

# Electronic Waste Solutions

*Electronic Waste Collection Days Event and Other Initiatives*

**Prepared By Laura Knudsen**

Indiana University Office of Sustainability Intern

**Mentor: Susan Coleman Morse**

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## Introduction

Electronic waste or e-waste constitutes a growing solid waste stream, not only in the United States but also in the world. E-waste is best defined as any piece of electronic equipment, such as a television, cell phone or printer, that has reached the end of its useful life.

### The Problem

One question that often arises is the following: *Why is e-waste dangerous and why should it be recycled?* The answer to this question is two-fold. Recycling e-waste is important both from an environmental health perspective and increasingly, from a legal perspective. E-waste contains extremely hazardous materials such as lead, cadmium and mercury. Cathode ray tubes, often used in computer and television monitors, may contain between 3-8 pounds of lead (Oregon Department of Environmental Quality, 2001). If e-waste is improperly disposed and is thrown into a regular landfill that is not meant to deal with these hazardous materials, then there is the possibility that these toxic substances could leach into the groundwater and cause harm.

Additionally, the *proper* recycling of e-waste is necessary to consider. Sadly, many sham e-waste recyclers exist who either leave the e-waste after collection or export the e-waste to a developing country where the processing labor is inexpensive because there are many people who desperately want to extract the valuable materials from the e-waste in order to feed their families and make a livelihood. However, when the crude extraction process involves burning a television monitor that houses 8 pounds of lead and this is inhaled into the body, the health costs of this decision are clearly negative.

Secondly, the decision to properly recycle e-waste increasingly has a legal base. To date, 21 states have passed e-waste recycling legislation (Electronics Take Back Coalition, 2010). This includes Indiana. The majority of these laws involve producer responsibility, where the electronic manufacturer is principally responsible for the e-waste recycling. The details of the Indiana law will be discussed later in this report.

### The Solution

As product obsolescence increases, it becomes increasingly clear that ways to deal with e-waste are not ubiquitous. As a result, many conscientious consumers rely on public recycling events to deal with their electronic items. Fortunately, the Indiana University Office of Sustainability (IUOS) recognizes this need and dedicates resources for organizing such an event as well as investing in other e-waste recycling initiatives. The first event occurred during the 2008-2009 academic year on the Indiana University Bloomington (IUB) and Indiana University-Purdue University (IUPUI) campuses in partnership with Apple Inc. This event was extremely successful due to the collaborative effort of many different campus entities and resulted in a total collection of 834,216 pounds.

Discussion for another event during the 2009-2010 year began during the fall of 2009, however because of the large quantity of waste gathered during the previous year's event, uncertainty existed as to whether it was necessary to organize another event for the 2009-2010 school year. However, after extensive discussions with Apple it was determined that another e-waste collection event would be useful. This decision was based, in part, on Apple's previous experience with the University of Michigan where e-waste collection events have been successfully run for the past 5 years. The result of these discussions culminated in another successful E-waste Collection Days program for Indiana University Bloomington and Indiana University South Bend where approximately 600,000 pounds of e-waste were collected. Although this amount is smaller than last year, the number of cars that frequented the event

was greater than 2009 which indicates improved awareness of the event. Table 1 shows a comparison of the 2009 and 2010 participant numbers on the public collection day. Please keep in mind that in 2009, only attendees at the IUB and IUPUI sites were recorded. For the 2010 event, only participants at the IUB and IU South Bend site were recorded because IUPUI was no longer a partner for the event.

**Table 1.**

<b>Event Year</b>	<b>Total Cars on Public Day</b>
2009	2,006.00
2010	3,682.00

This report tracks the development of the 2010 event as well as the other e-waste recycling initiatives that accompanied this year's event, specifically the first annual electronic waste art contest.

## **Overview of Goals for the 2009-2010 Year**

Fortunately, much of the groundwork was already laid for the 2010 event because of the hard work that the 2009 project team dedicated to the first Electronic Waste Collection Days event. For a more detailed explanation of the initial development of this project, please read *IUB and IUPUI Electronic Waste Collection Days* by Laura Knudsen. This report is available on the IUOS website.

While the 2009 event was extremely successful, the project team noted several areas for improvement as well as other initiatives that could enhance e-waste recycling for the Bloomington community and IU campus. The specific areas for improvement and initiatives that the project team wished to address during the 2009-2010 academic year are addressed below:

### **Comprehensive Statistical Analysis of the 2009 Results**

While some initial statistics were gleaned from the 2009 event, the project team greatly desired a comprehensive analysis of the 2009 results in order to draw some conclusions as to why people decided to recycle their e-waste. Fortunately, project team member Laura Knudsen was able to analyze the data in her statistical modeling graduate class with two other colleagues (Yunching Wang and Dayu Zhang). The results of this work will be discussed in this report.

### **Distribution of a 2010 E-Waste Community Survey**

The project team also desired to distribute another e-waste survey to the community at the 2010 event in order to compare and contrast results from the 2009 event. Additionally, the project team decided to add 2 questions to the survey based on analysis from the 2009 questionnaire and the 2010 E-waste Recycling legislation that was passed in Indiana. This report will address these changes to the survey as well as provide a cursory summary of the 2010 results.

### **Increase Participation from IU Departments & Regional Campuses**

Based on observations from the 2009 event, it was clear that while some IU Departments participated, not all IU Departments took advantage of this opportunity. The project team believed that the main reason for this lack of participation was because of the regulations involving IU Surplus that IU Departments must follow. This report will discuss this regulation as well as the plan that the 2010 project team formed in order to increase department participation.

Furthermore, increased participation from regional campuses formed another 2010 project goal. Increased communication with all regional campuses as well as increased collaboration with IU South Bend comprised the main tasks to address this objective.

### **Increase Education and Public Awareness of E-waste Issues**

Due to the hectic nature of organizing a community wide e-waste collection event for the first time, it was very difficult for the 2009 project team to integrate any additional e-waste recycling initiatives apart from some radio and television appearances. However, for the 2010 event the project team organized the first ever IU Bloomington E-waste Art Contest. For the first year, this contest was very successful and resulted in an art display that was held in the lobby of the Herman B. Wells library for the month of April. Additionally, with regard to the e-waste collection event, high school students were incorporated into the volunteering efforts so that broader community support for the event would grow.

The project team once again utilized television, radio and newspaper in order to reach Bloomington citizens.

## **Comprehensive Statistical Analysis of the 2009 Survey Results**

The survey that accompanies the Electronic Waste Collection Days event is extremely important because currently not much data exists regarding electronic waste recycling tendencies and not many surveys have been conducted regarding such events. As a result, it was decided during the 2009 event planning process that a survey would be developed and distributed to event participants. This task was somewhat arduous because survey approval was necessary from the Institutional Review Board (IRB) at Indiana University in order for the results of this survey to be published in the future. However, this approval was obtained and the survey was taken by 322 people in both Indianapolis and Bloomington.

Once all of the data were collected, some initial survey results were ascertained and will be discussed in comparison to the 2010 results. However, the project team wanted to determine if the data could help explain the reason why people decided to recycle their e-waste at the 2009 event because if these factors could be identified then this could aid policy makers with their efforts to properly recycle e-waste. As a result, a comprehensive statistical analysis with a logistic regression model was conducted and is available for review in Appendix A.

Results from the analysis suggested that prior knowledge of the importance of e-waste recycling as well as whether the electronic waste manufacturer, consumer or government agency was paying for the responsible recycling of the e-waste indicated whether someone was willing to recycle their e-waste at the 2009 event because they wanted to help the environment. As the analysis discusses, the data was difficult to work with because it was all binomial in nature and none of the survey questions asked for a specific numerical input. Unfortunately, the 2010 survey was already designed and approved by the time the results from the 2009 survey were ready so no survey format changes were made to the 2010 survey. However, in the future, the recommendations addressed in the analysis report, such as conducting the survey outside of the event participants and changing some of the survey questions to be more specific and require specific numerical inputs (especially for age) should be considered.

## Distribution of a 2010 E-Waste Community Survey

As a result of the immense success of the 2009 event, the project team decided to conduct another survey for the 2010 event in order to compare and contrast the results from the 2009 event. However, 2 questions were added. The first question referred to how the participant heard about the event because this would be extremely useful to hone the event's marketing efforts. Additionally, in light of the new e-waste recycling law passed in Indiana, another question was added to the survey. This question merely assessed whether the participant was aware of the electronic waste law. Aside from these two changes, the rest of the questions remained the same.

However, the total number of survey participants declined from last year most likely because only participants at IU Bloomington were surveyed instead of in addition to IUPUI. For the 2009 event there were 322 survey participants, while for the 2010 event there were only 158. A comparison of the main 2009 results to the 2010 results is noted below. Appendix B includes the 2010 survey questionnaire. The survey was taken by participants via survey monkey.

### Age of Event Participants

From the 2009 event, it was determined that the 50-57 age class claimed the majority of visitors to the event who took the survey. In comparison, as Table 2 shows, the 2010 event once again demonstrated that the 50-57 age category dominated the survey responses.

Table 2.

Age Category	Number of Survey Participants
18-25	3
26-33	20
34-41	13
42-49	28
50-57	36
58-65	33
>65	25

### Distance to 2010 E-waste Collection Days Event

From the 2009 event, it was determined that the most survey participants drove 0-5 miles to attend the Electronic Waste Collection Days event. This result was followed by the second highest response of 6-10 miles. The 2010 results exhibit no apparent difference, as indicated in Table 3.

Table 3.

Distance Driven	Number of Survey Respondents
0-5 miles	87
6-10 miles	44
11-15 miles	14
16-20 miles	8
> 20 miles	5

## Factors Causing People to Recycle Items at the 2010 Event

Additionally, in both the 2009 and 2010 surveys, participants were asked to assess how they valued 4 different factors in order to determine what might have spurred them to take advantage of this event. The rank values were as follows: Don't Care, Moderately Important, Very Important or Don't Know. The factors were: (#1) there was no charge to recycle the electronic devices, (#2) friends and family were recycling their electronic devices so the event participant decided to recycle theirs too, (#3) the event participant felt like they would help the environment by recycling their electronic devices and (#4) the drive through drop-off event was convenient for the event participant. Table 4 shows the results from the 2009 event with large response values highlighted in yellow for the "Very Important" ranking.

**Table 4.**

<b>Factor #1: No Charge to Recycle</b>	<b>Number of Respondents</b>
Don't Care	5
Moderately Important	35
Very Important	118
Don't Know	0

<b>Factor #2: Family &amp; Friends Recycled</b>	<b>Number of Respondents</b>
Don't Care	96
Moderately Important	44
Very Important	3
Don't Know	11

**Note:** 4 respondents did not answer this particular question (n=154 for factor 2)

<b>Factor #3: Help Environment</b>	<b>Number of Respondents</b>
Don't Care	1
Moderately Important	21
Very Important	136
Don't Know	0

<b>Factor #4: Drive Through Convenience</b>	<b>Number of Respondents</b>
Don't Care	4
Moderately Important	33
Very Important	117
Don't Know	3

**Note:** 1 respondent did not answer this particular question (n=157 for factor 4)

These results are extremely similar to the 2009 event. In 2009, the top 3 factors (based on the number of survey participants writing "Very Important") appeared to be helping the environment, no charge to recycle and the drive through convenience. These same 3 factors also appear to be significant on the 2010 survey.

## Media Campaign Results

Furthermore, the results of the two new questions were quite interesting as well. The first new question referred to *how* participants were made aware of the 2010 event. The 2010 project team utilized a similar media plan to the 2009 event (Appendix C), and the team was interested in the response to this question. Table 5 shows that newspaper was the primary way that survey participants found out about the event. This indicates that the *Herald Times* banner ads, while expensive, were a significant investment and should be utilized for future events.

Table 5.

Media Form	Number of Respondents
Newspaper	97
Radio	19
TV	4
Work	33
Friends	25

## Knowledge of the New Indiana Electronic Waste Recycling Law

Additionally, the state of Indiana recently passed an electronic waste recycling law that went into effect April 1, 2010. Manufacturers of electronic goods in Indiana must recycle 60% by weight of any computers, laptops and televisions that they sell to consumers in the state of Indiana, specifically households, public schools and small businesses (Indiana Department of Environmental Management, 2009). The 2010 project team was interested in determining how aware survey respondents were of this new law. Table 6 indicates that the majority of survey respondents were unaware of this legislation.

Table 6.

Awareness of Indiana E-waste Law	Number of Respondents
Aware	23
Unaware	135

Additional analysis of the 2010 survey results are necessary and improvement for any future survey work should be seriously considered.

## **Increase Participation from IU Departments & Regional Campuses**

In order to increase participation from IU Departments, a pilot program was developed by Laura Knudsen and Susan Coleman Morse, although Mrs. Coleman Morse was the main leader of these efforts. The pilot program was designed to alleviate the confusion and hassle that the current policy regarding IU Surplus causes for IU Departments. In order to understand the value of the pilot program, a brief explanation of the current surplus program is necessary.

### **IU Surplus E-Waste Recycling Policy**

Currently IU Departments are required to first erase sensitive data from any hard drives or other devices before the equipment leaves the department. Then, the electronic items must go to IU Surplus (Surplus will send a box truck to departments upon request) so that the usable electronic goods may be separated from the non-usable electronic goods. The problem with this policy is that many departments are not aware of these regulations or think that it is much more cumbersome than it actually is. Some departments don't realize that surplus will send a box truck to the department's door to facilitate pick-up.

However, this is also a problem for the Electronic Waste Collection Days event because departments are not allowed to bring their e-waste directly to the event and instead must go through surplus. The project team theorized that this policy is the reason why more department e-waste was not brought to the 2009 event. Furthermore, based on internal discussions from IU staff who walked through various department space, it was visually confirmed that a great deal of e-waste still existed on campus.

### **IU Department E-waste Pick Up Pilot Project**

In light of these obvious problems that departments face, the project team decided to offer complimentary e-waste pickups for departments before the Electronic Waste Collection Days event. An e-mail was sent out to the Information Technology Managers in each department and an e-mail was also sent to each of the Deans of the schools on campus in order to apply pressure from above and below the administrative IU chain. Additionally, presentations were made to the IU Green Teams on campus. The results of the pilot project were positive, although additional department interest was desired. However 17 departments contacted the project team for early pickups and this resulted in a total of approximately 35,000 pounds of waste collected before the actual 2010 event. Table 7 shows the names of these departments.

**Table 7.**

<b>IUB Department Name</b>
Archives of African American Music and Culture
Biology
Chemistry
College Information Technology Office (CTO)
Ethnomusicology
Folklore
Indiana Memorial Union
Office of International Services
Philosophy
Political Science
Religious Studies
School of Health, Physical Education, and Recreation (HPER)
School of Informatics and Computing (SOIC)
Spanish
The Laboratory of Dr. Jeffrey Alberts, Psychology
Undergraduate Education
University Information Technology Services (UITS)

It was the hope of the project team that this early department pick up project would not only increase the amount of e-waste collected from departments for the 2010 Electronic Waste Collection Days event, but that this campaign would also alert departments to the current surplus policy and encourage them to utilize this option in the future when dealing with their e-waste.

### **Regional Campus E-waste Pick Up**

Additionally, increased regional campus e-waste collection was a goal of the project team. Again, Susan Coleman Morse led the efforts on this project. In contrast to the 2009 event, a distinct effort was made to solicit participation from regional IU campuses. Due to Susan's persistent efforts, such as participation in regional IT manager meetings, 4 regional campuses were involved in pick-ups. Table 8 shows the names of these campuses.

**Table 8.**

<b>Regional Campus Name</b>
IU Northwest
IU South Bend
IU Southeast
IUPU Columbus

One of these 4 campuses was IU South Bend, and the project team made a concentrated effort to reach out to this campus because IU South Bend organized their own e-waste collection event last year. However, apart from Apple picking up the e-waste collected from the event, no other aid was offered. Impressively, on the public day, the amount of waste that IU South Bend totaled was 1/3 of the total e-waste collected by all the IU campuses. However, after multiple conversations with the IU South Bend team leading up to the 2010 event, it was decided by the project team that Apple should provide support staff and additional resources to South Bend, especially since IUPUI was not a partner with

the2010 event. The allocation of these resources to South Bend was the correct strategy because the event was even larger than the previous year and in the afternoon participants experienced as long as a 45 minute wait. In retrospect, additional resources should have been given to South Bend.

# Increase Education and Public Awareness of E-waste Issues

## E-waste Art Contest

Additionally, the project team felt strongly about developing additional education tools in order to increase public awareness of e-waste recycling. Due to this goal, the first annual electronic waste art contest was born. Titled UNPLUGGED: IUB Electronic Waste Art Competition, this art contest was the result of a collaborative effort with the fine arts department, the apparel merchandising and interior design department and the Indiana University libraries.

The first step of this process was to connect with faculty in the fine arts and apparel merchandising and interior design departments. This involved first e-mailing individual faculty members during the fall semester, however no responses were received. Then, in the spring semester individual department offices were visited and e-mail requests were sent out via department listservs. After this second push, two faculty members responded (Professor Kathleen Rowold from the Department of Apparel Merchandising and Interior Design and Assistant Professor Mariana Tres from the School of Fine Arts) who agreed to serve as judges. Aarthi Devanathan, who is the director of environmentalism for the IUB Residence Halls Association, served as the third judge.

Next, contest entry forms and materials were created (Appendix D). Feedback from Professor Rowold and Professor Tres was extremely helpful in creating these forms. Additionally, research into how other areas had organized similar contests was useful.

However, once these materials were created it was necessary to make sure that they were legally acceptable. The project team did not want an individual to attempt to make an item with a blow torch and accidentally create a huge explosion and then hold the university liable. As a result, IU Environmental Health and Safety as well as IU Legal Services and the IU Office of Risk Management were consulted. Ultimately, Larry Shaver from the Office of Risk Management changed the wording in the document and everything went smoothly.

Next, submissions were solicited from all over campus by sending out the necessary information on various listservs and posting the information on the IUOS Electronic Waste Website. Several submissions were judged and accepted for display. Appendix E visually shows all of these submissions. Positive feedback was received from this art exhibit and it is advised to have another exhibit next year with additional time for entry submission and judging to take place. All materials for the backdrop were saved and are currently in storage in the Office of Sustainability for future use.

## Official IUOS Website

Yet another part of the project team's work was to create a new URL for the electronic waste website. While the Office of Sustainability did create an exclusive electronic waste website, the link name was cumbersome and long and not conducive for public service announcements. As a result, a new link was developed by the project team ([ewaste.indiana.edu](http://ewaste.indiana.edu)) which will be very useful for future electronic waste recycling initiatives.

## **Radio and Television Appearances**

For the 2010 event, the project team wanted to continue to utilize radio and television to educate citizens about the importance of e-waste recycling. As a result, a close relationship formed between UITS and the project team. Continued support from the Office of University Communications and the Office of the Vice President of Public Affairs also supported this goal. Coordination with television crews and radio stations formed a crucial part of the media plan.

The results of these efforts were extremely positive. For example, project team members Susan Coleman Morse and Laura Knudsen appeared as guests on the Friday Noon Edition. Additional television and radio interviews took place as well.

## **Future Goals and Recommendations**

Based on the experience of the project team, several ideas for improving e-waste initiatives on campus were generated during the project process. If possible, the project team recommends that the following ideas be investigated and potentially implemented.

### **Potential Organization of the 2011 Electronic Waste Collection Days Event**

In follow up conversations with Apple, it was unclear as to whether a 2011 Electronic Waste Collection Days event will take place. The Monroe County Solid Waste District recently contracted with a new electronic waste recycler (Electronic Recyclers International, Inc.) and has reduced all former fees for taking electronic items to \$1. This may increase the supply of e-waste into the county collection center and reduce the demand for large community collection events like Electronic Waste Collection Days. However, this is not necessarily the case as many people tend to store their e-waste year round and seek out drop off events.

The project team advises close contact with the Monroe County Solid Waste District, particularly Larry D. Barker (Executive Director) to better understand how well the new e-waste collection program is being utilized.

If there is a need for a 2011 collection event, utilizing the coordination methodology outlined in the 2009 report by Laura Knudsen (entitled *IUB and IUPUI Electronic Waste Collection Days* and available on the IUOS website) is advised.

### **Bimonthly Pick-Up for IUB**

Apple is very willing to work on organizing a bimonthly pick-up of e-waste from Indiana University Bloomington. This would be an excellent project to work on and would require coordination with IU Purchasing (Jill Schunk), IU Surplus (James McAuley) and Apple (Art Fichter). If implemented, this could become an excellent example for other campuses around the nation of effective e-waste recycling.

### **Increase Participation from Other Campuses**

While participation from other IU campuses did occur for the 2010 event, it would be wonderful to have similar coordinated efforts like IU South Bend and IU Bloomington in the surrounding communities so that e-waste collection efforts could be maximized. In the future, it would be advised to concentrate on providing increased support to these campuses.

### **Competition with Purdue University**

Another idea that arose from internal discussions was the organization of a competition for e-waste recycling between Indiana University and Purdue University. This could be an extremely fun and engaging way to increase the amount of e-waste that is recycled. Apple has already been consulted about this idea and is in favor of such an arrangement.

### **Continue to update the oPOD**

In 2009, the oPOD (Official Project Overview Document) was created in order to keep track of contacts and plans and to have a comprehensive record of the progress for the Electronic Waste Collection Days event. Appendix F includes the current version of the oPOD that was updated for the 2010 event, although additional updates still need to occur. In the future, this document should be continually updated.

## **Conclusion**

The fact that the 2010 event was extremely successful is a testament to the hard work and dedication of the project team. Fortunately, e-waste recycling has broad support at Indiana University and this allows massive events like Electronic Waste Collection Days to take place. Continued formation of these campus relationships is crucial to dealing with electronic waste recycling in Bloomington and all the IU campuses and surrounding communities.

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**Appendix A: Statistical Analysis of the Survey  
Results from the 2009 Event**

# **Understanding E-waste Recycling Tendencies**

**A Logit Model Approach  
April 26, 2010**

**Laura Knudsen  
Yunching Wang  
Dayu Zhang**

## **1.0 Introduction**

### **1.1 Problem Definition and Project Goal**

Electronic waste (e-waste) is defined as electronic equipment, such as cell phones, televisions and printers that has reached the end of its useful life or has become obsolete in some way. According to a recent report by the Environmental Protection Agency (EPA) Office of Solid Waste, in 2007 only 18 percent of electronic products that had reached the end of their lifecycle were recycled (Electronics Waste Management in the United States, 2008). With the onslaught of the technology boom in the 20<sup>th</sup> century, more electronic waste is in existence than ever before. Unfortunately various hazardous materials are typically incorporated into electronic items such as lead, mercury and cadmium and without proper disposal and treatment these elements can become major environmental contaminants. While general solid waste recycling is common in the U.S., e-waste recycling is not yet ubiquitous. Understanding the best strategies for promoting e-waste recycling could aid policy makers with the promotion of e-waste recycling.

In the spring of 2009, Indiana University Bloomington (IUB) and Indiana University –Purdue University in Indianapolis (IUPUI) hosted a free electronic waste collection event in collaboration with Apple, Inc. At this event, commemorative magnets were handed out to the event participants with a link to an online survey. This survey, designed by IUB graduate students Laura Knudsen and Kristen Hanks, incorporated several questions that sought to determine why people decided to recycle their electronic waste at the event. This survey data, with 322 respondents, formed the base for this analysis. The overall goal for our regression analysis is stated below:

***Goal: To identify the key factors that are significantly associated with an individual's willingness to recycle electronic waste based on data from survey respondents of the 2009 Electronic Waste Collection Days event in Bloomington & Indianapolis.***

### **1.2 Hypothesis Formulation**

In order to achieve our goal, a hypothesis was generated:

***Hypothesis: An individual's willingness to recycle electronic waste is significantly associated with specific factors from the 2009 survey.***

The dependent variable in the analysis (willingness to recycle electronic waste) was determined via use of a proxy variable on the study; the willingness of someone to recycle at the event because they wanted to help the environment. The dependent variable question and responses are below:

***Question:*** *How important was the following factor in deciding to bring your electronic devices to the 2009 Indiana University Electronic Drop-Off Event?*

***Factor:*** *I felt like I would help the environment by recycling my electronic devices*

***Responses:*** *Don't Care • Moderately Important • Very Important • Don't Know*

Based on the responses, the majority were 'Very Important.' This was coded as '1' and all else as '0'.

The original independent variables included the factors that were asked on the survey\*, some of which were also factors found in the literature regarding willingness to recycle e-waste. These variables included: (1) charges for E-waste recycling, (2) influences by family or/and friends, (3) convenience of drop-off event, (4) knowledge of the importance of e-waste recycling, (5) age of participants, (6) distance to the recycling center, (7) personal e-wastes recycled (8) group e-wastes recycled, (9) importance of pollution from electronic waste, (10) spatial differences between Bloomington and Indianapolis, (11) the preferences for recycling e-wastes, such as sending to retail stores, manufacturers, local charity, government agency or mail, and (12) preferences for who should pay for the safe recycling of E-wastes, such as retail stores, manufacturers, consumers, or a government agency.

Clearly if an individual came to the event they were already demonstrating a willingness to recycle. However, they could have decided to handle the waste differently if this event were not available (i.e. landfill or storage). Therefore, this analysis was meant to determine the why an individual came to the event *because they wanted to recycle their electronic waste and help the environment by doing so* versus someone who just came to the event for another reason. It is the authors' hope that by determining the factors that drove someone to the event to recycle their electronic waste, greater effort may be made toward increasing e-waste recycling efforts in the future.

### **1.3 Justification for Regression**

Regression analysis is the best analytical tool for this problem because it can build a model to estimate the relationship between a dependent variable and independent variables by using existing data. Regression models can help us to know what independent variables are determining whether or not participants come and how much each variable affects an individual's willingness to recycle e-waste. Due to the fact that the dependent variable is a dummy variable, a logistic regression model can perform theoretically better than any other regression model.

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\* Please note that the survey did not ask any information on gender, education, or income

## **2.0 The Model**

### **2.1 Model Identification and Theoretical Base**

Although there is extensive literature on household recycling, only a few studies appear to focus the behavioral analysis of human willingness to e-waste recycling. Saphores et al (2006) makes contributions in this area. It is the first literature in the behavioral analysis on e-waste. It analyzes the behavioral determinants for recycling e-waste at drop off locations. In California, the factors affecting the willingness to drop off e-waste at a recycling center include gender, education, convenience, and environmental beliefs, but not income or political affiliation. Meanwhile, the methodology for analysis is unique and involves a combination of principal component analysis (PCA) and an Ordered Probit model.

This literature provides useful suggestions not only for our survey but also for our regression data analysis. The first suggestion is the regression method and model used in the literature. Compared with Linear Probability Model (LPM), a Logit or Probit model is a more appropriate model for analyzing an individual's willingness to recycle e-waste. In our analysis, a Logit regression model is adopted.

The second is the method of the collection of e-waste. There are some possibilities presented for the collection of e-waste, such as curbside collection, having a drop off facility at different locations such as a community center, a grocery shopping mall or a recycling center. According to the literature, a drop off facility is typically less expensive than a curbside program (Saphores et al 2006) and in our survey analysis we also prefer the drop off location. However, the literature does not mention the rate of recycling associated with a drop off facility or a curbside collection. The rate of recycling is increasing when curbside and drop off options are implemented together (Slidique et al 2010).

### **2.2 Data and Data Sources**

The data are from a survey distributed to every participant of the 2009 e-waste recycling event in Bloomington and Indianapolis. Data we used from this survey are in different data formats and needed to be regrouped and coded as dichotomous data (either 1 or 0).

Age of participants and distance to the recycling center are continuous data, which falls into a range, such as 18-25 years-old. Importance of motivation factors, such as no charge, helping the environment, convenience of dropping-off directly, is ordinal data. Awareness of the importance of e-waste pollution is

ordinal data as well. Convenient ways to recycle e-waste and payers for safe recycling of e-wastes are nominal data.

All variables were coded as dichotomous data, yet by different rules. For instance, the age of participants, was coded a specific way based on Nnorom et. al (2009) who discovered the middle aged people are more willing to do e-waste recycling than the younger and the elder. Using general guidelines from the US Census, we grouped the 34-57 year-old as 1 and all else as 0. Furthermore, the participants from Bloomington were coded as 1 and those from Indianapolis were coded as 0. In addition, a distance of less 5 miles to the recycling center was coded as 1 and all else was coded as 0, since the city boundary of Bloomington is around 5 miles. Other variables were coded in a similar fashion. Please refer to the technical appendix for a full variable coding disclosure.

### **2.3 Specification Error**

Several problems might have resulted from the original data or the complied data, which leads to errors or problematic variances. Firstly, the way we grouped and coded variables could not show the difference of each variable. For instance, the age for the respondents falls into a range rather a specific number and city boundary may not be representative. Furthermore, all options of convenient ways of e-waste recycling or payers of safe e-waste recycling may be correlated, so all options could not be coded separately. While we tried to correct for this error by recoding the age and distance variables, it did not have a noticeable effect on our results. Additionally, the survey did not include certain variables that the literature indicated were significant, specifically gender and education. These missing variables could definitely have caused specification error.

## **3.0 Regression Analysis Results**

### **3.1 Overall Logistic Regression Statistics**

As a result of the logit analysis, the following final model was generated:

$$L_i(\text{willingness to recycle electronic waste}) = -0.7569 + 1.3574X_{\text{Pay\_EM}} + 1.042X_{\text{Imporecy}} + 1.248X_{\text{Pay\_Con}} + 1.2778X_{\text{Pay\_GA}} + 0.7699X_{\text{Family}} + 0.6011X_{\text{Disp\_CC}} + 0.4952X_{\text{Equip\_PP}}$$

The results of the final analysis are summarized in Table 1 below and the technical appendix includes the raw SAS code and a complete list of our original variables.

**Table 1.**

<b>Number of Observations Used</b>	299
<b>Max-rescaled R-Square</b>	0.1318
<b>Chi-Square Likelihood Ratio</b>	21.5205
<b>P-Value</b>	0.0031
<b>Percent Concordant</b>	69.1
<b>Percent Discordant</b>	25.3

\*Note: For this analysis an alpha value of 0.05 was used.

As Table 1 shows, while the overall Max-rescaled R<sup>2</sup> value is low (0.1318), the overall model is very significant (p=0.0031) and the percent concordant is relatively high (69.1) compared to the percent discordant (25.3). As a result, it appears that the final model is doing a relatively good job of predicting an individual's willingness to recycle e-waste at the 2009 event.

Furthermore, the independent variables that were included in the final model included both significant and insignificant variables. This is due to the fact that as we ran the regressions, many of the original independent variables were highly insignificant and eliminating these variables from the model exhibited no effect on the rest of the independent variables and only improved the significance and percent concordant of the overall model. However, the Family, Disp\_CC and Equip\_PP variables *did* have a notable impact on the model when they were omitted. As a result these variables were retained. Table 2 summarizes the parameter estimates, statistics and significance values for these variables:

**Table 2.**

<b>Variable</b>	<b>Variable Definition</b>	<b>Parameter Estimate</b>	<b>Chi-Square Statistic</b>	<b>Significance</b>
Intercept		-0.7569		
Pay_EM	Prefer that Electronic Waste Manufacturer Pays for E-Waste Recycling	1.3574	8.9997	0.0027
Imporecy	Knowledge about the Importance of E-Waste Recycling	1.042	6.8611	0.0088
Pay_Con	Prefer that Consumer Pays for E-Waste Recycling	1.248	5.8654	0.0154
Pay_GA	Prefer that Government Agency Pays for E-Waste Recycling	1.2778	4.1929	0.0406
Family	Prefer to Recycle if Friends/Family are Recycling Their E-waste	0.7699	1.8422	0.1747

Disp_CC	Generally prefer to recycle e-waste at a city/county recycling	0.6011	1.779	0.1823
Equip_PP	Individual brought personal equipment to the E-waste	0.4952	1.059	0.3035

\*Note: For this analysis an alpha value of 0.05 was used.

### **3.2 Odds Ratio Interpretation**

The odds ratio interpretations make the most sense for data interpretations regarding our logit model. Table 3 summarizes these interpretations for only the significant variables in our final logistic regression.

**Table 3.**

<b>Variable SAS Name</b>	<b>Odds Ratio</b>	<b>Odds Ratio Interpretation</b>
<b>Pay_EM</b> Prefer that Electronic Waste Manufacturer Pays for E-Waste Recycling	3.886	The odds of a survey respondent at the 2009 Electronic Waste Collection Days Event being willing to recycle electronic waste (because they are helping the environment) increases by 3.886 times if the individual believes that the electronics manufacturer should pay for the safe recycling of the electronic products, holding the effects of all other independent variables constant.
<b>Imporecy</b> Knowledge about the Importance of E-Waste Recycling	2.835	The odds of a survey respondent at the 2009 Electronic Waste Collection Days Event being willing to recycle electronic waste (because they are helping the environment) increases by 2.835 times if the individual knows about the importance of recycling electronic waste, holding the effects of all other independent variables constant.
<b>Pay_Con</b> Prefer that Consumer Pays for E-Waste Recycling	3.483	The odds of a survey respondent at the 2009 Electronic Waste Collection Days Event being willing to recycle electronic waste (because they are helping the environment) increases by 3.483 times if the individual believes that the consumer/user should pay for the safe recycling of the electronic products, holding the effects of all other independent variables constant.
<b>Pay_GA</b> Prefer that Government Agency Pays for E-Waste Recycling	3.589	The odds of a survey respondent at the 2009 Electronic Waste Collection Days Event being willing to recycle electronic waste (because they are helping the environment) increases by 3.589 times if the individual believes that a government agency should pay for the safe recycling of the electronic products, holding the effects of all other independent variables constant.

### **3.3 Overall Probability of the Model**

If we assume a value of 1 as the dummy variable for every independent variable, then the following

probability is generated:

$$L_i(\text{willingness to recycle electronic waste}) = -0.7569 + 1.3574(X_{\text{Pay\_EM}}=1) + 1.042(X_{\text{Imporecy}}=1) + 1.248(X_{\text{Pay\_Con}}=1) + 1.2778(X_{\text{Pay\_GA}}=1) + 0.7699(X_{\text{Family}}=1) + 0.6011(X_{\text{Disp\_CC}}=1) + 0.4952(X_{\text{Equip\_PP}}=1)$$

$$Y_{\text{Willingness to recycle e-waste}} = 6.7914$$

$$P\text{-hat} = \exp(6.7914) / [1 + \exp(6.7914)]$$

$$P\text{-hat} = \mathbf{0.9989 \text{ or } 99.89\%}$$

This means that the predicted probability of a survey respondent at the 2009 Electronic Waste Collection Days Event who believed that electronic waste manufacturers, consumers and government agencies should pay for safe electronic waste recycling, understood the importance of e-waste recycling, felt that because their family and friends went to the event they would be willing to recycle electronic waste (because they are helping the environment) is 99.89%. Likewise, if a survey respondent had the same characteristics but did not feel like they would help the environment by recycling their electronic waste, then the probability would be 0.11%.

The technical appendix includes a list of various scenarios and probabilities, however the most notable change in probability is when all of the payment variables assume a value of 0 ( $X_{\text{Pay\_EM}}=0$ ,  $X_{\text{Pay\_Con}}=0$ ,  $X_{\text{Pay\_GA}}=0$ ). This caused the predicted probability to decrease to 89.57%.

### **3.4 Problems with the Logit Analysis**

Fortunately the logit model includes corrections for heteroscedasticity. Furthermore, the sample size included in this study ( $n=322$ ) is large and allows for proper logit analysis. However, the principal assumption of properly specifying the relationship was not necessarily met in the model because of the aforementioned omission of relevant variables.

Near multicollinearity was experienced in the model with the payment variables. However, by dropping the payment variables out one by one it became evident that certain payment variables *were* significant and necessary to the model.

### **4.0 Conclusion**

The outcome of this analysis somewhat supports our initial hypothesis that included various factors from the survey to determine an individual's willingness to recycle e-waste. However, not all of the variables from our original hypothesis were included in our final model. Only knowledge about the importance of e-waste recycling, preference that electronic waste manufacturer pay for e-waste recycling, preference that the consumer pay for e-waste recycling and preference that a government agency pay for e-waste recycling were significant in the overall model. We believe that the payment variables were significant because the city of Bloomington comprised the majority of the respondents, and this is a very environmentally conscious area so payment consideration for the safe recycling of e-waste may have an impact on an individual's willingness to

recycle in this area. As aforementioned, the significance of knowledge about the importance of e-waste recycling makes logical sense in the model. However, we expected distance, age, charge to recycle, convenience of the drop-off event, personal e-wastes to be recycled and the importance of pollution from electronic waste recycling to be important factors but these exhibited no significance in the model.

This lack of significance of certain variables could result from problems with the original data or the compiled data. First, participants may have homogenous characteristics, such as usually being environmental friendly and with ample knowledge about environmental issues; thus, statistics cannot show significant difference of charges, influences by families or/and friends and distance to the recycling center. Additionally, the aforementioned discussion of the way we grouped the data could have impacted the model. Third, some questions may not be with proper statements to reflect the initial intends of this survey. Fourth, each respondent may explain each question by his/her own recognitions.

In future studies, the survey could be reworded to include some non-categorical variables for seemingly influential factors such as age and also include variables like gender and education that were found in the literature as significant variables. Additionally, principal component analysis (PCA) could be combined with Logit regression analysis. PCA involves a mathematical procedure that transforms a number of possibly correlated variables into a smaller number of uncorrelated variables, which are called principal components. These new set principal components are new variables in regression data analysis. We do not use PCA to generate the data because there are not many variables in our current e-waste survey. But, with the improvement of survey design, more variables could be considered in the analysis, and there might be more likely interaction between variables.

In conclusion, we feel that this model definitely shows that knowledge of the importance of e-waste recycling is positively correlated with an individual's willingness to recycle e-waste. As a result, policy makers should increase educational efforts for e-waste recycling if they want to increase e-waste recycling among their constituents.

## References

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## Technical Appendix

This technical appendix details our process for the analysis.

### 1. Data Collection

All data was collected via an online survey that was designed for participants of the 2009 Electronic Waste Collection Days Event for the cities of Bloomington and Indianapolis. Figure 1 (appended) shows the original survey questions.

### 2. Data Cleaning

We used periods in place of each blank of our data, since some respondents did not answer certain questions.

### 3. Original Linear Parameter Model (LPM)

$$E(Y_i|X_i) = \beta_0 + \beta_1(\text{CHARGE}) + \beta_2(\text{FAMILY}) + \beta_3(\text{DROPOFF}) + \beta_4(\text{EWPOLU}) + \beta_5(\text{IMPORECY}) + \beta_6(\text{AGE}) + \beta_7(\text{DIST}) + \beta_8(\text{PAY\_CON}) + \beta_9(\text{PAY\_EM}) + \beta_{10}(\text{PAY\_GA}) + \beta_{11}(\text{PAY\_OTHER}) + \beta_{12}(\text{PAY\_RETAIL}) + \beta_{13}(\text{B\_I}) + \beta_{14}(\text{EQUIP\_PP}) + \beta_{15}(\text{EQUIP\_GROUP}) + \beta_{16}(\text{DISP\_CC}) + \beta_{17}(\text{DISP\_RETAIL}) + \beta_{18}(\text{DISP\_MAIL}) + \beta_{19}(\text{DISP\_LOCAL}) + \beta_{20}(\text{DISP\_OTHER})$$

3.1. LPM has the assumption that  $u_i$  is normally distributed, which is invalid for our model, since  $u$  will have only two values (one when  $Y=1$  and one when  $Y=0$ ). Therefore, we decided to move onto the logit model, which is better than LPM when the dependent variable is a dummy variable.

### 4. The Original Logit Model

$$L = \log\left(\frac{P_i}{1-P_i}\right) = \beta_0 + \beta_1(\text{CHARGE}) + \beta_2(\text{FAMILY}) + \beta_3(\text{DROPOFF}) + \beta_4(\text{EWPOLU}) + \beta_5(\text{IMPORECY}) + \beta_6(\text{AGE}) + \beta_7(\text{DIST}) + \beta_8(\text{PAY\_CON}) + \beta_9(\text{PAY\_EM}) + \beta_{10}(\text{PAY\_GA}) + \beta_{11}(\text{PAY\_OTHER}) + \beta_{12}(\text{PAY\_RETAIL}) + \beta_{13}(\text{B\_I}) + \beta_{14}(\text{EQUIP\_PP}) + \beta_{15}(\text{EQUIP\_GROUP}) + \beta_{16}(\text{DISP\_CC}) + \beta_{17}(\text{DISP\_RETAIL}) + \beta_{18}(\text{DISP\_MAIL}) + \beta_{19}(\text{DISP\_LOCAL}) + \beta_{20}(\text{DISP\_OTHER})$$

$P_i$  is the probability of willingness of recycling E-waste to help the environment occurring. Please see Table A for a complete explanation of these variable names. Table B shows our initial logit regression results.

**Table A.**

<b>SAS Variable Name</b>	<b>Variable Explanation</b>	<b>Coding Procedure</b>
<b>CHARGE</b>	Importance of not having a charge to recycle the electronic devices	Very Important=1, Moderately Important = 0 (Note: These were the two predominant categories)
<b>FAMILY</b>	Importance that family/friends were recycling their electronic devices	Very Important & Moderately Important =1, All Else=0
<b>DROPOFF</b>	Importance that the drive through drop-off was convenient	Very Important & Moderately Important =1, All Else=1
<b>EWPOLU</b>	Importance of pollution from e-waste	Urgent, Very Important, Somewhat Important = 1, All Else=0
<b>IMPORECY</b>	Knowledge about the Importance of E-Waste Recycling	Very Much & Moderate =1, All Else=0
<b>AGE</b>	Age of survey respondent	34-57 = 1, All Else=0
<b>DIST</b>	Distance to recycling event from respondent's home or business	0-5 miles=1, All Else=0
<b>PAY_CON</b>	Prefer that Consumer Pays for Safe E-Waste Recycling	Prefer that Consumer Pays =1, All Else=0
<b>PAY_EM</b>	Prefer that Electronic Waste Manufacturer Pays for Safe E-Waste Recycling	Prefer that Electronic Waste Manufacturer Pays=1, All Else=0
<b>PAY_GA</b>	Prefer that Government Agency Pays for Safe E-Waste Recycling	Prefer that Government Agency Pays=1, All Else=0
<b>PAY_OTHER</b>	Prefer that someone pay for Safe E-Waste Recycling	Prefer that Someone Pay=1, All Else=0
<b>PAY_RETAIL</b>	Prefer that a retail store pay for Safe E-Waste Recycling	Prefer that a Retail Store Pay=1, All Else=0
<b>B_I</b>	Attendance at Bloomington or Indianapolis Event	Bloomington = 1, Indianapolis =0
<b>EQUIP_PP</b>	Individual brought personal equipment to the E-waste Drop Off event	Personal Equipment =1, Group Equipment =0
<b>EQUIP_GROUP</b>	Individual brought business/school/other group equipment to the E-waste Drop Off event	Group Equipment =1, Personal Equipment =0
<b>DISP_CC</b>	Generally prefer to recycle e-waste at a city/county recycling center	Prefer to Recycle E-waste at City/County =1, All Else=0
<b>DISP_RETAIL</b>	Generally prefer to recycle e-waste by taking it back to a retail store	Prefer to Recycle E-waste at Retail Store = 1, All Else =0
<b>DISP_MAIL</b>	Generally prefer to recycle e-waste by mailing it back to a manufacturer	Prefer to Recycle E-waste by Mailing to Manufacturer=1, All Else=0
<b>DISP_LOCAL</b>	Generally prefer to recycle e-waste by	Prefer to Recycle E-waste by Taking it

	taking it to a local charity	to a Local Charity=1, All Else=0
<b>DISP_OTHER</b>	Generally prefer to recycle e-waste in some other way	Prefer to Recycle E-waste in Another Way=1, All Else=0

**Table B.**

<b>Number of Observations Used</b>	295
<b>Max-rescaled R-Square</b>	0.287
<b>Chi-Square Likelihood Ratio</b>	48.6788
<b>P-Value</b>	0.0002
<b>Percent Concordant</b>	77.3
<b>Percent Discordant</b>	22

<b>Variable</b>	<b>Chi-Square</b>	<b>Probability</b>
<b>CHARGE</b>	0.0039	0.9501
<b>FAMILY</b>	1.0098	0.3149
<b>DROPOFF</b>	0.0095	0.9224
<b>EWPOLU</b>	0.0018	0.9661
<b>IMPORECY</b>	4.5441	0.033
<b>AGE</b>	0.4199	0.517
<b>DIST</b>	0.4011	0.5265
<b>PAY_CON</b>	0.0016	0.968
<b>PAY_EM</b>	0.0017	0.9674
<b>PAY_GA</b>	0.0016	0.9682
<b>PAY_OTHER</b>	0.0021	0.9635
<b>PAY_RETAIL</b>	None (Multicollinearity Problem)	None (Multicollinearity Problem)
<b>B_I</b>	0.0265	0.8708
<b>EQUIP_PP</b>	0.3843	0.5353
<b>EQUIP_GROUP</b>	0.0029	0.9574
<b>DISP_CC</b>	0.2363	0.6269
<b>DISP_RETAIL</b>	0.0002	0.9875
<b>DISP_MAIL</b>	0.3731	0.5413
<b>DISP_LOCAL</b>	0.369	0.5435
<b>DISP_OTHER</b>	0.2895	0.5905

#### 4.1 Data coding

We recoded all the variables as 0 and 1, as this made the most sense for interpretation in the logit model based on our survey data. As for the age of respondents, we coded the middle age from 34-57 years-old as 1, and others as 0 based on U.S. census and literature and the authors' general knowledge of age categories. Also, we coded distance to the recycling center by the Bloomington city boundary, 5 miles as the threshold. Less than 5

miles would be coded as 1, otherwise as 0. Table B (above) also summarizes our data coding efforts.

#### 4.2 Data re-coding

We tried to code the age of respondents and distance to the recycling center in different ways, but there is no obvious difference of the p-values in comparison of the initial way we did. Therefore, we decided to use the initial coded data to find out the logit model with best prediction.

#### 4.3 Autocorrelation

We did not have to deal with autocorrelation since our data is cross-sectional data and our variables are binary.

#### 4.4 Multicollinearity

We found near multicollinearity and perfect multicollinearity existing in our model with our payment variables. We did not set interaction terms for correcting multicollinearity because we could not find any literature that indicated a specific strategy for fixing near multicollinearity and setting an interaction terms for our dichotomous data (as 0 and 1) would lose some information of our data. Therefore, we decided to correct for multicollinearity by dropping the payment variables with p-value higher than 0.3 one by one (however we started by trying to drop Pay\_Other because this variable is so broad), starting with the variable with highest p-value to see how the dropped variable affected the other variables by looking at p-value, max rescaled  $R^2$ , Chi-square likelihood ratio and percent concordant.

#### 4.5 Other Insignificant Variables

Other variables were found to be highly insignificant to the model (as noted in our original logit regression) and these were dropped out one by one (starting with the highest p value). If the variable did not have a significant overall impact on the model, we decided to drop it from the analysis. If the variable did not affect our overall model significance or percent concordance or greatly affect the significance of our parameter estimates, we dropped this variable from the model. However, when we tried to drop out the insignificant variables in our final model (Family, Disp\_CC and Equip\_PP) we realized that these variables were necessary to the model because or percent concordant decreased and our individual parameter estimates were affected. Figure 2 demonstrates this analysis.

**Figure 2.**

The LOGISTIC Procedure					
Testing Global Null Hypothesis: BETA=0					
Test		Chi-Square	DF	Pr >	ChiSq
Likelihood Ratio		17.1968	4	0.0018	
Score		19.2102	4	0.0007	
Wald		16.8540	4	0.0021	

Analysis of Maximum Likelihood Estimates					
Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq

Intercept	1	0.2276	0.4276	0.2832	0.5946
IMPORECY	1	1.0892	0.3895	7.8201	0.0052
PAY_CON	1	1.3320	0.5111	6.7927	0.0092
PAY_EM	1	1.3377	0.4451	9.0325	0.0027
PAY_GA	1	1.3083	0.6169	4.4984	0.0339

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
IMPORECY	2.972	1.385	6.376
PAY_CON	3.788	1.391	10.315
PAY_EM	3.810	1.593	9.117
PAY_GA	3.700	1.104	12.396

Association of Predicted Probabilities and Observed Responses

Percent Concordant	60.2	*	Somers' D	0.390
Percent Discordant	21.2		Gamma	0.479
Percent Tied	18.6		Tau-a	0.084
Pairs	9842		c	0.695

\*The percent Concordant of our final model was 69.1

## 5. Final Logit model

We ended up the following logit model which that provided us with the best prediction. Regression values and parameters are already included in the main report.

$$L = \log\left(\frac{P_i}{1-P_i}\right) = -0.7569 + 0.7699(\text{FAMILY}) + 1.042(\text{IMPORECY}) + 1.248(\text{PAY\_CON}) + 1.3574(\text{PAY\_EM}) + 1.2778(\text{PAY\_GA}) + 0.4952(\text{EQUIP\_PP}) + 0.6011(\text{DISP\_CC})$$

### 5.1 Final Probabilities

A variety of probability scenarios were conducted in order to figure out how the willingness of an individual to recycle their e-waste would change depending on different factors. Table C includes a complete summary of the probability scenarios that were run. Highlighted cells show notable probability decreases.

**Table C.**

Scenario	Variable Values	Overall Model Value	Overall Probability
1	All 1	6.0345	0.997611027
2	All significant 1, Insignificant 0	4.1683	0.984757382
3	All 1, Imporecy 0	4.9925	0.993257104
4	All 1, Pay variables 0	2.1513	0.895790194
5	All 1, Pay_EM is 0	4.6771	0.99077984
6	All 1, Pay_Con is 0	4.7865	0.991727405
7	All 1, Pay_GA is 0	4.7567	0.991479304
8	All insignificant 1, else 0	1.1093	0.751998587

**Figure 1. 2009 Final E-Waste Event Survey Questions**

### Demographic Questions

Please indicate your age:

Younger than 18      18-25      26-33      34-41      42-49      50-57      58-65      older than 65

Which electronic waste day did you attend:

Bloomington (at the IU Athletic Stadium)

Indianapolis (at the Indiana State Fairgrounds)

Did you come to the event to drop off equipment from a local business, school, or other GROUP?

Yes

No, I came with just personal equipment

### Awareness Questions

How much would you say you know about the importance of recycling electronic waste?

Nothing      very little      a moderate amount      very much

How important are the following issues today:

Air pollution	Trivial	Not Important	Somewhat Important	Very Important	Urgent
Water pollution	Trivial	Not Important	Somewhat Important	Very Important	Urgent
Greenhouse gas emissions	Trivial	Not Important	Somewhat Important	Very Important	Urgent
Global climate change	Trivial	Not Important	Somewhat Important	Very Important	Urgent
Pollution from electronic waste	Trivial	Not Important	Somewhat Important	Very Important	Urgent
Water shortages	Trivial	Not Important	Somewhat Important	Very Important	Urgent

### Motivation Questions

Approximately how many miles did you come to recycle your electronic waste today?

0-5 miles      6-10 miles      11-15 miles      16-20 miles      21 miles or more

How important were the following factors in deciding to bring your electronic devices to the 2009 Indiana University Electronic Drop-Off Event? (Please select one option for each factor)

**Factor #1: There was no charge to recycle my electronic devices**

Don't Care      Moderately Important      Very Important      Don't Know

**Factor #2: My family/friends were recycling their electronic devices so I decided to recycle mine too**

Don't Care      Moderately Important      Very Important      Don't Know

**Factor #3: I felt like I would help the environment by recycling my electronic devices**

Don't Care      Moderately Important      Very Important      Don't Know

**Factor #4: The drive through drop-off event was convenient**

Don't Care      Moderately Important      Very Important      Don't Know

Were there any other factors that prompted you to bring in your items today?

## **Alternatives to Event Questions**

What is the most convenient way for you to recycle your electronics?

Take them to a city/county recycling center

Take them back to a retail store

Mail them back to a manufacturer

Take them to a local charity

Other: Please specify

Who do you think should typically pay for the safe recycling of electronic products?

(Only one selection for each person)

Consumer/User

Retail store

Electronics manufacturer

Government agency

Other: Please specify

If this event had not been available, what would you have done with the devices you brought today?

Please tell us what you brought to the e-waste event:

Feel free to leave any other comment here:

## Appendix B: 2010 Event Survey Questions

Final 2010 E-Waste Event Survey Questions  
Changes from the 2009 survey are highlighted in yellow!

### Demographic Questions

Please indicate your age:

Younger than 18      18-25      26-33      34-41      42-49      50-57      58-65      older than 65

Did you come to the event to drop off equipment from a local business, school, or other GROUP?

Yes

No, I came with just personal equipment

How did you hear about the event (Please check all that apply)?

Newspaper      Radio      TV      Work      Friends      Other (Please specify)

Are you aware of the new e-waste law in Indiana?

Yes

No

### Awareness Questions

How much would you say you know about the importance of recycling electronic waste?

Nothing      very little      a moderate amount      very much

How important are the following issues today:

Air pollution	Trivial	Not Important	Somewhat Important	Very Important	Urgent
Water pollution	Trivial	Not Important	Somewhat Important	Very Important	Urgent
Greenhouse gas emissions	Trivial	Not Important	Somewhat Important	Very Important	Urgent
Global climate change	Trivial	Not Important	Somewhat Important	Very Important	Urgent
Pollution from electronic waste	Trivial	Not Important	Somewhat Important	Very Important	Urgent
Water shortages	Trivial	Not Important	Somewhat Important	Very Important	Urgent

## **Motivation Questions**

**Approximately how many miles did you come to recycle your electronic waste today?**

0-5 miles      6-10 miles      11-15 miles      16-20 miles      21 miles or more

**How important were the following factors in deciding to bring your electronic devices to the 2009 Indiana University Electronic Drop-Off Event? (Please select one option for each factor)**

**Factor #1: There was no charge to recycle my electronic devices**

Don't Care      Moderately Important      Very Important      Don't Know

**Factor #2: My family/friends were recycling their electronic devices so I decided to recycle mine too**

Don't Care      Moderately Important      Very Important      Don't Know

**Factor #3: I felt like I would help the environment by recycling my electronic devices**

Don't Care      Moderately Important      Very Important      Don't Know

**Factor #4: The drive through drop-off event was convenient**

Don't Care      Moderately Important      Very Important      Don't Know

**If there were any other factors that prompted you to bring in your items today, please tell us here:**

## **Alternatives to Event Questions**

**What is the most convenient way for you to recycle your electronics?**

Take them to a city/county recycling center  
Take them back to a retail store  
Mail them back to a manufacturer  
Take them to a local charity  
Other: Please specify

**Who do you think should typically pay for the safe recycling of electronic products?**

Consumer/User  
Retail store  
Electronics manufacturer  
Government agency  
Other: Please specify

**If this event had not been available, what would you have done with the devices you brought today?**

**Please tell us what you brought to the e-waste event:**

**Feel free to leave any other comment here:**

## Appendix C: E-Waste Days Publicity Schedule

### February

- 1 Meet with Kelly (Blgtn. Chamber) Story line for March Business Network Edition (PAGR)
- 2 Reserve banner ad space in Herald-Times for 4/8 – 10/10. **Nancy**
- 3-15 Develop plan for IU department's advance involvement with getting items to Surplus Stores **(Laura Knudsen and Susan Coleman Morse)**
- 3-15 Explore possibility of radio spots being produced by Mike Pipher **(Nancy with Angela Tharp)**
- 15 Website Launch <http://www.indiana.edu/~sustain/E-Waste/index.html> **(note: this became ewaste.indiana.edu)**
  
- 15 Contact Jeremy Shere regarding "A Moment in Science" featuring E-Waste Collection Days. Jeremy is to pitch the idea to Don Glass. **(Nancy Clensy)**
  
- 15 Contact Will Murphy about WFHB Eco Report. **(Nancy Clensy)**
  
- 1-15 Discuss cross-promoting of MCSWD Bulky Item Drop Days and E-Waste Event with Steve Akers, Scott Morgan, Tim Frazier, etc. Report back at 2/15/10 Committee meeting.
  
- 18 Research "green" student groups at Ivy Tech, Bloomington High School North & Bloomington High School South.
  
- 18 IUB Departmental Flyer Release **(Nancy Clensy to compose) – could also be linked to release issued 3/22/10**
- 22 Poster & flyer design work completed and approved. To printer. **(Chip Rondot)**
  
- 26 Distribution list for posters/flyers prepared for Committee review **(Nancy & Corinne)**
  
- 28 Plan in place on how we hope to work with various elementary, middle and secondary schools on promotion of E-waste event to parents **(Corinne Fries/Nancy Clensy)**

### March

- 8 IUB Departmental E-News Blast **(Steve Hinnefeld/Nancy Clensy draft of document)**  
Omit any mention of IUPUI's involvement, include 1) people there to unload your e-waste from your vehicle and 2) new e-waste law in Indiana.
  
- 8 - 12 Email Blast to Educators in K-12 system among all counties adjacent to Monroe **(Nancy Clensy)**
- 8 – 12 Distribution of posters & flyers completed by student groups coordinated through IT student ambassadors and Office of Sustainability, perhaps even with high school student groups  
Local schools, churches, Ivy Tech, Starbucks, Dunkin Donuts, Square Donuts, Crescent Donuts, Best, Buy, Sam's Club, Office Depot, Staples, etc. Complete list to be determined and made available.
  
- 12 E-mail addresses to Hinnefeld from Clensy for news release distribution purposes on 3/22/10  
  
Possible feature (spotlight) item for IU Bloomington Web site **(Nicole will mention to Thom)**  
**(Twitter and Facebook)**

- 22 Press Release to Blgt. Sustainability Committee **(Nancy get e-mail addresses to Steve by 3/12/10)**
- 22 Press Release to Monroe County Solid Waste Mgt. **(Nancy get e-mail addresses to Steve by 3/12/10)**  
 Press Release to City/County Offices of Blmgtn **(Nancy get e-mail addresses to Steve by 3/12/10)**  
 Press Release to Monroe County Social Services network **(Nancy get e-mail addresses to Steve by 3/12/10)**  
**IUPUI internal promotion of this event to Tox Away day via JagNews, Inside IUPUI, JagTV and others (Schneider)**  
 Events Calendar and Campus News link on IUPUI's home page **(Schneider)**  
**UITS will be piggy-backing promo of Tox Away Day along with IUPUI Media Relations – Chip Rondot**
- 22 Press Release #1 sent to wide spread media **(Steve Hinnefeld)**  
**This release will appear on the Newsroom site as soon as it goes out.**
- 24 E-Waste Event Button on IU Gateway 3/29 – 4/10/10 **(Steve Hinnefeld)**
- 26 Electronic Home Pages – Story Topic: What can be collected **(Jayne S. & Steve H.)**
- 29 Flyer and Earth Day Outreach to K-12 School System **(???)**  
 Earth Day Press Release – Story Topic: Preserving the Environment by not dumping **(Steve Hinnefeld)**

**April**

- 1 Live at IU (Event Box & Calendar) – **(Nicole Roales)**
- 2 HT story **(Steve Hinnefeld)**  
 Chamber Email Blast to members Blmgtn **(Nancy)**  
 BEDC Email Blast to members **(Nancy)**
- 8 Active for Life Calendar **(Nicole Roales)**
- 8-10 HT/Bloom Paid Advertisement – bottom front page strip **(PAGR/Nancy)**  
 Press Release on Collection from first day – artwork with weight **(Chris Meyer or another UC photographer to capture photos (photo gallery) on first day of collection)**  
 Email News Release to all IUB **( may not be possible; needed??)**
- 8 Press Release on Collection from first day (artwork)
- TBD Press Release on Collection To Date (artwork)
- 21 Press Release on Total Collection to All local media outlets (artwork)

## Appendix D: Electronic Waste Art Contest Materials

UNPLUGGED: IU Bloomington Electronic Waste Art Competition

Theme: "Electronic Waste Recycling is Important because...."

### **Submission Criteria**

Spring 2010



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## ***Electronic Waste Recycling is Important because...***

Give Electronic Waste life again!!

Do you have some cables, cords, and light bulbs that you can't wait to make into art? Or have you always wanted to try to draw or photograph some electronic waste? Now is your chance! To spur awareness about electronic waste recycling in preparation for the [2010 Electronic Waste Collection Days](#) event on April 8, 9 & 10 at the Indiana University Memorial Stadium's Purple Lot, the Indiana University Office of Sustainability is sponsoring the first annual **Electronic Waste Art Competition**. Please read details below:

Submission Deadline:

Submissions will only be accepted until **Wednesday, March 31 by midnight**.

Eligibility:

**Submissions will only be accepted by individuals currently living in Bloomington, IN (students, faculty members, residents, and community members).**

Submission Instructions:

Do NOT submit the actual art piece. In order to be considered for judging, you need to do the following:

**(1)** Turn in a [submission form](#) (found at the end of this document)

**(2)** Submit a photograph of your piece or pieces

Both **(1)** and **(2)** must be submitted via e-mail to [lknudsen@indiana.edu](mailto:lknudsen@indiana.edu). You will be contacted by Friday, April 2<sup>nd</sup> if your piece has been selected as a finalist or for display.

Judging:

The artwork submitted will be judged on the following elements of artistic expression based on the theme: ***"Electronic Waste Recycling is Important because..."***

Specifically, you will be judged on:

1. Overall creativity and originality
2. Description of how your piece relates to the overarching theme
3. Quality of composition and design

### **DISPLAY**

Submissions that are selected as finalists will either be displayed in the glass cases of the West lobby of the Wells library during the month of April, or will be included in the April 6th InfoShare display at the Wells library.

## UNPLUGGED: IU Bloomington Electronic Waste Art Competition

**Theme:** "Electronic Waste Recycling is Important because...."

Submission Criteria

Spring 2010



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Additional Guidelines and Information for Entries:

### Dimensions

There will be 2 display areas for finalists and you should keep this in mind when designing and submitting your piece. Depending on the size of your piece, it may be displayed in display area 1 or display area 2:

**Display Area 1:** 3 glass cases in the West Lobby of the Wells library. If you would like to try and have your piece displayed in this area, you must follow one or more of the 3 dimensions below:

Case 1: Height (48"), Width (30"), Depth (16")

Case 2: Height (48"), Width (80"), Depth (16")

Case 3: Height (48"), Width (30"), Depth (16")

**Display Area 2:** There will be a large display on April 6<sup>th</sup> in the Wells lobby and your piece could be displayed during this event as well. This event does not have dimension limits, although excessively large pieces will most likely not be selected for display.

### Example of Electronic Waste Submissions

Examples of electronic waste submissions could include:

"Clothing" made out of electronic waste items (such as keyboard buttons on a jacket)

A drawing or sculpture that involves electronic waste

Any other form of art that incorporates electronic waste in some way

**Return of Artwork:** If your piece is selected as a finalist, it will be returned to you after the display period is over.

**Safety:** Please be aware that electronic waste often contains dangerous components, such as lead in the cathode ray tubes that form the computer screen. Depending on your submission, you will need to research any hazardous components that are included in your items before construction so you are aware of any potential hazards.

**Liability:** By making a submission to this contest, you agree to not hold the Trustees of Indiana University liable for any injury you incur while making your submission(s) and also for any damage that your piece(s) may incur during display, if you are selected as a finalist. We will obviously make all effort to keep your piece(s) safe, but we are unable to guarantee complete safety.

**Questions:** If you have any questions, please direct them to Laura Knudsen at [lknudsen@indiana.edu](mailto:lknudsen@indiana.edu).

# UNPLUGGED: IU Bloomington Electronic Waste Art Competition

**Theme:** "Electronic Waste Recycling is Important because...."

Official Submission Form ~ Page 1

Spring 2010



**Note:** You **MUST** turn in this form via e-mail to [lknudsen@indiana.edu](mailto:lknudsen@indiana.edu) by **midnight on Wednesday, March 31** along with a quality **photograph** of your submission in order to be considered for judging. Also note that this form is **2 PAGES** and you must fill out all the information.

**NAME (First, Last):**

**PHONE:**

**E-MAIL:**

**YOUR DEPARTMENT (if you are an IU student):**

**YOUR POSITION TITLE (if you are IU faculty/staff or a community member):**

**HOW MANY PIECES ARE YOU SUBMITTING TO THE CONTEST?:**

**TITLE OF YOUR PIECE(S):**

**DESCRIPTION OF YOUR PIECE(S):**

*Note: This description should include how your piece answers and reflects the art contest theme of "Electronic Waste Recycling is Important because..." Also include any **materials** that you used to create the piece. Please limit this description to 100 words or less.*

# UNPLUGGED: IU Bloomington Electronic Waste Art Competition

**Theme:** "Electronic Waste Recycling is Important because...."

Official Submission Form ~ Page 2

Spring 2010



## WHAT DISPLAY AREA WILL YOUR PIECE(S) FALL UNDER?

Depending on the dimensions of your piece(s) that may be selected for display, it may qualify for one or both of the following display areas (see information below). Excessively large pieces will not be selected for display. The following information must be filled out by ALL contest participants, regardless of the kind of piece(s) they are entering into the contest.

### Please list the rough dimensions (in inches) of your piece(s):

*Note: If you are entering multiple pieces, please type or write in the information for each piece*

**Height:**

**Width:**

**Depth:**

#### Display Area 1

3 glass cases in the West Lobby of the Wells library. If you would like to try and have your piece displayed in this area, you must make sure that it fits within one or more of the 3 dimensions below:

Case 1: Height (48"), Width (30"), Depth (16")

Case 2: Height (48"), Width (80"), Depth (16")

Case 3: Height (48"), Width (30"), Depth (16")

Feel free to go and into the Wells lobby and look at the space if you want to qualify for this display option.

#### Display Area 2

There will be a large display on April 6<sup>th</sup> in the Wells lobby and your piece could be displayed during this event as well. Larger items would be displayed in this area. This event does not have dimension limits, although excessively large pieces will most likely not be selected for display.

### Please list the rough dimensions (in inches) of your piece(s):

*Note: If you are entering multiple pieces, please type or write in the information for each piece*

**Height:**

**Width:**

**Depth:**

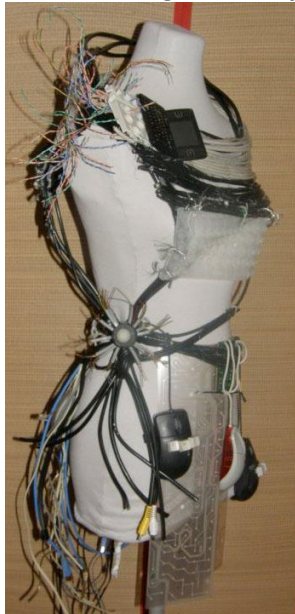
**\*\*Don't forget to attach a photograph of your piece(s)!\*\***

## Appendix E: 2010 E-waste Art Contest Submissions

Caroline LeFevre, "Still Life With Sky"



Albert Cheung and Emily Colman, "Double Click"



**Rachel Cohen, "Chillen' With My Gnomie"**



**Susan Coleman Morse, "Kickin' it E-School"**



Trevor Jones, "Lassiter 1.0"



Trevor Jones, "Hover-Mouse"



William Spelker, "Love"



# OFFICIAL PROJECT OVERVIEW DOCUMENT

## *ELECTRONIC WASTE COLLECTION EVENT, SPRING 2010*

Indiana University and the Bloomington Community

**Dates:** April 8, April 9, April 10

### Project Coordinators:

**Susan Coleman Morse**

*Sustainable Computing Graduate Assistant*

[colemans@indiana.edu](mailto:colemans@indiana.edu)

**Laura Knudsen**

*Electronic Waste Recycling Intern, IU Office of Sustainability*

[lknudsen@indiana.edu](mailto:lknudsen@indiana.edu)

## I. Introduction

In April of 2008 the Consumer Electronics Association reported that on average, Americans have about 24 electronic devices in each household.<sup>1</sup> Electronic waste (e-waste) is ubiquitous in our technological era and as a result, recycling of these electronic elements is desperately needed. E-waste contains extremely toxic materials, such as lead that is found in cathode ray tubes in computer monitors and television screens and often this waste is improperly disposed and not recycled. According to a recent report by the Environmental Protection Agency Office of Solid Waste, in 2007 only 18% of electronic products that had reached the end of their lifecycle were recycled and the rest were disposed.<sup>2</sup> Additionally, the EPA estimates that about 235 million electronic products are not disposed but are merely stored in homes across the United States because citizens are unsure of what to do with these electronic items.<sup>3</sup>

For these reasons and more, we have decided to organize a second well orchestrated electronic waste collection event for the Bloomington community. This is the principal electronic collection event for the city of Bloomington. We hope that through advertising of this event, the improper disposal of electronic waste will be minimized.

Other universities have conducted similar events. The University of Hawaii collected 1.5 million pounds of electronic waste at 2008.<sup>4</sup> Additionally, the University of Michigan conducted a similar event in 2005 and collected over 145 tons of e-waste.<sup>5</sup>

The purpose of this official project overview document (oPOD) is to outline the details for the Indiana University event and establish a general theme for project coordination and collaboration.

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<sup>1</sup> Consumer Electronics Association. *Market Research Report: Trends in CE Reuse, Recycle and Removal*. April 2008

<sup>2</sup> Office of Solid Waste, U.S. Environmental Protection Agency. *Electronics Waste Management in the United States*. July 2008

<sup>3</sup> Ibid

<sup>4</sup> See <http://www.hawaii.edu/ewaste/>

<sup>5</sup> See <http://www.climatesavers.umich.edu/projects/recyclingevents.html>

## II. Project Details

### 1. Project Background

In the spring of 2009, Apple Inc. and Indiana University partnered to form a comprehensive e-waste collection event for the cities of Bloomington, IN and Indianapolis, IN. This event was highly successful and approximately 832,000 pounds of e-waste was collected. Due to the high success rate of this event, it was decided that Apple, Inc. would conduct the event again but only at the Indiana University Bloomington campus.

#### 2010 Event Objectives

Due to our experience with the 2009 event, the project team has developed the following objectives for the 2010 event.

*\*Increase public awareness of electronic waste and the consequences of improper disposal*

This year, an electronic waste art exhibit is going to be displayed during the month of April in the Wells library in order to draw more attention to the event as well as educate the public about the e-waste problem.

*\*Increase participation from Indiana University regional satellite campuses*

While South Bend was actively involved with last year's event (and will be again this year), other regional campuses were not as active. This year, Susan and Laura plan on reaching out to these campuses to try and coordinate e-waste pickups by Apple.

*\*Increase participation from Indiana University Bloomington departments*

In 2009, participation from departments was not as high as expected. This year, Susan and Laura will target department IT managers to increase the amount of e-waste obtained at this year's event from IUB departments.

#### General Project Timeline & Media Plan

To expedite the project planning, we have drafted a general project timeline (Appendix 3) that details weekly activities until the event dates of April 8, April 9, and April 10. This timeline includes advertising (Appendix 5), volunteer coordination and collaboration with community partners. However, the Office of the Vice President of Public Affairs and Government Relations has created a detailed media plan for the 2010 event as well (Appendix 8).

## 2. Collection Locations

This event will take place on the Indiana University Bloomington campus at the IU stadium in the Purple Lot. The stadium will be used as a collection center for residents. Appendices 6 and 7 provide maps of this location.

## 3. Timeframe for Event

This event will last for a total of three days (Thursday, Friday, and Saturday) in order to obtain the largest turn-out possible. Set-up for the event will occur on Thursday morning. Thursday and Friday are intended for larger drop-offs from organizations, but consumers may still drop off their goods at this time. Saturday is intended for consumer waste collection.

## 4. List of Appropriate Items for Collection

The specific list of waste items that will be collected is found in Appendix 4. All items will be collected free of charge. Items that are contaminated with biological or chemical agents will not be collected.

## 5. Day-Of-Event Activities – Volunteers and Survey

On the day of the event we understand that Apple will be in charge of handling all the electronic waste that is dropped off at the Bloomington campus. However, we intend to have volunteers in charge of directing traffic and providing information to patrons.

Additionally, we will have volunteers assist us in administering and informing patrons about an optional paper or online survey at both sites regarding their perceptions of electronic waste and the reasons they decided to attend the event. This survey and our methodology are currently pending approval by the Indiana University Research Board.

## 6. Event Advertising

Coordination will occur with Indiana University Media Relations and the Office of the Vice President of Public Affairs and Government Relations in order to disseminate information about this event to the press. A list of contacts that will be provided upon request for interviews is included in Appendix 9.

### III. Guidelines for Project Work

The project will involve a holistic communications process with the internal points of contact (Appendix 1). All internal parties should be informed of any decisions or important project developments via e-mail. Additionally, all project communications must involve the Indiana University project coordinators, Susan Coleman Morse ([colemans@indiana.edu](mailto:colemans@indiana.edu)) and Laura Knudsen ([lknudsen@indiana.edu](mailto:lknudsen@indiana.edu)).

### IV. Conclusion

We are very excited to work with you on this project and welcome any comments and suggestions you have regarding this oPOD. Thank you for your time.

## APPENDIX 1: INTERNAL PROJECT COMMUNICATIONS

Category	Name	Title	Affiliation	E-mail
IU Bloomington	Susan Coleman Morse	Sustainable Computing Graduate Assisant	University Information Technology Services (UITS)	colemans@indiana.edu
	Laura Knudsen	Electronic Waste Recycling Intern	Indiana University Office of Sustainability	<a href="mailto:lknudsen@indiana.edu">lknudsen@indiana.edu</a>
	Bill Brown	Director	Indiana University Office of Sustainability	<a href="mailto:brownwm@indiana.edu">brownwm@indiana.edu</a>
	Chip Rondot	Manager, University Communications	University Information Technology Services (UITS)	crondot@indiana.edu
	Sarah Engel	Communications Specialist	University Information Technology Services (UITS)	<a href="mailto:sjengel@indiana.edu">sjengel@indiana.edu</a>
	Nancy Clensy	Assistant for Special Projects	Office of the Vice President of Public Affairs and Government Relations	nclensy@indiana.edu
	Corinne Fries	Intern	Office of the Vice President of Public Affairs and Government Relations	cjfries@indiana.edu
	Steve	Media Specialist	Office of University Communications	shinnef@indiana.edu
Apple	Art Fichter	Recycling Manager	Apple Computer, Inc.	<a href="mailto:afichter@apple.com">afichter@apple.com</a>
	Dick Hamstra	Higher Education Account Executive	Apple Computer, Inc.	<a href="mailto:hamstra@apple.com">hamstra@apple.com</a>
	John Yeider	Event Management	Apple Computer, Inc.	<a href="mailto:yeider.j@apple.com">yeider.j@apple.com</a>
	Ewa Kalman	Contract Manager	Apple Computer, Inc.	<a href="mailto:ekalman@apple.com">ekalman@apple.com</a>
	Ryan	Web Devlopment	PowerON	development@poweron.com

## APPENDIX 2: PARTNERS

Category	Name	Title	Affiliation	Email
Administrative	Kim Milford		UIITS	
	Mike Sample	VP PR/Government Relations	IUB	
	Bill Stephan	VP for Engagement	IUB	
	Terry Clapacs	VP CAO	IUB	
	Dotti Frapwell	VP & General Council	IUB	
	Dennis Cromwell/Sue Workman?		UIITS	
	Marsha Egan		UIITS Technology Centers Computing - IUB	
	Virginia Dowling		UIITS Technology Centers Computing - IUPUI	
Sustainability Task Force	Steve Akers		Residential Services	<a href="mailto:spakers@indiana.edu">spakers@indiana.edu</a>
	Melissa Greulich	Recycling Intern	Sustainability Task Force	<a href="mailto:mmgreuli@indiana.edu">mmgreuli@indiana.edu</a>
	Mike Steinhoff	Intern Coordinator	Sustainability Task Force	<a href="mailto:msteinho@indiana.edu">msteinho@indiana.edu</a>
	Michael Hamburger		Sustainability Task Force	
	Tom Fallwell		Building Services	
Student Groups	Nathan Bower-Bir	President	Volunteers in Sustainability	<a href="mailto:vsustain@indiana.edu">vsustain@indiana.edu</a>
	Luke Fielder	President	IUSA	
	Abby Schwimmer	Sustainability Officer	IU Student Association	<a href="mailto:acschwim@indiana.edu">acschwim@indiana.edu</a>
	Aarthi Devanathan		Residence Hall Association	<a href="mailto:adevanat@indiana.edu">adevanat@indiana.edu</a>
	Lucy Wehking		Greeks Go Green	<a href="mailto:lwehking@uemail.iu.edu">lwehking@uemail.iu.edu</a>
Departmental	Carissa Moncavage	E-waste contact	EMA - Environmental Management Association	<a href="mailto:cmoncava@indiana.edu">cmoncava@indiana.edu</a>
	David Good	Faculty	SPEA	
	Becky Thacker		UIITS (IUPUI)	
	Kevin Clark		Athletics	
	Jim McAuley		Surplus Stores	
	Eli Blevis	Faculty	Informatics	<a href="mailto:eblevis@indiana.edu">eblevis@indiana.edu</a>
Community	Larry Barker	Executive Director	Monroe County Solid Waste Management District	<a href="mailto:lbarker@mcswmd.org">lbarker@mcswmd.org</a>
	Unknown		MCCSC - Monroe County Schools	
	Unkown		RBBCSC - Richland Bean Blossom Schools	
	Unkown		Ivy Tech	
	Adam Watson	Member of Commission for Sustainability	City of Bloomington	<a href="mailto:wasona@bloomington.in.gov">wasona@bloomington.in.gov</a>
	Unkown		City of Indianapolis	
	Tamara Loewenthal	Festival Event Volunteer Coordinator	Lotus Festival	<a href="mailto:vlotus@bluemarble.net">vlotus@bluemarble.net</a>
	Rick Dietz	IT Director	City of Bloomington	
	Unkown		Indianapolis Schools	

## APPENDIX 3: GENERAL TIMELINE

I. Week of January 11 – 15

II. Week of January 18 – 22

1. Meet with Apple and finalize event dates

III. Week of January 25 – 29

1. Press Release #1

IV. Week of February 1 – 5

1. Begin early notice of volunteers

2. Establish community partners

V. Week of February 8 – 12

1. Press Release #1

VI. Week of March 15 – 19

Spring Break

VII. Week of March 22 – 26

1. Volunteer Sign-up

2. Finalize Volunteer Schedule

3. Press Release #2

VIII. Week of March 29 – April 2

IX. Week of April 5 – April 9

1. Press Release #3

2. The Event!

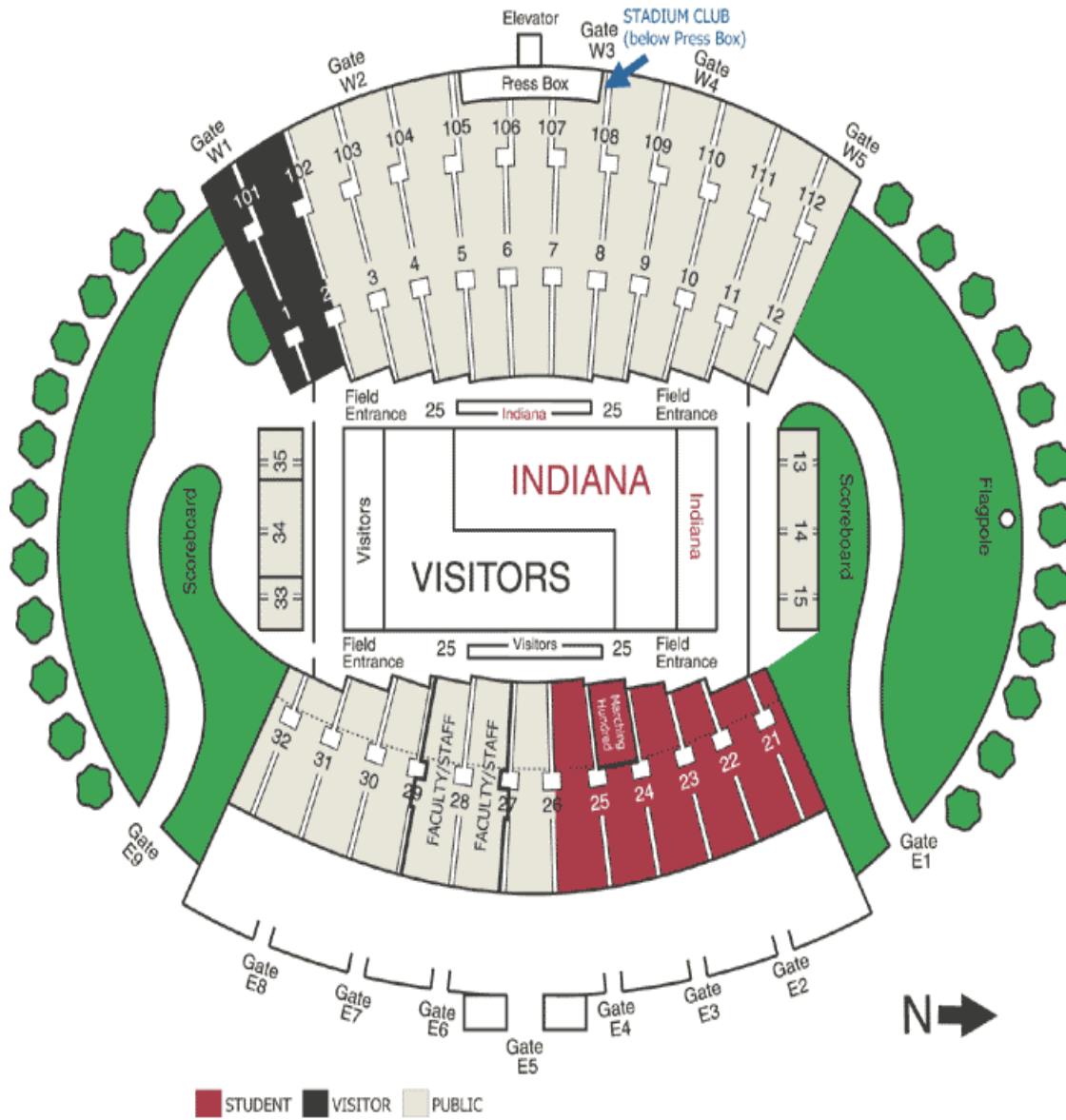
#### APPENDIX 4: PROPOSED LIST OF COLLECTION ITEMS

- Televisions
- Personal Computers
- Floppy Drives
- Laptop Computers
- Telephones
- Inkjet Printers
- Dot Matrix Printers
- Cable Boxes
- Cables, Wires, Extension Cords, etc...
- CD-Rom and Floppy Drives
- Misc. Equipment
- Mainframe Equipment
- Docking Stations
- Monitors (all sizes)
- MP3 Players/iPODs
- Game Systems
- VCRs
- CD-Rom and Msc. Circuit Boards
- Cell Phones
- Laser Printers
- Scanners
- UPS Battery Back-ups
- Power Supplies
- Telecommunications Equipment
- Network Equipment
- Keyboards and Mice
- Flat Panel Displays
- Digital Cameras
- DVD Players
- Microwave Ovens

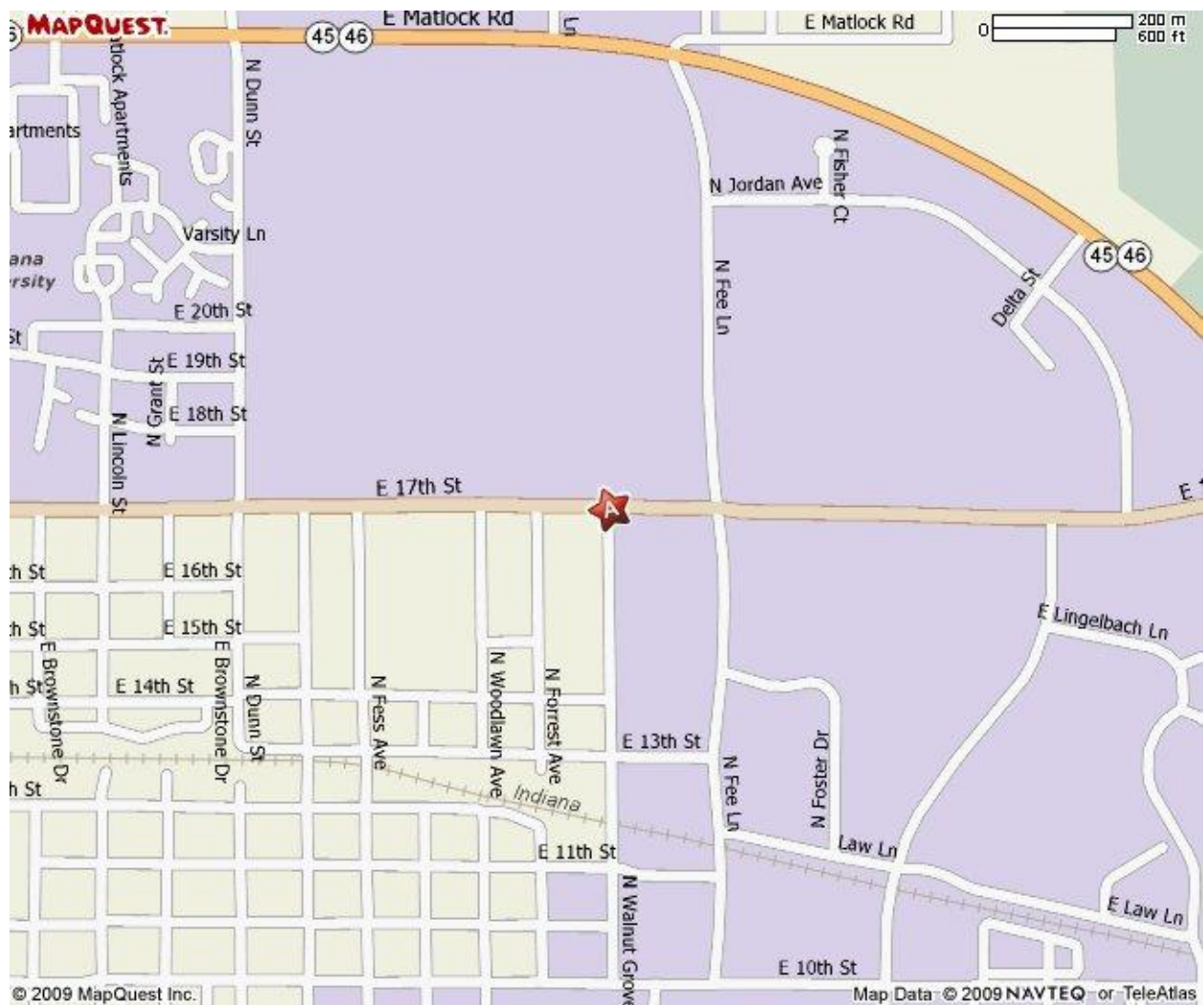
## APPENDIX 5: IUB PROPOSED MEDIA OUTLETS

Communication Source	Contact	Title	E-mail
UITS monitor	Chip Rondot		
Student Groups – IUSA, VIS, EMA	see partners list		
Staff Council, Faculty Council, Professional Council	Unknown		
STC Consultants, RITS Consultants	Sue Perin		
Residence Halls	Steve Akers		
News release to IDS, WTIU, WFIU, Spanish Radio, HT, IU Homepages			
UITS all note	Chip Rondot		
IU Sustainability Task Force	Michael Hamburger		
Library Sustainability Task Force	Unknown		
Greeks go Green	Lucy Wehking		<a href="mailto:lwehking@umail.iu.edu">lwehking@umail.iu.edu</a>
Student Activities Office	Colleen Rose	Civic Engagement Coordinator	<a href="mailto:rosec@indiana.edu">rosec@indiana.edu</a>
Chalking sidewalks	Unknown		
Knowledge Base update	Elizabeth Venstra		
Athletic Events (Ad on Big Ten Network)	Unknown		
Facebook group	Unknown		
Sustainable Computing website	Unknown		
Earth Care Bloomington (Bloomington Church Alliance)	Madi Hirschland (Chairperson) Allan Edmonds (Member)		<a href="mailto:mhirschland@gmail.com">mhirschland@gmail.com</a> <a href="mailto:edmonds@indiana.edu">edmonds@indiana.edu</a>
Bloom Magazine	Malcolm Reynolds	Publisher	
University Communications	Jennifer Piurek		<a href="mailto:jpiurek@indiana.edu">jpiurek@indiana.edu</a>

Appendix 6. Layout of Indiana University Stadium (Bloomington, IN)



Appendix 7: Map of area around Indiana University stadium (Bloomington, IN)



## Appendix 8: 2010 E-Waste Days Publicity Schedule (Edited 2/2/2010)

### February

Meet with Kelly (Blgtn. Chamber) Story line for March Business Network Edition (PAGR)

Reserve banner ad space in Herald-Times for 4/8 – 10/10. **Nancy**

3-15 Develop plan for IU department's advance involvement with getting items to Surplus Stores  
**(Laura Knudsen and Susan Coleman Morse)**

3-15 Explore possibility of TV spots for IU cable channel **(Nancy with Valerie Pena)**

3-15 Explore possibility of radio spots being produced by Mike Pipher **(Nancy with Angela Tharp)**

15 Website Launch <http://www.indiana.edu/~sustain/E-Waste/index.html>

1-15 Discuss cross-promoting of MCSWD Bulky Item Drop Days and E-Waste Event with Steve Akers, Tim Frazier, etc. Report back at 2/15/10 Committee meeting.

18 IUB Departmental Flyer Release **(Nancy Clensy to compose) – could also be linked to release issued 3/22/10**

22 Poster & flyer design work completed and approved. To printer. **(Chip Rondot)**

28 Plan in place on how we hope to work with various elementary, middle and secondary schools on promotion of E-waste event to parents **(Corinne Fries/Nancy Clensy)**

### March

8 IUB Departmental E-News Blast **(Steve Hinnefeld/Nancy Clensy draft of document)**

Omit any mention of IUPUI's involvement, include 1) people there to unload your e-waste from your vehicle and 2) new e-waste law in Indiana.

8 - 12 Email Blast to Educators in K-12 system among all counties adjacent to Monroe **(Nancy Clensy)**

8 – 12 Distribution of posters & flyers completed by student groups coordinated through IT student ambassadors and Office of Sustainability, perhaps even with high school student groups

Local schools, churches, Ivy Tech, Starbucks, Dunkin Donuts, Square Donuts, Crescent Donuts, Best, Buy, Sam's Club, Office Depot, Staples, etc. Complete list to be determined and made available.

12 E-mail addresses to Hinnefeld from Clensy for news release distribution purposes on 3/22/10

Possible feature (spotlight) item for IU Bloomington Web site **(Nicole will mention to Thom)**  
**(Twitter and Facebook)**

22 Press Release to Blgt. Sustainability Committee **(Nancy get e-mail addresses to Steve by 3/12/10)**

22 Press Release to Monroe County Solid Waste Mgt. **(Nancy get e-mail addresses to Steve by 3/12/10)**

Press Release to City/County Offices of Blmgtn **(Nancy get e-mail addresses to Steve by 3/12/10)**

Press Release to Monroe County Social Services network **(Nancy get e-mail addresses to Steve by 3/12/10)**

IUPUI internal promotion of this event to Tox Away day via JagNews, Inside IUPUI, JagTV and others **(Schneider)**

Events Calendar and Campus News link on IUPUI's home page **(Schneider)**

UITS will be piggy-backing promo of Tox Away Day along with IUPUI Media Relations – **Chip Rondot**

22 Press Release #1 sent to wide spread media **(Steve Hinnefeld)**

**This release will appear on the Newsroom site as soon as it goes out.**

- 24 E-Waste Event Button on IU Gateway 3/29 – 4/10/10 **(Steve Hinnefeld)**
  - 25 WGCL Afternoon Edition Radio Show 4pm-6pm – Apple Interview **(Nancy) ?? status of this show??**
  - 26 Electronic Home Pages – Story Topic: What can be collected **(Jayne S. & Steve H.)**
  - 29 Flyer and Earth Day Outreach to K-12 School System **(???)**
- Earth Day Press Release – Story Topic: Preserving the Environment by not dumping **(Steve Hinnefeld)**

**April**

- 1 Live at IU (Event Box & Calendar) – **(Nicole Roales)**
- 2 HT story **(Steve Hinnefeld)**  
Chamber Email Blast to members Blmgtn **(Nancy)**  
BEDC Email Blast to members **(Nancy)**
- 7 WGCL Afternoon Edition Radio Show 4pm-6pm **(Nancy)?? Status of this show??**
- 8 Active for Life Calendar **(Nicole Roales)**
- 8-10 HT/Bloom Paid Advertisement – bottom front page strip **(PAGR/Nancy)**  
Press Release on Collection from first day – artwork with weight **(Chris Meyer or another UC photographer to capture photos (photo gallery) on first day of collection)**  
Email News Release to all IUB **( may not be possible; needed??)**
- 8 Press Release on Collection from first day (artwork)
- TBD Press Release on Collection To Date (artwork)
- 21 Press Release on Total Collection to All local media outlets (artwork)

## Appendix 9: List of Media Contacts (for interviews, information, etc...)

### 1. Susan Coleman Morse

Title: Sustainable Computing Graduate Assistant, UITS

Phone:

E-mail: [colemans@indiana.edu](mailto:colemans@indiana.edu)

### 2. Laura Knudsen

Title: Electronic Waste Recycling Intern, IU Sustainability Task Force

Phone: 425-766-1022

E-mail: [lknudsen@indiana.edu](mailto:lknudsen@indiana.edu)

### 3. Art Fichter

Title: Recycling Manager, Apple

Phone:

E-mail: [afichter@apple.com](mailto:afichter@apple.com)

### 4. Nancy Clensy

Title: Assistant for Special Projects for the Office of the Vice President of Public Affairs and Government Relations

Phone:

E-mail: [nclensy@indiana.edu](mailto:nclensy@indiana.edu)