposition of rubbish electronics is more complex that just counting equipment that is potentially hazardous if improperly disposed of. Instead, the wasting, ridding and moving along of rubbish electronics is crucial to the formation and reproduction of individual, departmental and institutional identities at MUN.

The Surplus Asset Disposal Form

I wanted to know how the rubbishing of electronics is actually done at my school, and I was told in my first formal interview on campus that everything starts with the DECLARATION AND DISPOSAL OF SURPLUS PROPERTY form (Personal

Interview June 29, 2009). I have broken this form down into its constituent parts in order to describe how this form does particular work on the campus. In the wild, this form is a six-page legal-sized (8 ½ X 14 inch) document. The first section of the form (see Figure 2 below) is designed to collect information about you as someone declaring assets as surplus, where you are, how you can be contacted and what it is you wish to dispose of.

Memorial
University of Newfoundland

1144

DECLARATION AND DISPOSAL OF SURPLUS PROPERTY
PLEASE USE A SEPARATE FORM FOR EACH ITEM

Department, Faculty, School _____ Date _____

The Asset described is available for disposal. Good Fair Poor

Item _____ Make _____ Model _____ Serial Number _____

Fixed Asset Main Number _____ Vehicle License Number _____ Unit Number _____

Date Available _____ Pick Up Location _____ Fixed Asset Location _____

Departmental Contact _____ Phone Number _____

Authorization _____ Date _____

Figure 2: Part 1 of the Surplus Asset Disposal Form.

The next line of the form appears directly under the contact information section of the form, and is to be used if one is disposing of item(s) that may pose particular threats to those charged with moving equipment such as Restricted Articles, x-ray emitting

equipment or material, sources of radiation, etc., as seen in Figure 3 below.

Restricted Articles, Radioactive Source, X Ray Device, etc. Signature: FM Radiation Biosafety Control Officer

Figure 3: Part 2 of the Surplus Asset Disposal Form.

The third section of the form speaks directly to my work, as this is the section of the disposal form that pertains to computer data storage equipment. In fact, in the very first interview I conducted on campus with the person charged with the oversight of the asset disposal system for the campus, he noted up front that "...computers are very different" (Personal Interview June 29, 2009). What he meant by this is that the disposition of electronic equipment is a problem on campus, but not because of the material constituents of the stuff that is being discarded. Instead, this was an explicit reference to the problem of ensuring data security, privacy of information and brand protection across an entire university campus. The complexity of this process is outlined in Figure 4 below.

Computer Data-storage Equipment Only See http://www.mun.ca/dataremoval for details.

PLEASE DETERMINE WHERE DATA WIPING WILL OCCUR:

Check here to be picked up by Facilities Management for delivery to **Computing and Communications** for **data wiping**. ☐

Note: Equipment containing data, **to be erased by C&C cannot be combined on the same Surplus Form as peripheral devices, such as monitors.** Only the hardware containing data (typically the computer case) will be transported.

If the box above is checked, please contact the C&C Help Centre (737-4595 or *help@mun.ca*) to request data removal and quote the number on this form before submitting to Facilities Management. **Apply a red sticker** to the equipment for identification purposes. C&C will arrange Computer for Schools donations for systems wiped at C&C.

OR

If **data has been wiped in your own faculty or department**, by IT-classified staff, simply complete the Section(s) below and submit form to Facilities Management.

Data storage has been wiped: (See C.10 Data Removal Policy) IT-classified Employee (Required) Date (MM/DD/YY)

Figure 4: The data security section of the Surplus Asset Disposal Form.

Figure 4 outlines the procedure to be followed in the removal of any data storage device that is declared as surplus on the campus. The message contained in this section of the disposal form contains is clear, before any data storage equipment is moved off of the campus, the data must be wiped. Note that there are bubbles, check boxes, bold print, e-mail and telephone contacts provided to make this message as clear as possible. Two sections of the form remain. In the fourth section, there is an opportunity for equipment to be donated to the Computers for Schools program in the province, if the equipment in question meets the minimum specifications set by Computers for Schools (see Figure 5 below).

IT staff can determine whether equipment meets Computers for Schools (CFS) minimum specification and CFS should be contacted directly for pickup. If equipment does not meet CFS specification and is not signed for CFS pickup, then Facilities Management will arrange for pickup. CFS equipment should not be combined on Surplus Forms with non-CFS equipment.

Computer for Schools Donation:
(Call 834-2377 for pickup – see above) _____ Computers for Schools Representative _____ Date (MM/DD/YY)

Figure 5: Surplus equipment may be donated to Computers for Schools NL using this section of the form.

Finally, there is a section dedicated to the administration of the surplus asset disposal program. This section is important to note because it is here that the fate of equipment is recorded (i.e., where was the surplus item sent ultimately). Also note along the bottom of the form that there are six copies of this form for each disposal reported. This form is the key mechanism by which surplus asset disposal activities are coordinated across the campus. As we can see at the bottom of Figure 6 below, copies of this disposal form (when used) will make their way to three different parts of the Facilities Management

department, the local auction house (if the assets are to be sold at auction), Computing and Communications (if data wiping is required) and finally the Requisitioning Department.

COMPUTING AND COMMUNICATIONS USE ONLY Form and Equipment Received By:
(Retain blue copy after wiping and CFS donation completed):

Print Name:	Signature:	Date:

FACILITIES MANAGEMENT USE ONLY

Form Received	Received By:	Deliver Item To:
Item Removed	Receiver Signature and date	

White Copy: Facilities Management - Administration
Yellow Copy: Facilities Management - General Services
Pink Copies: Facilities Management - Auctioneer
Blue Copy: Computing and Communications (If sent to Computing and Communications for Data Removal)
Green Copy: Requisitioning Department

Figure 6: This section of the form is for use by Surplus Asset Disposal program administrators.

Table 1 shows that the majority of equipment that is declared as surplus on the MUN campus is computer equipment, computers, displays and peripherals. In keeping with my theoretical commitments I wish to engage here with the materiality of waste (cf. N. Gregson and Crang 2010). What I mean here is that I wish to engage with the stuff of waste. However, I wish to make a slightly different move here. There is an opportunity to read the call of Gregson and Crang (to engage with the materiality of waste) more generously. That is, the stuff of waste (as surplus electronics at MUN) is indeed material, but so are the practices that bring about this surplus material. By engaging with the practices that move equipment from value to rubbish and then out of the rubbish

category, the seemingly simple and unproblematic category of e-waste can be shown to be quite complex. Furthermore, by engaging with the material practices of rubbishing electronics, we see that there is more at stake than just the proper handling of potentially dangerous material goods. The proper handling of information, and also the production and reproduction of identities is also at stake here. To demonstrate these ideas, I will return to the disposal form.

To begin with, contrast what is shown in Figure 3 with what appears in Figure 4. Figure 3 deals explicitly with materiality. More specifically, it deals with materiality that might pose a threat to human or environmental health. However, Figure 3 does not speak to the handling of electronic equipment. There is a requirement (via signature) to enlist the expertise of a Facilities Management Radiation Biosaftey Control officer in order to dispose of particularly dangerous materials. The focus here is on the handling of material goods that might be problematic as they move off the campus. However, in Figure 4, a very different set of problems is being enacted. In Figure 4, the movement of materials vis-a-vis electronics is being controlled, but not in order to get them off campus. Rather, they are being routed in particular ways before they move off campus such that something different than materiality does not escape, leak or spill. This is the protection of information. It is not environmental protection here but rather the protection of proprietary or private information as well as brand protection.

It is important to understand that this is not simply a semantic difference. For instance, if one is disposing of a computer or other data storage device, it is the

coordination between the Facilities Management and Computing and Communications departments on the campus that ensures data storage devices are wiped and moved off the campus in an appropriate fashion. These data storage devices, once wiped, are placed in a truck by university employees and moved off the campus. Or Computers for Schools may collect them. No further special handling or treatment is undertaken. For anything outlined in Figure 3, the department of Health and Safety oversee the disposal. Moreover, the department of Health and Safety will contract out the disposal of hazardous items to a third party in Newfoundland which operates a hazardous goods management facility and the appropriate licenses for the transportation of hazardous goods within Canada (Personal conversation, May 31, 2012). Now compare the practices of data wiping on the campus with the popular story presented in the previous chapter by ENGO groups and the dangers of e-waste. The hazards the MUN are concerned with as they pertain to electronics are based on the information contained in particular devices, rather than harmful toxic substances.

The point I wish to highlight here is that while the popular story of e-waste is a story of human health and environmental impacts related to the use of toxic materials in the manufacture of electronics, and the release of these toxins on disposal. This is the predominant storyline. But at MUN, this storyline is not enacted in practice via the disposal form. Instead the concern about the dangers of e-waste is focused upon the care and control of information. At MUN then, when practices are attended to what we see is the enactment of electronics as a particular problem, but these practices do not enact data storage devices as dangerous because of toxicity. This enactment of electronic rubbish

does particular work in materializing the identity of MUN as an institution. Efforts are made to ensure that proprietary information is safe and accounted for. This is not a set of practices that speaks to sustainability or environmentalism, but rather a set of practices that materialize the identity of MUN as an institution that is trustworthy (and legally compliant with federal and provincial legislation) with respect to personal and research data. That is, there is a clear problem with rubbish electronics being disposed of at MUN, but this problem is enacted (via the disposal form) as a data security problem, not an environmental and occupational health issue.

As seen in Figures 2 through 6 above, the disposal form offers more than one option to the MUN community in terms of the ridding of surplus institutional assets. Figure 5 shows that electronics may be donated to Computers for Schools, and Figure 6 shows that there is an option that sees assets sent to a local auction house to be sold. In fact, there is an asset disposal hierarchy which is outlined on the MUN website. There are three official ways in which MUN policy states that university assets may be disposed of. First, assets are to be redistributed within the campus. If the department that an asset belongs to is unable to repurpose this asset then the asset can be listed on the computer redistribution website for campus wide distribution by filling out a form on the campus computer store web site ("Computer Purchasing Centre Online Re-distribution Program Page" 2012). If the individual or group responsible for these assets is unable to redistribute this equipment then these assets can be declared as surplus assets and donated to the provincial Computers for Schools program ("Computers for Schools (NL) - Home" 2005). The Computers for Schools program is a Canadian federal government program

that collects and refurbishes computers from government and business and donates this equipment to schools, libraries and not for profit learning centres across Canada. The program was developed at the federal level but is run individually by province (for more details see "Computers for Schools - Home - Computers for Schools" 2012). If equipment is not redistributed and is not a fit for the Computers for Schools program, it is collected and sent to a local auction house where, depending on the terms of the contract with the auction house, a certain number of attempts are made to sell this equipment.

The three conduits of disposal listed above are hierarchical, as outlined on the MUN website:

> "Any property that is surplus to a department's needs should be identified and options explored, in order of priority, either to allocate the equipment within the University, transfer the property to another publicly-funded institution, or offer the property to the public at large through solicitation of bids or public auction ("Surplus University Property (MUN)" 2005)."

Said another way, the options are, 'in order of priority', redistribute, donate or sell at auction. The disposal form and the policies outlining how and when the form should be used are clear. It would make sense then to assume that the majority of the electronic equipment that MUN moves along would be documented and countable because this system is in place. However, this is not the case. Instead, when we look at the documents surveyed in order to create Table 1 more closely, we see that an answer to the question of how much e-waste does MUN produce year on year is not as simple as counting the disposal forms. I suggest that there are two reasons for this. First, recall

from Figure 6 that completed disposal forms indicate where surplus assets are routed when they are moved along. Also recall that the disposal hierarchy for MUN indicates that 'in order of priority'; the auction house is the last option to be explored. However, in examining the disposal documents that I sampled, 95% of those documents outlined that equipment was sent directly to the auction house. Moreover, the disposal documents sampled only account for half of the departments on campus.

This is where Latour's concept of formatting is of help. For Latour, objects of the world act as much (or sometimes more) than humans do. In his Invisible City project, Bruno Latour takes readers on a walk through Paris streets. Along the way he is constantly commentating about how the objects that he encounters work to format him as various things, an average Paris metro rider (of average weight so as to fit the calculations of the engineers who designed the rail system and the carrying capacity of the cars), an automated teller machine (ATM) user who is able to read French (presented to the automat user at a certain acceptable average height), enter a card into the machine and memorize a security code such that they can access their money. He notes how pedestrian railings and gates at the metro offer or deny permission to move in certain ways (for more see Latour and Hermant 2006).

Reading the disposal form in a similar fashion, the form is doing work before anything on the campus is declared as surplus. This form is formatting both those declaring goods as surplus as well as the practices that move these goods from value to rubbish and beyond. To make this more concrete, there is no space on the disposal form

for routing surplus into the trash. Similarly, the disposal hierarchy outlined in the policies section of MUN's web site does not address or acknowledge the possibility that things might be placed in the trash, or end up as any other type of waste. Here then, the disposal form works to format individuals in the campus community as a group that uses, but does not 'throw away' any electronic equipment. The disposal form formats the identity of the institution of MUN as a place that never disposes of anything that is waste, and never puts assets in the garbage. Furthermore, it formats (and limits) the number of ways in which electronic equipment can be moved along at MUN. This of course does not mean that other means of disposal of assets are not employed, but rather it means that they are simply not rendered countable. These additional disposal practices then have no chance to become part of the disposal record at MUN, and as a result these practices will have little to no effect on the development of future e-waste policy development at our institution.

There are two points to be made here. First, not even the disposal form can fix the ontological status of discarded equipment. Second, the materializing of identities at MUN is sometimes in conflict between the institution, the department and the individual. The additional disposal practices (those beyond the practices outlined on the surplus asset disposal form) can be generalized along three lines. First, there are people who are simply unaware of the practices that have been outlined by the institution as the proper ways to move things along. Second are those who are aware of the practices and follow them (We always follow the policy). Third are the individuals who are aware of the practices and do not follow them (There is a lot of "don't tell anybody" going on). In

each case, the moving along of rubbishing of surplus equipment comprises a practice that in part materializes individual, departmental and institutional identities.

The ontological uncertainty of electronic equipment at MUN that is no longer wanted is in evidence as I sat at my desk in my office in January of 2010. A faculty member came in to ask me what to do with a few CRT monitors that the department no longer wanted. I suggested that they call facilities management and declare them as surplus. If that was not a satisfactory option I further suggested that they could be placed in the garbage (as outlined by the city of St. John's). After a short discussion about why there isn't a better fate for equipment that is no longer wanted on campus (no framework for the management of electronic equipment discards, no facilities in the province for the processing of discarded electronics, large distances to electronics recycling facilities), and a re-hashing of the university policies, I was asked if I could help a student move several monitors out into a dumpster behind our building. I did this and took some photos of the monitors in the dumpster (see Figure 7 below).

Figure 7: Computer monitors placed in a dumpster at MUN. Photo by author.

Here, I am a participant observer enacting this equipment as waste. But not e-waste. Municipal Solid Waste (MSW). This is not a semantic difference. Here again, I will lean on the province of Nova Scotia (NS), as much of my work is based on the regulatory e-waste framework in place in that province. NS has a framework that defines what e-waste is, and places a ban on the disposition of such equipment in NS landfills. In contrast, the province of Newfoundland had no such framework in place and in St. John's electronic equipment is still deemed 'bulk garbage' (see "Curb It Recycling St. John's, Newfoundland : Curbside Bulk Collection" 2010). The banning of e-waste from landfills in NS is designed to protect the environment from exposure to toxins housed in electronic equipment and keeping e-waste out of landfills in NS is a legal requirement. In Newfoundland, I was not in violation of any laws by helping move equipment off the campus.

I should also note here that my department was not moving along these monitors because they were obviously broken or not working (though I admit I did not test them, but when moving them they appeared intact). In fact, they were moved along because they were taking up valuable office space, which is always at a premium in our department. This moving along of working equipment in favour of creating more space speaks to departmental identity. More specifically, it speaks to the relative status of our department on the campus. This is not a slight against other departments, but rather it is illustrative of our department as one that is larger and has a higher turnover of assets. This is not the case with all departments on the campus however. Departmental identities are bound up in the ways in which they use and discard electronics, as I found out during the course of my fieldwork. An administrator in the Computing and Communications department told me '*There are lots of departments that hang on to their stuff for a very long time*' (Personal Interview July 24, 2009). This sentiment was echoed by two different heads of small departments on campus whom I spoke to. One told me '*When we get rid of something it's pretty much done*' (Personal Interview July 16, 2009). Another said '*By the time electronics leave [the department], they have little remaining utility as computers*' (Personal Interview August 12, 2009). These people were responding to questions about what they typically do with electronic equipment that they no longer want. In the above quotes though, it is clear that while some departments turn over equipment in good condition, other departments cannot afford to do so. In other words, departments materialize their identities in part by the type and condition of equipment that they are ridding themselves of. Above I have presented two different snapshots from

the field, one where good equipment is being moved along to make space, and the other where departments hang onto equipment until it stops working.

In contrast to the smaller departments that I spoke to, the following quote comes from the head of a large department on campus: '*We have a lot of grants and we buy a lot of equipment... we move a lot of equipment along .... we put it in the hall and we don't care where it goes .... we try and move it along and give it to someone ....there is a lot of "don't tell anybody" going on*' (Personal Interview July 13, 2009). This quote speaks both to the department directly (a lot of grants) as well as the individual desire to help someone else. This person, speaking on behalf of the department (we, we, we) illustrates how this department is a large, successful academic unit. They have a lot of grants and as a result, they have a lot of stuff. Because they have a lot of stuff, some stuff has to be moved along. They do the best they can, but their identity is materialized not by protecting the environment, but by quietly moving along that which they no longer need. They are a sizeable department, they are busy and things have to go. They use the surplus asset disposal system, but not for everything. Another participant I spoke to said that '*about a year ago we were told the protocol to follow when getting rid of computer systems is per system including serial number and asset tag number. Before this my protocol was to trash them*' (Personal Interview July 16 2009). Here the participant has changed the way that surplus disposal is practiced, and in so doing, they have changed the way that they materialize their own identity. A year before our interview, this person was exercising a level of decision making power that they no longer have. In both instances here, prolonging the lifespan of equipment is not a goal and it is not cited as a

practice. Rather, these are departments that make and remake themselves (in part) as successful academic units through bringing in the new and moving along the old.

Ethnographic work is a critical component of any study of e-waste (or electronic rubbish) in an institutional setting. The reason that I make this claim is grounded not in the interview evidence that I have presented, but back in the disposal forms. I say this because people practice disposal in ways that are not outlined on the disposal form. The evidence supporting this claim is found in the disposal records that I collected. The documents that I collected and sampled indicate that 95% of the time, surplus electronic equipment is routed directly to the auction house. Again, there are (or at least might be) good reasons for this. Redistribution is complicated and time consuming, making this potentially unattractive. Donation requires a certain grade of equipment, which the university often cannot provide (see the quotes from small departments above). Here then, the disposal documents indicate that the explicit hierarchy of disposal almost completely fails to be enacted in practice. There are three important things to note here. First, any equipment that fails to sell at auction is sent to the local landfill as waste. This is not made explicit in the policies at MUN. Second, even though the disposal hierarchy, as outlined in the policies of our institution, fails to be enacted in practice, this does not translate directly into radically different geographies of waste or wasting at MUN. That is, whether policy is followed or not, there is evidence that much of this traceable equipment may end up at the same place (the local landfill). Third, the disposal records do not represent the entire disposal that happens at MUN.

I compared the list of departments represented by the documents that I collected to a current list of departments on the university web site. The results of this comparison show that half of the university departments and institutes appear to have never disposed of any electronic equipment via the surplus asset disposal system. That is, 74 departments are represented in my document sample and 73 are absent. I include this comparison here not to try and illustrate some kind of mathematical or statistical veracity regarding the disposal data and participation rates. Rather, this comparison provides evidence that some departments use the system and others do not. What accounts for this seeming lack of participation in the institutional surplus asset disposal system? One of my key participants told me that he was '*...in discussions with various people from various groups around campus and the topic of e-waste was something that was getting a lot of attention but they have yet to come up with a satisfactory plan*' for managing this stream of institutional surplus equipment (Personal Interview June 29, 2009).

The crux of this chapter is not that things happening at MUN are bad, wrong or in some way illicit, illegal or inappropriate. There are three things that I have tried to illustrate here. First, the default ontological status of surplus electronic equipment at MUN is not waste. Similarly, equipment left in hallways, in storage closets, in offices is not waste. Nor is it necessarily value. It is somewhere in between. It is rubbish. Practices will dictate what this equipment becomes, and the status of this equipment can change and change back again as it might variously and alternately be practiced as waste and value. Second, because this is so, it does not make sense to collect disposal data and interpolate for missing data. That is, because everything should be done according to

policy does not mean that everything is done according to policy. This being the case, does it make sense to build a world around policy that often fails to come into being in the first place? Third, the situation at MUN currently results in few different or radical outcomes. Some equipment is redistributed, and some equipment is donated. The vast majority of documented disposal indicates that the auction house is the primary conduit of disposal. Equipment can and does end up in the local landfill. Some of this is due to policy not being followed, but some of this is due to policy being followed to the letter.

Conclusion

This is the situation at MUN now. However, MUN and the province of Newfoundland and Labrador will soon adopt some form of electronic waste legislative and management framework that will dictate how e-waste is to be done properly and legally (Personal Interview August 18, 2009). This will invoke particular ways of practicing electronics disposal that will necessarily include places outside of Newfoundland and Labrador, as critical electronics recycling infrastructure does not exists in this province. This means shipping large amounts of equipment great distances and processing problematic material assemblages in other jurisdictions. This does not eliminate the environmental problems associated with this equipment, it moves them somewhere else. This is the politics of e-waste. It is about doing the right thing. It is about doing the good. There will likely be little debate about landfilling e-waste here versus shipping it out of province for recycling. Recycling is the right thing to do; even

if is uncertain what the environmental benefits of this activity are. The next chapter will unpack this further.

MEMORIAL UNIVERSITY IN THE FUTURE

Introduction

In the previous chapter I offered an overview of how practices of disposal at MUN enact discarded electronic equipment (electronic rubbish) as both waste and value. In this chapter I speculate about the future of electronic discards from the MUN campus. I ground my speculation in interview evidence, site visits to electronics recyclers visited during fieldwork and more recently, an announcement by the campus that MUN will hold its first ever electronic waste collection event in conjunction with Apple Computers and SIMS Recycling Solutions in Mississauga, Ontario.[3] In this speculative mode, I offer one key idea – that when it comes to social studies of waste, following practices is preferable to following things. In order to provide evidence to support this single claim, this chapter is broken down into two sections. In the first section I offer a typical enactment of e-waste. In other words, taking my cue from the MUN announcement mentioned above, I follow an ontologically stable entity (e-waste) as it travels from the MUN campus to a recycling facility in Mississauga, Ontario. Here I build on the excellent critique of the follow-the-thing (FTT) method offered by Gregson and Crang (2010) to show that the very notion of thingness is a good place to start when studying wastes, but it does have limitations that need to be addressed. For Gregson and Crang, following things of

[3] See http://www.mun.ca/gazette/issues/vol44no10/e-waste.php (accessed March 5, 2012)

rubbish value allows them to 'address the back-end of the value chain' (2010, 847). But in this case, while the thing that they follow (an end-of-life ship) is shown to come apart and be transformed into other things, the value chain provides a stable thing and a stabilized trajectory to be followed.

The FTT approach also stands in stark contrast to Mol's "politics of what" (see 2002, 176). That is, my theoretical framework draws upon Mol's notion that practices enact reality. And because practices can differ by location, this offers up the possibility for reality to be enacted in multiple ways. Ultimately, Mol's project is to explore the differences between different enactments of atherosclerosis. The exploration of differences between different enactments of a particular thing is what Mol defines as a politics of what. But compare this with FTT. FTT relies on a stable thing to follow. That is something that we must agree upon in advance. We must follow *a* thing. But what happens when, as I have argued throughout this thesis, that thing (as e-waste here) is multiple? For Mol, one key issue that is opened up by her work is how to inquire into "the diverging and coexisting enactments of *the good*. Which goods sought after, which bads fought? And in which ways are these goodnesses set up as being good [...]? (2002, 176)" For my research then, this chapter is in part about questioning the recycling of electronic equipment. Not questioning it for the sake of questioning it, but asking if recycling is the best solution if the problem to be solved is environmental impact. If recycling is not the best solution, then what goods are being sought in the case of MUN?

What I argue below is that the recycling of electronics is becoming what John Law (who is borrowing from Bruno Latour) calls a constitutional approach to solving a perceived problem. What Law means by constitutional here is the offer of a system of general protocols and solutions for problems in a common world that we all share. But this is not Mol's vision, and nor is it the vision of e-waste that I am enacting with this thesis. The problem with constitutionalism is that it offers general solutions, but the recycling of electronics is not done in a general way, as I demonstrate below. It is done in very particular ways in particular locations. So here again, if recycling electronics is a general solution that does not solve the problem of what to do with electronic discards at MUN, then what goods are being sought in the case of MUN?

In the second section of this chapter, I offer another way that e-waste can be done in scholarship. In the second section of the chapter, I will follow the practices of e-waste recycling in Canada. In particular, I show here that following practices is liberating because practices do not imply necessary directionality and that by following practices we can cast a wider net when researching waste in the making. In addition to this, I show that practices are material, just as material as the stuff of (e-)waste itself. Indeed, by following the practices of e-waste in the making I show that the formal recycling of e-waste is a critical, but complicated enactment of electronic rubbish. I say this because recycling is often positioned as an antidote to two additional enactments of electronic rubbish that have negative outcomes. For the individuals, organizations and institutions who use and discard electronic equipment there are two different issues to be avoided. First, for organizations, businesses and institutions, formal electronics recycling offers a

way to ensure that their equipment is not being illegally dumped in developing countries, and a way to avoid the potential media scrutiny that goes along with this type of illegal dumping. Second, formal electronics recycling ensures that any user and consumer of electronic equipment can be sure that none of their private/proprietary data is available for recovery after assets or belongings have been discarded. I end this chapter in a place where things are uncertain. This chapter is meant to interfere[4] with the popular notion of what e-waste is and what should be done with it by offering a different way to think about and engage with (e-)wastes – through practice rather than thingness.

Follow-the-Thing

Follow-the-thing (FTT) has become popular method for social science scholars interested in commodities, commodity fetishism and scholars studying value chains and value networks. It was Arjun Apppadurai who in his 1988 edited volume "The Social Life of Things" first urged scholars to follow things in motion (see 1988, 5). More recently, the FTT approach has been applied to that which happens after commodities are consumed used up and discarded. That is, social scientists studying waste have taken up the call to follow-the-thing (see for example N. Gregson et al. 2010; Crang 2010). In plain terms, FTT is self-explanatory. Scholars focus upon a particular commodity or

[4] By interfere here: I am using the word in the John Law (in particular see Law 2010) sense of the term. That is, I mean to interfere by practicing a different kind of e-waste, one that is different than the commonly understood version in which doing the good via the formal recycling of electronics is an unquestioned given.

waste object and follow said thing either from a pre-figured beginning (e.g., production) to a final destination (e.g., consumption), or more recently in waste studies, from disposal to dismantling. Oft cited examples include cut flowers (Hughes 2000), fruit (Gibbon 2003), hot pepper sauce (Cook and Harrison 2007b) and more recently end-of-life military ships (N. Gregson, Crang, and Watkins 2011). In the spirit of this method, and taking my cues from the recent campus announcement that MUN will hold an e-waste collection event in conjunction with Apple Computers Canada, I offer a narrative of follow-the-thing below. The following narrative must be preceded by two caveats. What follows comprises an amalgam of actual fieldwork experience and a realistic imagination of a likely journey of a load of electronic waste from Newfoundland to mainland Canada. Additionally, the recycling facility is an amalgamated processing facility that is described based upon visits to several similar facilities.

On the floor, in the corner of a typical university department (Department X) office sit two computer systems. These are desktop computers, including tower, monitor and peripherals (keyboard, mouse, power cords). On top of each tower lay a legal sized piece of paper, the disposal of surplus asset form introduced in the last chapter. These two machines have been declared surplus and are waiting to be collected. A copy of each surplus disposal form has been sent to Facilities Management on our campus, as well as to the Computing and Communications department. Two months pass, and one-day two people from facilities management arrive in Department X and collect the two computer systems and the surplus asset disposal forms. The machines are taken to building T12, the Computer Services building on campus. They are placed in a small

room that is filled with various computers in various states of repair. It is here that all data is wiped from any electronic storage device that is declared as surplus. When the hard disks of these machines are sanitized, the surplus asset disposal form is checked (in the box indicating that all data has been erased) and signed by a Computing and Communications employee. This form is then sent on to Facilities Management too. Once the hard disks have been sanitized, the two computers are taken to the basement of the engineering building where they are carefully placed on wood shipping pallets, wrapped in plastic and stored with other surplus electronica until there is enough to merit a shipment.

In the basement of the engineering building, a large pile of electronic equipment sits in a loading bay. Parked in the loading bay is a MUN cube van. Facilities Management employees are pulling pallets of electronics wrapped in plastic wrap into the van. When all of the equipment has been loaded into the truck, it is driven to the port of St. John's where it is loaded into a shipping container and placed on a ship bound for Montreal. Upon arrival in Montreal, the container is placed on a truck, where it will travel down the MacDonald-Cartier Freeway, roughly five hundred and fifty kilometres to Mississauga. At exit 344, the truck will turn right and head north on Highway 410 for about three kilometres. The truck arrives at a large concrete building in a business park on the outskirts of the city of Toronto. Our equipment has arrived at Facility X.

Inside the recycling facility, a young man of no more than 30 years old is driving the forklift that is taking pallets of e-waste off of the truck. He is wearing a hardhat, eye

protection, breathing mask, gloves, heavy boots and heavy cloth coveralls. All employees in the facility are dressed like this. He moves quickly and efficiently, lining up pallet after pallet of material in a staging area in the recycling facility. The two computers that I am following are now a mere fraction of a load of feedstock for this facility. The pallets have the plastic wrap removed. The material is unloaded from the pallets and moved towards a series of benches that resemble the checkout area in a grocery store. There are 25 benches, and at each bench stands a worker armed with screwdrivers, pliers, prying tools ready to begin preliminary processing. Here, initial dismantling takes place. These workers are here to remove both the value and the waste. Our computers have all the cables cut off, the circuit boards are removed and any large chunks of metal are taken out of the computers so that they do not harm the mechanical shredder. The cables and the circuit boards are placed in large separated gaylord containers (a triple walled, corrugated cardboard pallet container). Circuit boards from various types of equipment are further separated into high value (high gold content) and low value (high steel content) varieties. Once all easily removable valuables and hazards have been removed by hand, our two computer towers are thrown into another gaylord container. Their associated monitors are not shredded as they contain leaded glass. The monitors are sent to another processor for dismantling and then on to one further processor for materials recovery. The towers sit in a large gaylord box and are aggregated with a large amount of other equipment. They are still more or less recognizable as desktop computer towers. When the gaylord with our two towers is full, the dismantler at the workbench turns on a light (again picture a grocery store here with a light on indicating 'this lane is open'). This light signals the forklift operator to come and collect the full

box. The full box is then brought into a huge adjacent room that houses automated shredding and sorting equipment. Three shredders, a vibration table, a large electro-magnet and an eddy-current separator are the workhorses in this room. The gaylord is placed on an elevator that rises roughly three stories in height. At the top, the gaylord tips and the contents are dumped into the primary shredder.

In the narrative I offer above, I have followed the waste from the MUN campus to the primary shredder at a recycling facility in Mississauga, Ontario. At the recycling facility, I have stopped at the primary shredder. In order to explain why I have stopped at this point, I revisit the trenchant critique of FTT offered by Gregson et al in order to build on this critique. For Gregson et al, FTT is marked by four problems. First, there "...is a tendency to position those in the global south solely as producers supporting corporately driven flows, rather than as multiply entangled – as consumers and instigators – in flows that have more diverse paths and connections" (N. Gregson et al. 2010, 848). In terms of electronic waste, the popular story of e-waste, and indeed the outcome of popular FTT-style studies of e-waste position those in global south not as producers, but as unsuspecting and helpless victims of toxic dumping of dangerous waste by the rich in developed countries (in particular see Puckett et al. 2002; Puckett et al. 2005; Greenpeace International 2008). Studies like Exporting Harm and The Digital Dump have provided the foundation upon which to build current popular understandings about what e-waste is, and why it is a particular problem in particular places. However, popular e-waste tropes largely ignore the fact that as Gregson et al suggest, those in the global south are entangled in the e-waste story in multiple ways. That is, the portrayal of those in the

global south as unsuspecting victims cannot account for recent research on the electronic rubbish trade patterns between developing countries (see 2010) as well as the projections that developing countries will become the dominant producers of electronic waste as soon as 2016 (cf. Yu et al. 2010). This brings me to the second problem with FTT offered by Gregson et al, "...the emphasis placed on western consumption and western consumers" (2010, 848). In other words, FTT has typically been used to describe a particular kind of production for consumption that has tended to be read as *the* model of production for consumption, and there is symmetry here with e-waste as well. The common storyline of rich countries dumping e-waste in poor countries has come to represent *the* way that electronic rubbish is enacted as a hazardous waste. However, as my research at MUN in the last chapter shows, electronic rubbish is multiply enacted as both waste and value by using various conduits of disposal. Because this is so, FTT is problematic here because it reproduces the notion of an ontologically stable 'thing' that scholars can follow along an already understood trajectory, as opposed to a messy multiple thing enacted in multiple ways along multiple trajectories.

The third problem with FTT offered by Gregson et al is "...following the thing tends to focus attention upon objects that become successfully stabilised" (2010, 848). This point is the crucial problem with FTT when this method is used for waste studies. My reason for this claim is the same reason that I was forced to stop my FTT e-waste narrative at the shredder. It is at the shredder in the recycling facility that the two computer towers I was following cease to be recognizable as computer towers. They undergo a radical physical transformation at the shredder, and as they exit the shredder

they are no longer the things I was following. For FTT this is a problem because scholars no longer have a thing to follow. For studies of e-waste, this is a crucial problem because the popular storyline around e-waste suggests that this material stream is toxic and hazardous. But these toxins are safely housed inside electronic equipment and are not animated until this equipment is disposed of and dismantled in one way or another. That is, e-waste is not really problematic until it undergoes a radical transformation of its 'thingness'. This means that even if we follow-the-thing to the recycling facility (or into rural areas of developing countries where this equipment is dismantled by hand for that matter), we can never reach the point where we are able to engage with the hazards of e-waste and e-waste processing. We followed the thing, and the thing no longer exists.

The final problem with FTT that Gregson et al address is that "... a vast range of intermediary things that are consumed in production and circulation – from packaging to off-cuts to energy to, indeed, ships – become subsumed within, maybe obscured by, final commodities" (2010, 848). This point resonates deeply with my argument about arbitrary nature of the popular e-waste storyline. Where Gregson et al argue that intermediary things are "subsumed" or "obscured" by final commodities, e-waste as a post-consumption problem obscures problems related to the production of electronics, where electronics are produced, by whom and under what conditions. Also lost in the popular e-waste narrative are issues of environmental and human health impacts related to formal recycling activities in developed countries, including collection of equipment, aggregation, processing and materials recovery. The popular narrative around e-waste and recycling imagines that we are somehow able to transcend materiality by recycling

equipment, and as a result we can avoid the material problems of e-waste. But this is not so. Recycling involves messy, destructive and dangerous dismantling of equipment as well as shipping and smelting processes, all of which impact the environment in negative ways.

I would like to add one additional point to the FTT critique. There is a fundamental problem with the argument put forward by Gregson et al in terms of their claim that scholars should rethink the thing (cf. 2010). Gregson et al are correct in so far as they understand that, in terms of waste, things come apart and that this process of material transformation is difficult if not impossible to capture using a traditional FTT approach. However, what the authors miss here is their own reliance on one stabilized thing to make this point. Gregson et al urge us to rethink the thing, and call into question the value of thingness as it pertains to FTT, but at the same time their entire argument is built upon the pre-existence of another stabilized thing, the value chain itself. What these authors effectively do is insist on a partially formed intervention where things move up and down the front and back ends of a stable thing called the value chain. The value chain in this argument is not something to be questioned or investigated, but rather it is the destabilized things that move up and down this chain that are of interest. In this way, the authors attempt to move away from thingness, but they are unable to do so entirely. There remains a stable thing with a front end and now a back end. In other words, there is still a pre-figured trajectory, which wastes must follow in order to be revalorized.

The contribution of Gregson et al in terms of rethinking the thing is a crucial contribution, but it does not go far enough. We are still limited by what happens when things fall apart and the direction in which we are obligated to follow things (i.e., up and down the value chain). These two issues are key for waste scholarship because wastes physically break down. Moreover, wastes tend to move away from those individuals, organizations and institutions that produce them. What is critical to note here is that they do not move in predictable ways that necessarily follow a pre-figured trajectory. The popular narrative around e-waste being dumped in developing countries is an excellent example of how wastes can move and proliferate in unpredictable ways. In the next section I offer an alternative approach to engaging with the materiality of waste in the making. In doing so, I illustrate that the multiple enactments of electronic rubbish as both waste and value complicate the popular story line of e-waste as an environmental and human health problem in developing countries only. Furthermore, I question why and when recycling e-waste is a good thing to do and I suggest that for places like MUN, reasons for recycling might have little to do with environmental protection.

Follow-the-Practices

There is a way to escape the problems of following things, even those things that are coming apart. Moreover, instead of rethinking the thing, I will follow Mol (2002) and instead follow the practices. My focus in this section will be on the practices that bring e-waste that requires recycling into being. In taking this approach, by attending to

the practices that bring things into being, I make two moves. First, I illustrate how attending to practices of e-waste in the making free us of the thing as a focal point. This has important implications for e-waste as it highlights the difficulty of escaping materiality. This in turn shows that recycling electronic equipment in formal, industrial settings has environmental costs, just as recycling in informal sites in developing countries does. Furthermore, there are additional environmental costs to formal recycling that are not part of the popular storyline around e-waste, costs built in to collecting equipment and transporting it from those who produce this end of life equipment to those who process it, to those who refine it for materials recovery. In short, I show here that the environmental argument for recycling e-waste is arbitrary and that recycling should be thought of as *an* option rather than as *the* option. The second point that I make in this section is that there are good reasons why recycling e-waste is often positioned as *the* option, and these reasons have little to do with environmentalism or materials recovery. Instead, what I show here is in part an answer to Gregson and Crang who ask how different materials matter differently (2010, 1027). To answer this question, I want to connect the institutions and organizations that produce e-waste with those who formally process e-waste. In this final section of this chapter I offer the idea that for institutions and organizations, disposal of electronic equipment is about three different kinds of protection. On one hand, institutions and organizations want to be seen as good corporate citizens who are actively protecting the environment. However, these same institutions and organizations have a large interest in protecting both their own brands, as well as any information provided to them by their employees, clients and customers. It is the notion of the protection of information as it relates to the discarding of electronic equipment that

offers a glimpse of a very different enactment of e-waste. To conclude this chapter, I end with a question rather than an answer. That is, I offer a slight variation on Ackerman's 1997 book about recycling entitled "Why do we recycle"? Instead, I offer that it might be worth asking 'when should we recycle'?

By insisting on a focus upon practices of wasting, I want to interfere with the notion that recycling electronics is the right thing to do and that every other alternative is less desirable. The reason for my interference here is that recycling is often imagined to be a way to 'do the good' or do the right thing, everywhere. But as Law reminds us, practices are local (Law 2010). Recycling is rarely discussed in terms of the local though, and for this reason recycling can be thought of as constitutional. I am using the term constitutional here in a particular way, one that I have borrowed from John Law. For Law, "constitutionalism offers the promise of a general way of distinguishing truth from error, expertise from prejudice, and reality from fantasy. It's appealing, too, in a world that demands general protocols and solutions" (2010, 10). Recycling as constitution then is the right thing to do, everywhere. But as Law reminds us, "[i]f we become constitutionalists we're losing location and specificity" (2010, 5). Recycling doesn't happen in the global. It happens in the local. By sending electronics from MUN to Ontario, MUN will associate our campus with a national network of sites, some of which are notorious polluters a great distance from our province. I will say more about this later in the chapter. Moving our equipment to Ontario will be done in the name of environmentalism and responsibility, but without debate, impact assessments and public discussion. This idea was perhaps most succinctly made by an interview participant I

spoke to at the provincial recycling organization in Newfoundland: "If we started spreading the message that recycling was bad, the government would shut us down tomorrow" (Personal Interview August 18, 2009). Recycling here then is a general protocol and solution. It is constitutionalism.

Recall also from the literature review the work of Ron Ackerman and Samantha MacBride, two waste studies scholars who have written extensively on the topic of recycling. For these authors, one key reason that recycling has become so prevalent (not just for electronics but for many types of material) is the creation of what MacBride terms 'busyness'. That is, large-scale manufacturers have an interest in making the recycling of the things that they produce the domain of municipal and provincial governing bodies, with the help of individuals in those jurisdictions. The logic is thus, if individuals and municipalities are busy concentrating on the recycling of relatively small fractions of the municipal solid waste stream, then large-scale manufacturers of goods will remain free to produce products using the methods and materials that they see fit to use. There will be no external pressure on these manufactures to implement more burdensome production processes and waste management policies.

Why is recycling as constitutionalism problematic? An example from the Nova Scotia electronic waste regulation can help to illustrate my point: "The goal of the regulations is to divert electronic products from landfills through the creation of a province-wide collection and recycling system for electronic waste. The regulations include a disposal ban on electronic waste." (Nova Scotia's electronic waste regulation,

n.d.) The problem with this quote lies in the reference to the creation of a "province wide collection and recycling system". Recycling of electronics cannot be done solely in Nova Scotia. There are no smelters in Nova Scotia, and hence no technical solution to the problem of lead recovery in Nova Scotia, for example. This province-wide system then necessarily takes material beyond itself. That is, the province-wide system relies on a national infrastructure that is connected directly to global materials markets for metals. This quote also states that there is a disposal ban on electronic waste. The system in Nova Scotia then does not permit electronic waste to be placed in landfills, and suggests that this stuff will be recycled within the province. This approach though, is the exact opposite of Mol's politics-of-what. That is, there is no question about what to do. Recycling is the answer. However, as Mol reminds us, a politics-of-what explores the differences between different enactments of a particular thing (2002, 176). The Nova Scotia example helps to illustrate why Mol's politics-of-what is such a potentially powerful approach, because as my research shows, some of this material does indeed end up in landfills. This highlights different sets of practices and the resulting ontological multiplicity of e-waste. In terms of the production of e-waste then, we can use this politics-of what to explore the differences between different enactments of e-waste.

Exploring different enactments of e-waste is important because it is not at all clear that recycling electronics amounts to doing the good or the right thing, if by the good and the right thing is meant reducing environmental impact. One 2008 study suggests that the negative environmental impacts associated with the collection and transportation of electronic waste can outweigh the benefits of recycling, sometimes at distances of

collection between 200km to 300km (Barba-Gutierrez, Adenso-Diaz, and Hopp 2008). This study uses life cycle analysis to show that depending on the method of collection and the distances traveled to collect equipment, collection for recycling may be more environmentally damaging than land filling. Similarly, Williams et al (2008) cast some doubt on the constitutionality of recycling as doing the good when they ask:

> "Is recycling actually environmentally preferable to putting e-waste in sanitary landfills? We argue that this is not known and that it is conceivable that recycling could emit more toxic heavy metals over the lifecycle. [...] This question should be studied before public policy mandates recycling as the default environmentally preferable alternative." (6448)

For Williams et al, there are benefits to recycling that include the recovery of materials that would otherwise be collected through virgin material extraction, but they offer compelling evidence against recycling as constitutionalism. Enacting electronic rubbish as municipal solid waste versus enacting it as electronic waste with a requisite process for proper management are two different enactments. However, in engaging with the practices of each enactment the picture that emerges is not that one creates the potential for hazardous substance emission and one does not. Rather, what emerges is that in some cases, recycling electronic waste in formalized industrial processes may just change the locations where hazardous substances are emitted rather than ameliorating the problems associated with these substances.

By engaging with the practices of recycling e-waste rather than only following the things of e-waste that require recycling, I have been able to open up one space of inquiry

that precedes the recycling facility itself. In doing this, I have shown how following practices allows us to abandon a predetermined direction to studying e-waste and e-waste recycling. Alternatively, following the practices of e-waste allow me to attend to the ongoingness (cf. Lepawsky and Mather 2011) of waste in the making. That is, insisting on a focus upon things as waste belies all of the ways in which waste is enacted through specific practices, including waste created during transportation and processing. By focusing upon the practices that bring e-waste into being, we leave open where we might end up. This means that we may arrive at the recycling facility and then engaging with questions around industrial facilities and waste (see 2010), if this is where the practices lead us. Instead, by engaging with practices we open up e-waste as a process requiring multiple sites across Canada. Seen in this way, recycling is not a simple, clean solution to a hazardous waste problem. Recycling is rather messier, and this should matter to institutions like MUN. Because by attending to the practices, we see the ongoingness of e-waste. We also see that recycling e-waste in Ontario does not end in Ontario.

Our two towers are quickly reduced into chunks of material two feet square and smaller. A camera inside the shredder also records this radical material transformation. The camera is there for two reasons. First, it allows technicians to monitor the operation of the primary shredder (the largest one of the three). Second, it allows a digital record to be kept of all that is destroyed using the shredder. (I unpack why this matters below.) The pieces of material exiting the primary shredder are approximately two feet square and smaller. These pieces move along a conveyor belt into the secondary shredder where they are further reduced to about the size of a soccer ball. Another conveyor belt.

Then another shredder that reduces pieces to roughly five centimetres in diameter. Yet another conveyor belt. The pieces fall off of this conveyor onto a larger, slow moving wider belt. Above the belt hangs a large electro-magnet, which removes any ferrous material from this stream. One separation complete, the remaining melange of materials are then moved onto a vibrating table which separates out the smallest bits of material including small pieces of copper wire, gold and bits of wiring insulation. These fall through a metal mesh and into a container below to be sent to another processing facility. The remaining materials are then shunted onto a faster moving belt, which has on its end an eddy-current separator (essentially a spinning magnetic roller which repels aluminium containing materials). Tiny aluminium pieces are sent flying over a metal blade that divides two containers, the remaining plastic bits that do not contain aluminium fall directly off of this belt and into on container, the aluminium pieces fly over the blade and into another box. This is the final mechanical separation at this facility.

Commodity grade steel, plastic, aluminium as well as mixtures of material too difficult to separate by machine are what we are left with. But this is not all that remains. The workers are all wearing breathing masks. The air inside the plant is permeated with particulates that are hazardous to human health. The machinery is all covered with fine dust high in lead. The industrial air filtration system within the plant collects lead dust out of the air and this dust is sold on to a lead smelting facility in Western Canada. Recycling this material and the practices that this activity requires does not remove the hazards from electronic devices. Instead, materials are either recovered or sequestered

and moved along again until they reach a facility that can recover them. Following the thing cannot account for this activity. As mentioned earlier in the chapter, recycling e-waste requires smelters. Smelters in Canada have a long history of negative environmental impacts, including those critical to materials recovery from electronic devices. Two smelters that were mentioned repeatedly during my site visits to recyclers in Ontario were the Teck Resources refining facility in Trail, BC. This facility is one of the largest lead-zinc smelters of its kind in the world ("Teck Resources Ltd - Trail Operations Smelting and Refining Complex" 2013), and as of last year this facility was gearing up to increase its capacity to refine materials derived from electronic waste ("Teck to Spend $685-million on B.C. Operations" 2013). The Trail smelter is a notorious point source polluter (see for example "Teck Battles U.S. Pollution Lawsuit for Trail Smelter - British Columbia - CBC News" 2012; Goodarzi, Sanei, Labonté, et al. 2002; Hertzman et al. 1991). As recently as 2009 this facility has been the target of environmental remediation efforts focusing on residential lead exposure levels (particularly among children) (BC Ministry of Environment 2009). Despite this environmental record, this facility is one of the approved downstream processors of material originating from approved electronics recyclers in Ontario (Personal Communication June 11, 2009). The other facility that was repeatedly mentioned was the Xstrata copper smelting facility in Royun-Noranda, Quebec. This facility also has a spotty environmental record and has been the subject of a number of environmental studies (see for example Simonetti et al. 2004; Telmer et al. 2006).

The take-away message here is not that these smelters are bad or substandard in some way. Nor is the message that there are alternative ways in which to recover materials from electronic equipment on an industrial scale that would be environmentally preferable to smelting. Instead what I am trying to point out here is a simple message, we cannot escape materiality. That is, the smelting issue is also a clear example of the politics of what: what goods are being sought and which fought? How is that which is set up as good set up as goodness to begin with? Why has smelting become the default 'right thing to do'? There are alternative enactments of e-waste recycling, such as waste to energy conversion, that are available current technologies that could be employed to help manage this waste stream on an industrial scale, but this approach has not been adopted with the same enthusiasm as smelting. The point that I am making here is not that waste to energy is environmentally preferable to smelting, but rather that waste to energy is another plausible way of enacting e-waste recycling at an industrial scale, thus the situation (i.e., the world) could always be otherwise organized. The positioning of the e-waste problem as an occupational and environmental problem affecting the poor in developing countries is an arbitrary framing of an e-waste problem. The dumping of e-waste in poor countries is one enactment of e-waste multiple. There are also environmental and occupational consequences to the formal recycling of e-waste in developed countries, but these consequences are rarely included in the popular storyline about e-waste (see Figure 8 below).

Figure 8: Evidence that the responsible recycling of e-waste includes environmental and human health impacts in developed countries. Source: (BC Ministry of Environment 2009)

If a purely environmental argument does not explain the persistence of the notion of recycling electronics as the right thing to do, then what might account for this? Recall from the previous chapter that data security is a key feature of the disposal process for electronic equipment at MUN. In what follows below I suggest that considering the controlled disposal and or destruction of information is as critical to social studies of waste as is materiality. As I argued above, the popular storyline around e-waste is rich countries dumping equipment is a partial and situated storying of a complex set of enactments of electronic rubbish. This story of e-waste though, has come to be understood as *the* story of e-waste. Similarly, social studies of wastes are increasingly

carried out in a particular way. In my view there is a danger here of fetishizing the marginalized. By this I mean that waste scholarship should insist that we engage with materials as they come apart, as they move in and out of consumption and production via various waste streams. However, we should also maintain a keen awareness that while materiality as waste is 'unbecoming', it is often moving away from those who initiate the disposal process. Furthermore, it is unlikely to return to those who initiated this process. Rather, materiality moves in ways that tend to describe specific geographies of waste and value. Wastes as hazard tend to move away from the source of their production, and this is where the potential problem lies. By following the materiality of wastes, particularly in the case of problematic or hazardous wastes, geographies of difference be they economic, regulatory or otherwise will continue to be highlighted. While this is a worthwhile endeavour, it runs the risk of favouring a particular type of enactment of waste. Additionally it risks waste studies ignoring one of its own key contributions to waste scholarship. That is, it might ignore the process of disposal itself. This process, as evidenced by the previous chapter, is still quite poorly understood in the industrial, commercial and institutional (IC&I) sector. By following the stuff of waste to the margins, opportunities for future research may be overlooked. I recognize here that it was not the intention of Gregson and Crang (2010) to suggest that we ignore the processes of disposal at their 'source'. However, without a clear commitment to following the practices of wasting and unbecoming there is a potential risk that studying materiality as it moves away from those who produce wastes to those who are left to process or recover value from these wastes (often the marginal poor) will come to be the only way that wastes are studied.

How does studying the practices of e-waste mitigate this risk? It does this in at least two ways. First, it does answer the call to waste scholars to engage more deeply with materiality. As was shown in the literature review chapter, the materiality of e-waste qua waste is still a hugely problematic issue in social and environmental justice terms. But the disposal, and more appropriately the secure disposal or destruction of information contained within some electronic equipment is also problematic. Recall here the camera that lives inside the primary shredder. This camera has two purposes. First, it monitors the inner workings of the shredder and relays information to technicians regarding the operation of the shredder, equipment jammed inside and so forth. The second purpose is quite different. If you, as a client of recycling company X, would like to have documentary evidence that your equipment has been securely destroyed, you may have a recording of your equipment going into and being shredded. This is evidence of secure destruction. Every Canadian recycler that I visited offered a variation on this theme, as well as the option of a 'certificate of secure destruction'. One recycler that I visited explained that smaller recycling operations that did not offer this service were becoming extinct, because customers were increasingly requiring this as evidence of responsible recycling (Personal Communication June 19, 2009). He was also highlighting for me here that recyclers basing their profit on materials recovery alone were becoming extinct as commodity prices were crashing. Another recycler explained that when he was approaching customers, he would market his services by suggesting that the potential client he was talking to "*...didn't want to be the next Winner's*" (Personal Communication June 10, 2009). This mention of Winner's (a discount clothing chain in Canada) referred to a high-profile data security case where Winner's had

customer banking, credit card and drivers license information accessed by an outside party between September 2005 and December 2006. More broadly, what this recycler was suggesting was that when disposing of any electronic device that is capable of storing information, it is in the best interest (and also increasingly it is a legal requirement) of particular organizations and institutions to ensure that their equipment is securely destroyed in order to ensure data security.

This brings us to the second way in which e-waste scholarship mitigates the risk of fetishizing the marginalized. The industrial, commercial and institutional sector is an enormous producer of discarded electronic equipment, and the disposal practices within this sector are not well understood. This sector offers immense potential for waste scholars. In a sense, there is an opportunity here to read 'industrial waste' more generously than perhaps Gregson and Crang had initially intended. Many industries such as those engaged in the F.I.R.E economy (finance, insurance and real estate) are not thought to produce large volumes of what would traditionally described as industrial wastes. Despite this, these industries discard vast amounts of electronic equipment in the form of IT assets. During this process of disposal there are two things happening. One is the distancing and placing of material objects as they are 'moved along' at the end of their industrial 'first lives'. The other thing that happens here is that data or information has to be either secured, or securely destroyed.

This last point is a potentially crucial point of departure from that of materiality unbecoming. Again, and I must state this as clearly as possible, I am not suggesting that

there is a way of escaping materiality here. What I am suggesting is that there is an opportunity to follow two different sets of practices. The ridding, divestment or wasting of material objects is one such set of practices. With that said, these practices might differ quite radically from those of data security. While materiality tends to move away from the initial site of disposition, information moves differently. Materials proliferate and move away, harmful materials move away and harm those at a distance from sites of initial disposal. Information, specifically information out of place, tends to return. For instance, a 2009 story reported that while conducting research on hard drives purchased from the online auction sites, researchers collaborating from Longwood University in the USA, Edith Cowan University in Australia and British Telecom's Security Research Center discovered details of a U.S. 'top secret missile defence system' (Daily Mail Online 2009). Moreover, these researchers also found detailed information regarding employees of Lockheed Martin Corporation (the company that designed the missile defence system) including social security numbers. The conclusion that these researchers reached after reviewing the contents of more than 300 disks was that "[f]or a very large proportion of the disks we looked at we found enough information to expose both individuals and companies to a range of potential crimes such as fraud, blackmail and identity theft" (Daily Mail Online 2009). Information that is improperly disposed of can return to haunt those who disposed of IT equipment in the first place. This difference in the way that materials move versus the ways that information might move is powerful. It highlights the differences that appear when a follow-the-practices approach is adopted rather than a follow-the-thing approach. In following materiality unbecoming as it relates to discarded IT equipment, research tends to move away from the initial sites of disposal

processes, and often towards the margins. However, when we follow practices around information security we open up an entirely different set of potential geographies of waste and value. Instead of necessarily ending up in landfills, recycling centres or overseas we might end up back in large organizations in the institutional, commercial and industrial sector, or to individual peoples lives who are affected by identity theft of information gleaned from these large organizations' databases improperly disposed of. Here, there is an opportunity to build on previous waste studies work.

Disposal is not synonymous with waste. All that is disposed of does not enter the waste stream. This point has been made emphatically in the literature, in the last chapter, as well as at a recent electronics recycling industry conference that I attended. The industrial, commercial and institutional sector, via practices around information security, enacts disposed IT assets as value through re-use, re-marketing and recovery via materials recycling. These actions have been studied in detail in the home (e.g., N. Gregson, Metcalfe, and Crewe 2007a; Saphores et al. 2006) but are not as well understood in industry. At a minimum, the benefit of studying the disposal practices of the IC&I would be to add empirical depth to the waste studies literature. This sector is a large producer of disposed IT assets, and increasingly there are more options for disposing of these assets. Recycling is one option but it is not the only option. Re-use options are risky due to information security concerns, and the result of this is the continuing growth and development of the information technology asset disposal (ITAD) industry. In a space where little is known about IT asset disposal practices (evidenced by the paucity of disposal data for the IC&I sector), it might make sense for waste scholars

to treat this sector as a potential site of 'industrial wasting' of a type different from that of the traditional industrial waste understanding.

Conclusion

In summary, the FTT method is an extremely useful tool for those involved in studies of waste. However, I suggest here that it is a tool best used at the beginning of any research endeavour that is waste oriented. That is, if we follow-the-thing we have to stop following when the thing comes apart. FTT can help scholars to sketch an initial picture of a research problem, but it might ultimately lead to an artificial bounding of said problem. This is a problem for scholars who wish to engage with materiality unbecoming (cf. N. Gregson and Crang 2010). However, if we follow Mol and attend to the practices of wasting, we are free to examine the ways in which wastes are produced or transported or processed and transformed into valuables. Moreover, by attending to practices we are able to show, for example, that recycling electronic equipment is not merely about negating environmental concerns, because formal electronics recycling has its own environmental impacts. Instead, practices show that recycling is bound up in the care and control of materials, the environment and private and proprietary data. What we are also able to see is that while data security is a critical issue for institutions like MUN, the formal recycling of electronics might not be the best option when environmental concerns are included with concerns about data security. Because this is so, we might think about rephrasing Ackerman's book title (Why Do We Recycle?) and ask instead

when and where should we recycle? For institutions like MUN, located at some distance from electronics recycling facilities there may be better options.

CONCLUSION

I begin here with a bold statement. There is currently no e-waste being enacted at MUN. That is, there are no practices that transform surplus electronic equipment at MUN into e-waste. When I say that there is no e-waste being enacted at MUN, I mean this in a very particular way. First, recall that only recently has Newfoundland and Labrador put forward a legal framework that defines e-waste as a category of materials or equipment. It could be up to one year before an official e-waste management programs is up and running in our province. Prior to this, the only overt reference to e-waste within the province that I found in the course of my research occurred during an interview with a charitable technology organization that claimed that they have repeatedly sent e-waste to mainland Canada for recycling. This organization also claimed that none of the equipment that they had collected would have come from MUN, as collecting equipment from institutions such as MUN would only be done for working equipment. Anything collected for recycling would not come from MUN and similar institutions, as this is not a part of the mandate of this organization (Personal Communication January 20, 2009). I documented equipment that was left in hallways, placed in dumpsters, cannibalized for parts, sent to a local auction house and redistributed within the campus. In terms of the equipment that was placed in the trash, as I outlined above, this equipment moves to the category of waste, but MSW not e-waste. This is an important distinction because an oft-cited problem with the disposal of e-waste in landfills is that this equipment can leach toxins into the groundwater. While this claim is popular (see for example Osako, Kim,

and Sakai 2004; Poulios, Hadjiaggelou, and Papachristou 2006; Thakker 2005; 2005; 2002), there is some debate about its accuracy (see Williams et al. 2008). My work at MUN echoes the work of Gregson et al. in that not all equipment from MUN that is declared surplus is routed toward the waste stream. In fact, if one were to base their inquiry strictly upon the policy documents at MUN that outline surplus disposal procedure, it would appear that nothing that is declared as surplus at MUN is ever routed towards the waste stream. Of course in practice this is not the case, as I have outlined earlier.

What I have tried to present in the story of electronic equipment disposal at MUN is that it is complicated, complex and messy. It is not simply a matter of 'things go in the trash and they should instead be recycled'. The disposal records only tell a partial story of what is disposed of at MUN. The records do indicate that the vast majority of electronic equipment that is routed through the disposal system is sent to the local auction house for resale. However, if equipment does not sell at auction it is taken to the dump. Equipment is placed in the waste stream directly on campus by using dumpsters as conduits of disposal. However, the environmental implications of placing equipment in the local landfill when compared to formal recycling of electronics on the mainland are not clear. Because this is so, I suggest that the practices of disposal at MUN (and elsewhere as Gregson et al have shown) enact more than just municipal solid waste. Practices of disposal also enact identities at MUN. In other words, if it is not clear that formal recycling activities offer tangible benefits in terms of environmental impact reduction then why implement a recycling program? The answer is that practices of

disposal enact identities at MUN, as well as waste and value. That is, individuals (e.g., "*I* just couldn't do that, it wouldn't be right"), departments (e.g., "When *we* are finished with something it is pretty much dead") and the institution as a whole (see for example the MUN sustainability declaration) are continually enacting themselves as people, departments and a university that try to do the right thing. This means avoiding the trashing of equipment (in the first instance), using equipment until it will not function (in the second instance) or more generally trying to minimize the environmental impacts of the campus are goods to be sought (cf. Mol 2002, 176). These examples, taken from my own school, exemplify positive identity being enacted through particular practices.

I do not offer the examples above to demonstrate that my school is a benevolent institution, but instead to show that the management of electronic equipment is about more than a self-evident category of materials. Indeed, the categories of waste and value play a key role at MUN in the enactment of various identities. Individuals who are employed at MUN have a vested interest in maintaining a professional identity as employees who are efficient and not wasteful. People feel that it would be wrong to place things in the trash, perhaps due to explicit procedure policies that dictate other actions but perhaps to avoid being wasteful. The notion that "...some savvy person somewhere can get some value..." out of equipment that is no longer wanted at MUN makes clear that the extraction of value from our discards is that which is to be sought, but what type of value is left open. Furthermore, if MUN cannot extract value from its surplus discards then perhaps someone else can. This gestures to the imagined avoidance of waste on our campus, an imaginary that in practice is not always enacted. The point

here is one that has been made by waste studies previously, perhaps most succinctly by Zsuzsa Gille who says "[c]ulture, morality, ideologies, economic interests, social inequalities and power struggles permeate the very concept of waste and thus its very materiality. As a result, solving waste problems can never become the exclusive domain of engineers (Zsuzsa Gille 2007, 212)."

For Gille, a sociologist by trade, there are broad explanations such as culture that answer the question of why waste problems can never be solved purely by technical solutions. Where my work differs from Gille is in the use of different explanatory mechanisms. Here I have tried to follow Mol as closely as possible, and I have used Gregson et al and their notion of the materialization of identities as a guide. On my campus, people have interests (including economic) in keeping their jobs by being good employees. Being a good employee in some instances might mean not throwing working surplus assets in the trash. Departmental identities are formed in at least two ways, some by virtue of the fact that they have few resources in terms of electronic equipment and tend to hang on to things until they are worn out and others who materialize their identities by virtue of the fact that they are larger departments and turn over larger amounts of equipment. Departmental identities vary greatly on any university campus, and at MUN I saw this first hand. Small departments self-identify primarily as 'have-not' departments who fight to stretch every research dollar as far as it will go. This means hanging on to equipment until it no longer functions as electronic equipment. Larger departments enact their identities in precisely the opposite fashion, using the turnover of equipment as a barometer of departmental success. In both cases, the formation of

identities of various departments as it relates to moving things along indicates how identities are bound up not just in what departments throw away, but what departments use in day to day activity in order to generate research. This research in turn drives the generation of research dollars, which are then used to acquire more tools to further research efforts. Individual and departmental identities are enacted through practices of discarding. Practices of discarding are about more than a singular question of environmental impact, as these practices enact more than waste. At MUN, practices of discarding are bound up in identity formation for individuals, departments and the school as a whole. This has implications not only in terms of environmental impact but also for scholarship (the production of research), competing for enrolment, competing for research funding as well as how my school and the people within my school are seen in the larger community. These are issues are imbricated within the issue of e-waste, a problem that is largely treated as a materials management problem requiring more elegant technical solutions.

This issue of identity being bound up in practices of discarding has further implications as well that move beyond MUN. That is, because e-waste as a problem is more complex than merely being a materials management problem it is time for the research around e-waste to more accurately reflect this idea. There are several areas here where gains can be made. First, the literature around e-waste would benefit tremendously by having scholars engage with the idea that we are *doing* e-waste whenever they do research. That is, the publishing of research on virtually any topic in this day and age almost requires electronic equipment to submit to a journal, let alone the

collection, analysis and synthesis of research materials. Scholars use a large amount of electronic equipment in the course of doing scholarship, and because this is so, they are implicated in the generation of waste, value and rubbish. One benefit here might be increased attention to the moving along of equipment, with a greater effort to keep working equipment in the hands of those who may benefit for as long as possible. Second, FTT is an excellent method to employ at the outset of studies of waste, but as I illustrated in the previous chapter, this method is best used in conjunction with attentiveness to practice. Attentiveness to practice is a logical extension of the work that has been done recently in waste studies, work that has called for an increased attention to and engagement with materiality. One point that I wish to contribute with my work in this thesis is that, particularly in the case of wastes, things break down or are taken apart. Following the thing is a critical tool for waste scholars, but it need not be the only tool that we rely on, nor can it be. When some wastes come apart, we are left with materials. E-waste is emblematic of many wastes in that the stories about e-waste coming apart have tended to highlight the harmful material effects of dismantling and physical decay of equipment. A focus upon things is in part to blame here. A focus on the harmful components of electronic equipment and their material effects on disposition or dismantling are important of course, but I argue throughout this work that the continual building of this narrative tells a story that is lacking.

The dismantling of equipment has potentially detrimental occupational and environmental effects, but these same activities also underpin formal and informal materials recovery economies in many different parts of the world. There are two

important points to note here. Yes, the dismantling and recovery of materials from complex electronic material assemblages offers potentially harmful occupational and environmental effects. However, these harmful effects, while being positioned by ENGOs and the media as a global problem, have been documented and researched only in a few specific locations. Additionally, many of the informal recycling operations overseas that have been framed as primitive and dangerous while being documented have been partially described. There has been little engagement with these operations in terms of how these sites are connected to flows of materials recovered from electronics and how these materials enter into new rounds of production. Moreover, these same types of backyard recycling operations take place in North America (see for example www.scrapmetalforum.com or www.scrapmetaljunkie.com), but these North American sites have not seen the same amount of scrutiny as those in Asia or Africa.

This is one of the key points of my work. A focus upon practices takes us beyond the materiality of the thing(s) being discarded, rubbished or trashed. Narratives of discarding should continue to document the negative impacts of waste and wasting, to be sure. However, following practices of discarding can also lead scholars to sites where materials move into new rounds of production, for example. Following practices of discarding can lead us to sites where things are re-used, re-worked, refurbished. By following practices of discarding, we see that discarding does not necessarily lead to disposal sites. Furthermore, practices of discarding extend beyond the moving of physical objects from work sites, offices and residences to disposal sites. Institutional policy development around discarding surplus assets, sustainability and corporate social

responsibility initiatives can all be taken to be practices of discarding. While some waste sites have been, and will continue to be problematic to access for social scientists of waste such as sites where proprietary manufacturing methods are employed or methods of manufacturing are too hazardous to be accessible to all (cf. Z. Gille 2010, 1049), practices offer a way to open up sites where wastes are being enacted that have until now gone under-investigated. This can be seen as a reading of the term 'production sites' that is more generous than simply sites of large-scale manufacturing. In making this move, the seemingly mundane day-to-day practices that occur within businesses and institutions might be taken as potential sites of waste production. This move would add much needed breadth to the electronic waste literature, and as I have demonstrated at points earlier in this thesis, this is an area that is still poorly understood (for an excellent example see Associates 2008).

To unpack some of the ideas I have just offered, concrete examples may prove helpful. I will take two examples here but there are others. First, as I have showed at MUN, not all electronic discards are routed towards the waste stream. This does not mean that these pieces of equipment will not eventually make their way into the waste stream, but rather that they might enjoy further rounds of use before being disposed of. The re-use and repurposing of electronic equipment from businesses is an increasingly large industry, an industry that is driven by firms seeking a return on investment for surplus electronic equipment but concerned about data security. This moving along of equipment destined for re-use is known as ITAD, or information technology asset disposal. This includes the recycling of equipment but also the collection of equipment

for re-sale, refurbishment or repurposing. To give some idea of how the ITAD industry has grown in recent years, and more importantly how the common narrative around e-waste is at best a very partial telling of a very complex story consider the following; in February of 2012, IBM, the IT technology giant announced that they were going to open a computer and server refurbishing centre in China. Estimates suggest that by 2014 the secondhand IT equipment market in China could be worth two billion dollars (see Woody 2012). In addition, the creation of industry organizations such as the International Association of Information Technology Managers (see www.iatam.org) and the Asset Disposal and Information Security Alliance (see www.adisa.org.uk) demonstrate that the moving along of IT equipment is comprised of much more than simply sending equipment to Asia for primitive recycling. The circulation of IT equipment that is re-used, refurbished, remanufactured and re-sold onto the market is poorly understood and at present not a large part of the e-waste conversation. Scholars of waste have an opportunity to add "empirical thickness" (cf. Gille 2010, 1050) to the e-waste literature by engaging with the practices of discarding within institutions to connect sites within firms to those where electronics are disposed of and recycled, but also refurbished and resold.

By engaging with discarding practices within institutions such as MUN, what emerges is a messy complexity that belies the popular and tidy story of e-waste as the rich dumping on the poor. Environmental watchdogs have indeed followed the thing; they have followed things from North America and Western Europe to Southeast Asia. They found primitive, backyard-recycling practices that have lead to serious occupational

and environmental degradation. Scholars of e-waste have tended to follow the watchdogs. Published work around e-waste in China and India grows year after year. And rightly so, there is room for improvement in the way that hazardous materials are managed in these countries. But I submit here that it is time for those who publish on the topic of e-waste to turn their analytical lenses upon themselves and the places where they work. That is, there are opportunities for watchdogs and scholars to cast a wider net. For example, in 2002 BAN published their landmark study about e-waste being shipped to and processed in Guiyu, China. One practice that they noted as being particularly egregious was the use of a strong blend of acids called 'aqua regia', a mixture that is used to recover gold from complex material mixtures (such as e-waste). However, when one of the authors of the BAN report was confronted with evidence that this same practice was taking place in 2010, in Colorado, USA, the response was one of surprise:

> "Aqua regia? Where, in Colorado? Oh my God, that's incredible," said Sarah Westervelt. As the e-Waste Project Coordinator at the Seattle environmental organization Basel Action Network, Westervelt has documented aqua regia's use in toxic e-waste dumps in places like China and Nigeria. Just not in the U.S." (Jones 2010)

This quote from BAN illustrates one reason why I have advocated throughout this thesis for an approach to e-waste that considers e-waste as a thing enacted in multiple ways through practice. That is, primitive backyard-recycling operations in Asia have long been practiced (through writing about them and documenting them in film and television) in a particular way, as all that is wrong with e-waste. However, when these same kinds of operations are discovered in the United States, the response is surprise. Within the literature, studies of informal e-waste dismantlers in developed countries are non-

existent. But the fact that people are out there refining e-waste in their own yards in the United States begs several questions: Where do they get their equipment to dismantle and refine? To what sites are these informal dismantlers connected? How many operations of this kind might be out there?

The documentation of e-waste being informally recycled in the United States also speaks to one of the key points of this work. The ontological status of that which is deemed to be e-waste is not always fixed as waste. This is evident by those who collect electronic discards in order to extract value from them, in some cases by reselling equipment, in other cases by dismantling equipment and refining materials for precious metals recovery. Both waste and value are enacted. As John Law reminds us, practices are local, they happen somewhere (Law 2010). What I hope to have shown in this thesis is that the fate of our discards is not certain. We do not do just one particular thing with discarded electronics, a singular practice that enacts e-waste. We donate, we trash, we repurpose, we swap, we place in the hallway. I suspect that as institutions go, we are not alone in our multiple practices of discarding and moving along. But more importantly, because there are multiple practices going on with respect to electronic discards, we might consider multiple management strategies for this stream of equipment. Moreover, the e-waste literature as a whole might consider engaging with practices that enact electronic discards as waste and value, at home (wherever that might be) as well as abroad. There is much work to do to add both depth and breadth to what is currently a narrow literature, and a narrow story. This is going to mean challenging seemingly well-understood ideas, such as e-waste being an inherently bad thing requiring specialized

management. Ideas that include banning the export of electronic equipment to developing countries, as well as recycling automatically being the good and right thing to do in all cases. I am confident that by adding a keen attention to practices, scholars of e-waste and wastes more broadly will meet these challenges with success.

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