Assessing Electrical Plug Loads from Office and Computing Sources at Indiana University

Prepared for the Indiana University Physical Plant
SPEA V600 Spring 2014

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Abstract

The Indiana University Physical Plant seeks to identify areas across the Bloomington campus where energy cost savings can be attained. The purpose of this Capstone project was to identify the potential for energy-related cost savings associated with the use of computing devices and office-related plug-in devices on the IU Bloomington campus. Four areas were investigated for potential savings: plug-in devices in faculty and staff offices; Student Technology Centers (STCs); the IT-28 cyber risk mitigation policy; and Thin Client computing devices and docking stations. Additionally, an electronically distributed survey of IU faculty, staff, and students was conducted to gather information on individual behaviors and perceptions relating to these areas. Analysis of the data gathered enabled the Capstone group to provide a targeted cross-section of energy consumption on the IU campus in these areas and allowed for the development of policy recommendations for consideration by the Physical Plant.

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ACEEE – American Council for an Energy-Efficient Economy
ASHRAE - American Society of Heating, Refrigerating, and Air Conditioning Engineers
CERN – European Organization for Nuclear Research
CI – Confidence Interval
CIB – Cyber-Infrastructure Building
DC – Direct Current
ECI – Energy Cost Intensity
ECRM – Energy Cost Reduction Measure
EIA – Energy Information Administration
EPA – Environmental Protection Agency
EUI – Energy Use Intensity
GPSO – Graduate and Professional Student Association
GPU – Graphic Processing Unit
HP – Hewlett-Packard
HP – Horsepower
HVAC – Heating, Ventilation, and Air Conditioning
IFC – Interfraternity Council
IN – Indiana
IRB – Institutional Review Board
IT – Information Technology
IT-28 - Policy IT-28 Cyber Risk Mitigation
IU(B) – Indiana University (Bloomington)
IUOS – Indiana University Office of Sustainability
IUSA – Indiana University Student Association
kBTU – Kilo – British Thermal Unit (one thousand British Thermal Units)
kWh – Kilowatt-hour
LBNL – Lawrence Berkeley National Laboratory
LEED – Leadership Energy and Environmental Design
LHC – Large Hadron Collider
MD – Doctor of Medicine
MEL(s) – Miscellaneous Electrical Loads
MW – Megawatt (one million watts)
NILM – Non-intrusive Load Monitoring
OS – Operating System
OSU – Oregon State University
PUE – Power Usage Effectiveness
SAS- Statistical Analysis System
SCCM – System Center Configuration Manager
SEDAC - Smart Energy Design Assistance Center

Sf – Square Footage
SOIC – School of Informatics and Computing
SPEA – School of Public and Environmental Affairs.
SPSS – Statistical Package for the Social Sciences
STC(s) – Student Technology Center(s)
TWh – Terawatt-hour (one trillion watt-hours)
UITS – University Information Technology Services
UPS – Uninterruptible Power Supply
USGBC – United States Green Building Council
VM – Virtual Machine
W – Watt(s)
Yr - Year

Contributors and Acknowledgements

The Spring 2014 Capstone group would like to acknowledge the valuable support provided by all contributors. Special thanks go to our key contacts at the IU Bloomington Physical Plant, Office of Sustainability, and Pervasive Technology Institute, whose assistance throughout the semester greatly enhanced the quality of the report.

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I. Executive Summary

Energy costs are a significant part of Indiana University's budget. The IU Physical Plant seeks ways to save energy and reduce energy costs so as to better support the University's educational and research activities. Previous Capstone projects have aimed to aid the Physical Plant in this mission by surveying the attitudes of IU students, faculty, and staff towards energy conservation and by examining the electricity demand of IU facilities. This Capstone project builds off of that earlier work by assessing the electricity costs associated with computing and office devices.

This Capstone project had four major objectives. These were to:

1. Evaluate the potential for decreasing energy costs associated with plug-loads in offices by identifying and auditing a cross-sectional subset of campus office buildings and extrapolating the results to the whole campus;

2. Evaluate the potential for decreasing energy costs associated with the Student Technology Centers (STCs);

3. Characterize the potential energy savings achievable through full implementation of the IT-28 cyber risk mitigation policy; and

4. Evaluate and characterize the potential energy savings associated with increased use of thin clients and docking stations on campus.

To reach these objectives, the Capstone group conducted five different project tasks: one corresponding to each of the listed objectives as well as a survey task aimed at providing supplemental data for the other project sections.

Survey Task

The survey project group developed and conducted an electronically distributed survey for IU students, faculty, and staff that aimed to gather information on behaviors related to use of computing and office devices. The survey garnered 500 student respondents and 1,380 faculty and staff respondents, and met the standards for statistical significance for both groups.

The survey had several notable findings. A large majority of students (89%) indicated that they do not use IU's wireless printing service, with 47% not even knowing that it exists. 24% of students required access to the STCs in order to use software that they do not have access to on their own computers. The faculty and staff survey results indicated that approximately 50% of faculty and staff strongly oppose exchanging their current desktop computer systems for thin client or tablet systems, which will present a challenge to be addressed before the policy changes recommended by the office and thin client project groups can be implemented.

Office Task

The office project group conducted walk-through audits of five IU campus buildings (Ballantine Hall, the CIB, the Kelley School, SPEA, and Swain West), examining the energy demand of plug-in devices in the offices, conference rooms, and break rooms in those buildings. The office group determined that significant cost savings could be achieved by replacing office desktop computer systems with thin clients and limiting the use of thermal comfort devices.

STC Task

The STC project group conducted tests of computer power demand in multiple usage states and took observations of actual usage states of the computers in STCs. The STC group determined that differences in usage state had no significant impact on computer power demand, but that different models of computer did have significantly different power demands, indicating that the patterns of computer use are not as important for energy costs as the types of computer being used. The STC group also determined that STC computers do not currently enter standby mode when not in active use, and recommended that this be changed in order to reduce energy costs.

IT-28 Task

The IT-28 project group examined the current implementation status of the IT-28 cyber risk mitigation policy and evaluated the energy savings possible through full implementation of the policy. The IT-28 group determined that approximately 84% of the servers on the Bloomington campus had already migrated to the Data Center. It also determined that more than 400,000kWh in energy consumption could be avoided every year through migration of the remaining servers to the Data Center and into a virtual environment.

Thin Client Task

The Thin Client project group examined the energy savings possible through a transition from desktop computers to thin clients and looked at the functionality of current thin clients to determine if such a transition was feasible. The group determined that significant energy savings are possible through a transition to thin client systems. It also found that modern thin clients are at least as functional as the desktop computers in use in the STCs. However, the group also found that IU faculty, staff, and students have negative perceptions of thin clients that may make a transition to use of these systems unpopular.

Policy Recommendations

Office

- Transition away from individual office printers to print release stations for faculty and administrative staff
- Progress towards widespread use of thin clients in all office areas
- Restrict the use of food-related appliances and devices to break rooms and kitchen areas
- Eliminate the use thermal comfort devices in areas where heating and cooling issues can be resolved through HVAC system improvements
- Increase communication efforts between IU Green Teams, building managers, and faculty and staff
- Utilize directional air covers in buildings to facilitate the placement of conditioned or heated air where it can be most effective and where the occupants of the room are actually located
- Caulk and seal existing window units (especially single pane windows) to limit air infiltration and exfiltration

- Place copiers, computers, and printers into default standby mode, or shut off, when not in use
- Increase the use of high efficiency bulbs in office lighting equipment

Student Technology Centers

- Allow STC computers to enter standby mode after 30 minutes of inactivity
- Continue purchasing high efficiency desktops for offices and STCs where required
- Increase student awareness of wireless printing service

IT-28

- Move servers performing duplicative services to Data Center
- Move physical servers (including those already moved to the Data Center) into the virtual environment
- Examine cooling backups and other efficiency improvements for servers that remain in their departments
- Each department should maintain up-to-date inventory records and building computing policies that include purchasing standards
- Enforce server migration plans

Thin Clients

- Transition to thin-client based systems in STCs and offices
- Educate faculty, staff, and students about the improved functionality of thin clients
- Continue to improve IUanyWare

II. Introduction

A. Background Information

The Indiana University Bloomington (IUB) Physical Plant, in partnership with the Office of Sustainability, is seeking to lower overall energy consumption on the IUB campus. This objective is based on two core principles to lower energy costs and to achieve sustainable infrastructure and planning goals. Reduced energy consumption became a priority for the IUB Physical Plant after the release of the March 2010 Indiana University Bloomington Master Plan. This plan recommended that the University should focus on energy efficiency projects and work to reduce the overall campus carbon footprint (Smithgroup JJR, 2010). The 2012 Integrated Energy Master Plan (IEMP) reaffirmed the University goals to transition to energy-efficient infrastructure and to work towards campus carbon neutrality (8760 Engineering, 2012).

The support of these plans by IU President Michael McRobbie and the IU Board of Trustees prompted the IUB Physical Plant to work specifically towards reducing energy consumption associated with individual behaviors during campus peak demand. The University defines peak demand as the highest level of energy capacity, measured in kilowatts (kW), that the campus demands for 30 minutes in each billing period from Duke Energy, the University's electricity provider (IUOS, 2014). This peak demand is converted to a peak demand charge that comprises 40-50% of the University's monthly electricity bill. Due to the expensive nature of the peak demand charge, the IUB Physical Plant decided to focus on reducing individual behaviors during campus peak demand. The focus on student, faculty, and staff energy consumption patterns is due to the fact that building occupant behaviors account for an estimated 40% of all campus energy consumption (8760 Engineering, 2012). The other purpose of a behavioral focus is to encourage a campus-wide sustainability ethic that could further drive down energy costs.

The IUB Physical Plant and Office of Sustainability's search for solutions in reducing energy consumption during peak demand prompted a partnership with faculty and students at the IU School of Public and Environmental Affairs (SPEA). The current V600 Capstone builds on the work of two previous Capstone projects, completed in Spring 2013 and Fall 2013 under the direction of faculty advisor Diane Henshel. The two primary objectives for the Spring 2013 Capstone were to create a comprehensive survey that assesses students' understanding of energy use and conservation and to develop a campus energy dashboard that would encourage student participation in energy efficiency and sustainability (Betz et al., 2013). The Spring 2013 Capstone survey concluded that students both frequently underestimated energy usage and also failed to translate knowledge about energy conservation into behavioral changes. Through the survey results, the Spring 2013 Capstone group successfully identified individual perception and behavioral barriers to reducing energy use; however, the team did not identify potential actions to actually reduce campus peak demand.

The Fall 2013 Capstone's continued the work of the first Capstone, evaluating the major factors driving energy demand and usage on the IU Bloomington campus (Bennett et al., 2013). To do so, the project team created an energy use classification system at the sub-building level based on the following characteristics: number of occupants, frequency of occupancy, and special electronic or major equipment in the given room or space. The team used this classification system to estimate individual building demand and then developed heat maps to visualize patterns of peak demand. The results of this analysis indicated that major science, research, and class-room dominated buildings coincide with and appear to drive campus peak (Bennett et al., 2013). These results, combined with those of the Spring 2013 Capstone, informed the current V600 Capstone team of the factors driving campus peak demand (including building usage patterns), along with the barriers to changing individual energy consumption behaviors. As a result, the previous Capstones' results directed us to focus on reducing peak energy demand in office and academic buildings, rather than in residential buildings. We were also directed to focus on policy recommendations that were not subject to behavioral barriers identified in the Spring 2013 Capstone.

B. Literature Review

Miscellaneous electrical loads (MELs) are all electric loads except those associated with main heating, ventilation, cooling, water heating, and lighting systems (McKenney et al., 2010). As the efficiencies of these main, typically centralized systems improve, MELs make up an increasing percentage of the electricity consumption in commercial buildings (McKenney et al., 2010). MELs make up 40% of the electric load in high-efficiency buildings (Kaneda et al., 2010), and around 30% of the total electrical load in all American commercial buildings, more than any single main system load (McKenney et al., 2010). Energy efficiency design teams have traditionally not included MELs in their purview, instead focusing on the energy intensive, main building support systems (Kaneda et al., 2010). However, as the MEL share of building plug load increases, more attention is being paid to reducing the electricity demand from MELs (Kaneda et al., 2010).

The 2010 American Council for an Energy-Efficient Economy (ACEEE) Summer Study on Energy Efficiency in Buildings found that substantial reductions in MEL power demand could be achieved (Kaneda et al., 2010). The ACEEE authors conducted two case studies on possible MEL reductions; one on an office building used by one of the authors' employers, and one on a server closet (a small space containing a computing server). They found that electricity demand associated with MELs could be reduced on average by 44%. The steps recommended by the ACEEE authors for reducing MEL electricity demand included:

- Virtualization of servers and use of high-efficiency server designs
- Replacement of desktop personal computers with thin clients
- Reduction of the number of printers and copiers used
- Use of low-power modes for intermittently-used food-related appliances

The ACEEE authors highlighted the importance of server virtualization for MEL reduction; virtualization of the server in the server closet case study reduced the electricity demand for that MEL by 59%, reducing annual electricity consumption by 33,000 kWh (Kaneda et al., 2010).

A review of MELs across all areas of the economy, conducted by the Department of Energy, found that replacement of all MEL-associated devices with a best-in-class (most energy efficient) device could reduce the total electricity demand from MELs by 35% (McKenney et al., 2010). Of this saving, approximately half would come from improvements in the energy efficiency of electronics (computers, monitors, and other office equipment) (McKenney et al., 2010).

The ACEEE group suggested improved monitoring and use of monitoring technology as a way to control electricity demand from MELs. One proposed technology was an infrared occupancy sensor, which could be placed inside a workspace, monitoring when the space is occupied. When the space is unoccupied, the sensor can automatically turn off all electronic equipment in the workspace

(Kaneda et al., 2010). Another technique proposed was use of detailed electricity consumption monitoring and personal feedback to modify individual behavioral patterns (Kaneda et al., 2010).

Several institutions have conducted energy audits in an effort to reduce MELs. These include the University of Illinois Urbana-Champaign, Oregon State University, the University of California at San Diego, and Lawrence Berkeley National Laboratory, all of which focused on two specific approaches to conducting the audit: Load Reduction and Efficiency Improvements. Load reduction focuses on managing energy consumption by turning off devices or not using controls. Efficiency improvements upgrades the building envelope (the immediately surrounding area of a building), and replaces old or failing systems (Sample 2009).

1. University of Illinois

The University of Illinois was contracted from the Smart Energy Design Assistance Center (SEDAC) to perform an energy audit of a high school in Illinois (name redacted). The overall goal was to identify promising energy cost reduction measures (ECRMs). The ECRM packages put together by the SEDAC teams helped reduce the school's energy use by 12 percent and yielded an annual savings of $25,719 per year (SEDAC, 2009).

In order to identify the calculated savings, the SEDAC teams utilized both site visits and computational analysis to find a complete package for ECRMs. The SEDAC teams performed site visits making notes of buildings energy use for lighting, HVAC systems, hot water, and additional energy loads (office electronics) (SEDAC, 2009).

For computational analysis, the SEDAC teams used benchmarking tools, utility rates, and energy use profiles to understand each of the building's energy demands and energy utilization. Benchmarking and energy profiles were calculated by collecting the utility electric and gas data to calculate the building's energy use intensity (EUI, measured in kBTU/sf/yr) and energy cost intensity (ECI, given in $/sf/yr).

For the energy usage profiles, the utility bills for electricity and natural gas were used to determine when a significant portion of energy was used to heat or cool the school. The profiles help identify the amount of energy spent per amount of days required of heating or cooling, and where efficiency improvements are needed. Utilizing the different tools available, the University of Illinois was able to determine where their load and efficiency savings should be concentrated.

Overall, the University of Illinois' team's energy savings were achieved by making efficiency changes with their lighting controls and improved HVAC systems. This audit serves as an example of potential energy savings that can be achieved by meeting the correct amount of days required for heating and cooling, such that private comfort devices were not deemed necessary.

2. Oregon State University

Oregon State University (OSU) performed an audit on two of their buildings, Richardson Hall and Peavy Hall, to identify potential cost-effective energy upgrades for the buildings. The audit was conducted by PAE Consulting Engineers, Inc. Similarly to the University of Illinois study, OSU utilized site visits as well as performed computational analysis to find their energy cost savings. The results of their energy audit could save 20% of the energy cost and $47,000 per year for Richardson Hall, and 50% annual energy cost and $167,000 per year for Peavy Hall (OSU, 2012).

For OSU's site visits, the analysts toured each room of the building while cataloging equipment that was left on while the room appeared unoccupied. Lighting type, conditions, and controls were noted. HVAC systems were also observed to measure the heating and cooling efficiency in each system (OSU 2012).

The PAE reviewed the preliminary energy modeling results and determined the Energy Conservation Measures (ECM) which were required to reduce the energy usage; and using these ECM, calculated the energy cost savings (OSU, 2012). The Energy Conservation Measures are shown below:

	Peavy Hall - Energy Conservation Measures
1	Improved Wall Insulation (meet current OR Energy Code levels)
2	Improved Roof Insulation (meet current OR Energy Code levels)
3	Improved Window Glazing (meet current OR Energy Code levels)
4	Convert controls to DDC controls (set back and schedule savings)
5	Constant volume to variable volume lab hood conversions
6	Lighting controls for classrooms
7	Occupancy sensors for commons & restrooms
8a	Replace air handling unit
8b	Replace VAV boxes
8c	Incorporate economizer controls
9	Variable speed fans for fan systems
10	Waterside economizer for chiller plant
11	Steam trap monitoring, temperature sensors for failure of traps / replacement of traps
12	CO_2 demand based ventilation
13	Low flow plumbing fixtures
14	Exterior lighting control
15	Egress lighting controls
16	Pumping energy savings with VFD and two way valves for HW & CHW
17	Insulate CHW, HW, steam and condensate piping where missing
18	Replace motors with premium efficient motors
19	Lighting upgrade for offices and classrooms

Figure 1. List of Energy Conservation Measures at Peavy Hall.[1]

[1] Figure taken directly from OSU, 2012.

Richardson Hall - Energy Conservation Measures	
1	Improved Wall Insulation (meet current OR Energy Code levels)
2	Improved Roof Insulation (meet current OR Energy Code levels)
3	Improved Window Glazing (meet current OR Energy Code levels)
4	West (admin) penthouse envelope insulation
5	Lighting controls for the classrooms
6	Daylighting controls where applicable
7	Waterside economizer for chiller plant
8	Steam trap monitoring, temperature sensors for failure of traps / replacement of traps
9	CO_2 demand based ventilation
10	Low flow plumbing fixtures
11	Exterior lighting control
12	Egress lighting controls
13	Pumping energy savings with VFD and two way valves for HW & CHW
14	Insulate steam and condensate piping where missing (traps, PRV's, etc.)
15	Lighting upgrade for Lumber Bay

Figure 2. List of Energy Conservation Measures at Richardson Hall.[2]

Based on the recommendations proposed by PAE, the Energy Use Intensities (EUIs) of the current buildings were compared with model buildings and also with the results of the US Commercial Building Energy Survey. At the time of the audit, energy use for Peavy Hall and Richardson Hall were 7.1% and 18.3% greater than an average comparable building (OSU, 2012).

[2] Figure taken directly from OSU, 2012.

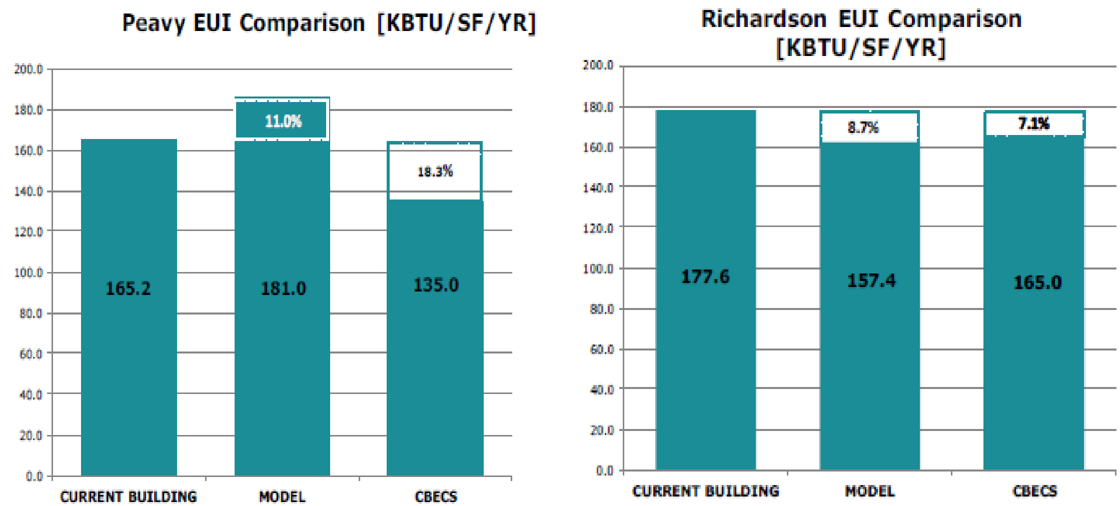

Figure 3. Comparing energy use intensity (EUI) values for the current energy bills at Oregon State University, the modelled existing buildings and average results from the US Commercial Building Energy Survey.[3]

3. *University of California, San Diego*

The University of California at San Diego (UCSD) used a campus wide scale for their audit as the UCSD campus resembles a small town; of the 45000 daily population, 29000 are students. There are around 450 buildings on the campus of which 60 of the largest buildings have been metered to provide the aggregate energy consumption data. The university campus has broadly spread energy generation, storage and management systems to supply electricity and thermal energy using high temperature and chilled water to the buildings across campus (Agarwal, & Gupta, 2009).

The Computer Science and Engineering (CSE) building was used as a test bed for the analysis of energy consumption. The CSE building had about 600 occupants and approximately 750 desktop PC machines

At UCSD the building meters report the data back to a central data acquisition center, and the individual meter readings are collected by a separate storage and visualization server, which stores aggregate time stamped data at 15 minute intervals (Agarwal & Gupta, 2009).

The initial observations, comparing few of the energy intensive buildings, suggested that the CSE and the Calit2 (Research Building) consumed significantly more energy than the other buildings due to the additional IT infrastructure in them. SDSC (San Diego Super Computer Center) had the

[3] Figure taken directly from OSU, 2012.

highest energy consumption, which was attributed to the computer servers (Agarwal & Gupta, 2009).

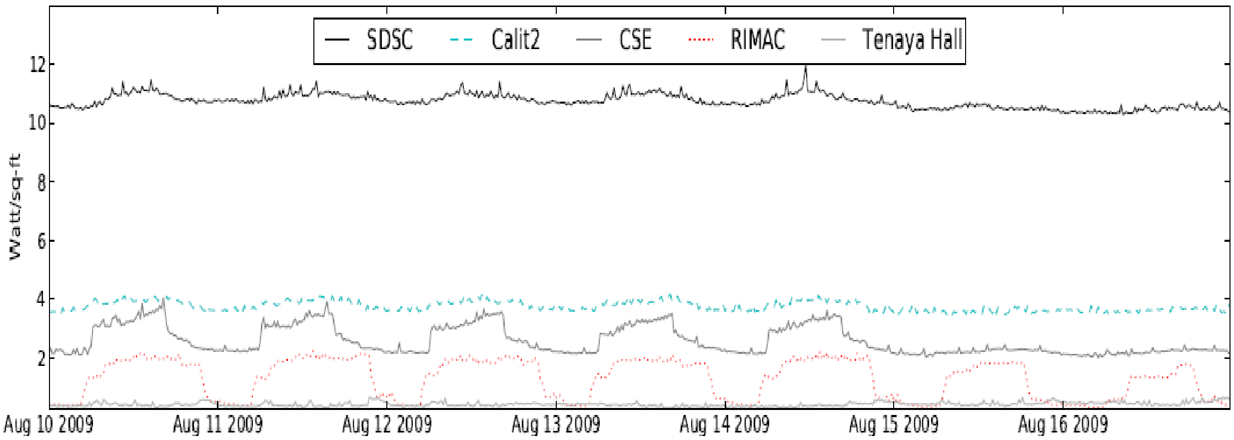

Figure 4. A comparison of five UCSD campus buildings based on their energy usage modalities for the month of August 2009. [4]

The energy consumption of the CSE building when analyzed for short term and long term usage showed that the electric load was similar throughout the year. (As San Diego has neither harsh winters nor very hot summers, the between-season heating and cooling demand differences are likely to be much smaller than a university, like Indiana University, where the winters are cold and the summers are very hot.) The 'base load' was 325 KW and remained the same throughout the year. Much of the base load energy consumption was attributed to the IT infrastructure in the building.

[4] Figure taken directly from Agarwal & Gupta, 2009.

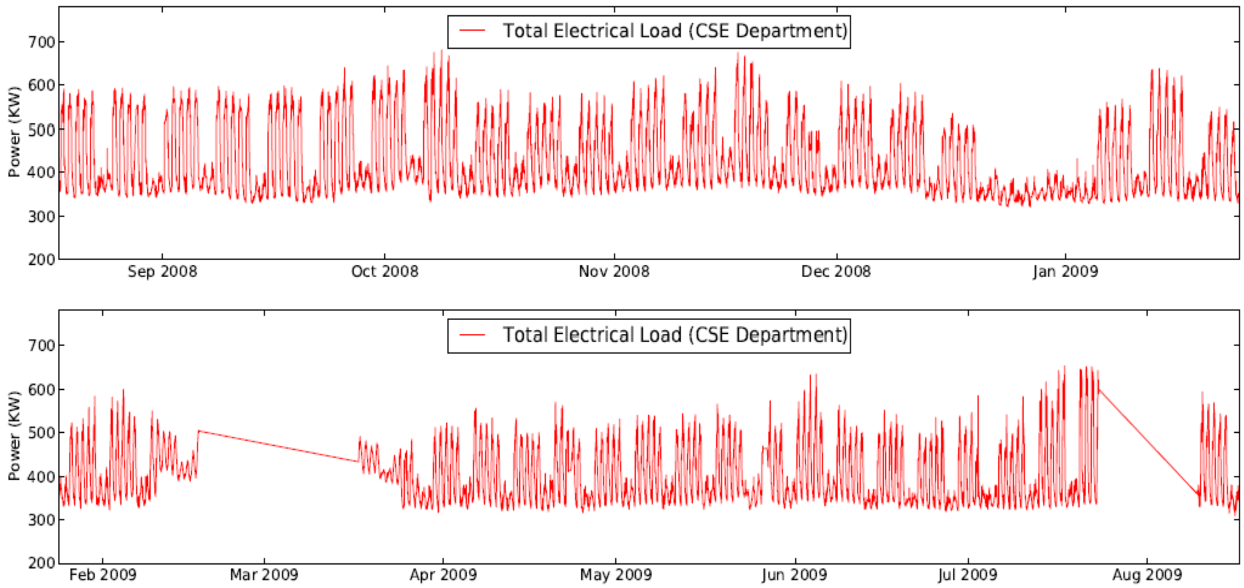

Figure 5. Total energy consumption within the CSE Building for a year.[5]

. Thus about 25% of the total building energy consumption came from computer systems (Agarwal & Gupta, 2009). Using the above analysis and results, energy saving recommendations for IT equipment such as Wake-on-LAN and Somniloquy, which reduce power by increasing the use of power saving states, were proposed to reduce the building energy demand (Agarwal & Gupta, 2009).

4) Lawrence Berkeley National Laboratory Office

The Lawrence Berkeley National Laboratory conducted a survey of commercial and educational buildings to explore the extent to which electronic office equipment is turned off or automatically enters a low power state when not in active use (Roberson et al., 2004). The data improves estimates of typical energy consumption and savings for different office equipment. The office equipment surveyed included computers, monitors, printers, multi-function devices (all-in-one devices), copiers, fax machines, and scanners. Additionally, miscellaneous equipment, such as TV's, portable HVAC systems, and lighting, were considered. This study expanded on previous work conducted in California and Washington DC, to include 12 commercial buildings from San Francisco, Pittsburgh, and Atlanta. The function of the buildings ranged from education buildings, health care; and small, medium, and large offices (Roberson et al., 2004).

In each building, the groups surveyed as much area available to them in a four hour time frame. The denser the area, defined by the number of computers per employee or employee per 1000 square foot, the more electronic equipment was made available for recording. Of the electronic

[5] Figure taken directly from Agarwal & Gupta, 2009. There were data collection issues for the months of March 2009 and August 2009.

equipment recorded, the groups took note of which devices were left on, in a "power management" mode, or turned off.

Of the office equipment surveyed, turn-off rates were highest for integrated computer systems (ICS) (60%), copiers (48%), and scanners (41%). Power management rates were highest for monitors (75% – 71%), ICS (61%), scanners (60%), and laser printers (60%). Lower power management rates were lowest for desktop computers and fax machines (Roberson et al., 2004).

The study concluded there is "significant room for improvement" in power management with desktop computers, and suggest, with future studies, to modify the parameters to enable computers to power manage themselves and their attached monitors (Roberson et al., 2004).

Each of the four energy audits concluded that efficiency improvements and/or load reductions can lead to significant energy savings. All four audits focused at least in part on computing equipment, and Lawrence Berkeley Laboratory study also explicitly included evaluation of other electronics. Efficiency improvements can solve over/under heating and lighting overconsumption issues as seen in the University of Illinois and Oregon State University audits. Additionally, load reduction in the form of power management or HVAC system controls can lead to significant energy savings, as seen in the University of California San Diego and Lawrence Berkeley National Laboratory audits.

III. Spring 2014 Capstone Project Goals

A. Objectives

The Capstone project's objectives were to:

1. *Evaluate the potential for decreasing energy costs associated with plug-loads in offices by identifying a cross-sectional subset of buildings on campus that have a high degree of faculty diversity:*
    a. Conduct physical inventory of plug loads in sample offices across multiple buildings;
    b. Survey faculty and staff to collect a wide cross section of office plug-related electricity usage;
    c. Estimate energy use in each type of office, for the average office, and for average open space workstations and break rooms;
    d. Identify options for increased energy efficiency of office computers. Consider:
        1. Using thin clients;
        2. Docking stations for shared printers;
        3. Using laptops instead of desktops;
    e. Gauge faculty and administrative response to the implementation of new technology standards;
    f. Compare the usage of comfort devices, such as fans and space heaters, to building heating and cooling patterns;
    g. Identify specific building policies for each building within the cross-sectional subset, including but not limited to: computer replacement, printing, food-related policies, and

comfort-based electronics;

h. Develop campus-wide policy recommendations for reducing energy use in offices.

2. *Evaluate the potential for decreasing energy costs associated with the Student Technology Centers (STCs):*
   a. Evaluate current utilization of STC Computers during peak and non-peak electricity usage times;
   b. Review management of STCs and compare to existing UITS management policies;
   c. Quantify equipment energy costs;
   d. Detail STC-related behavior of students through detailed surveys;
   e. Identify the potential for increased use of wireless printing capabilities, which may include recommendations for raising student awareness as well as other appropriate policy recommendations;
   f. Develop energy reduction policy recommendations for UITS management;
   g. Develop policy recommendations for getting students to shift energy consumption related to computing to non-peak electricity usage times;
   h. Develop policy recommendations for equipment energy savings.

3. *Characterize the potential energy savings due to full implementation of the IT-28 cyber risk mitigation policy:*

   a. Identify the current status of IT-28 implementation;

   b. Analyze the potential for future energy savings based on IT-28's full implementation. Consider:
      1. Cooling needs for servers not housed in the Data Center;
      2. Computing needs for independent servers and utilization level (i.e. if the function the server performs can be integrated into existing Data Center servers without increasing net energy consumption);

   c. Develop policy recommendations to encourage energy savings related to the implementation of IT-28, and:

4. *Evaluate and characterize the potential energy savings associated with increased use of thin clients and docking stations on campus:*

   a. Evaluate the current utilization of thin clients on campus;

   b. Analyze the potential for increased use of thin clients and docking stations in both STCs and faculty and staff offices on campus based on improved implementation and functionality;

   c. Analyze the potential for energy savings from increased use of thin clients and docking stations across campus;

   d. Develop policy recommendations for increasing the utilization of thin clients on campus in the near future. Specifically this will consider:
      1. Using thin clients in the STC settings;
      2. Using thin clients in office settings for faculty and staff;

3. Using docking stations in the STC settings;
4. Using docking stations in office settings for faculty and staff.

B. Areas outside the Scope of This Project

Potential areas of investigation not included in the project included:

1. Plug loads associated with appliances in residential facilities including dormitories and apartments.
2. Plug loads associated with Indiana University's Data Center (however, some consideration of cooling costs at the Data Center is provided in the IT-28 section of this paper).
3. Electricity demand from hard wired systems. This includes ceiling lights, HVAC systems, wall monitors, projector screens and any other piece of hardware that is wired directly to the building infrastructure.
4. Plug loads associated with student-owned portable electronic devices (including laptop computers, cellular phones, tablets, and other small electronic devices) that are intermittently plugged into outlets within IU academic buildings (Faculty and staff-owned electronic devices were considered as part of the office plug load task of this project).
5. Plug loads associated with laboratory equipment.

C. Project Deliverables

1. An inventory of energy use from office-related plug loads:
    a. Representative plug load inventory of five selected IU Bloomington buildings with faculty and staff offices;
    b. Specific policy recommendations for energy savings in selected buildings.
2. An energy assessment of representative STCs:
    a. Inventory of desktop devices, printing devices, and Thin Clients in selected STC stations and their associated energy demands;
    b. Analysis of STC energy usage patterns.
3. A survey of energy use habits conducted in support of deliverables 1 and 2 approved by the IRB and administered to faculty, staff, and students on the IU Bloomington campus.
4. Written bi-weekly progress reports, starting with a report delivered on February 28, 2014.
5. Monthly client meetings where progress and tentative findings were discussed.
6. A final comprehensive report presented at the end of the semester:
7. A formal public presentation of the final report (held in a large enough space that all interested parties will be able to attend).
8. Participation in the capstone symposium scheduled for late April and creation of appropriate materials for presentation at the symposium.
9. A contribution to the SPEA capstone website. Our addition will include copies of the final presentation, final report, and other relevant and important information and findings.

IV. Student, Faculty, and Staff Survey Task

A. Introduction

1. Background

The Spring 2014 Plug Load Assessment capstone group undertook five projects in order to come to a full understanding of how Indiana University (IU) utilizes its energy. While some of these projects looked at university policy initiatives, such as IT-28, other parts focused on the active use of technology centers by students, and device energy consumption by faculty and staff. These projects required observational data to be gathered in order to craft detailed policy recommendations. Both the Office and STC sections of this capstone required observational data in order to formulate policy recommendations for the IU Physical Plant. For instance, knowledge of how students use the Student Technology Centers (STCs) for their computing and personal electronic needs is essential for verifying assumptions about student utilization of STC machines. The team decided to use a survey to gather necessary data based off of the success of the Spring 2013 capstone group's energy behavior survey (Betz et al., 2013).

The design of the survey instrument focused on the length, clarity and relevance of the survey questions in order to increase the survey response rate, the value of the provided answers, and to ensure that the responses were useful to the substantive research teams. Most of the survey questions were written in conjunction with the other project teams in order to provide data that would help the groups validate their physical observations. We also sought to ensure that respondents understood the end goals of the survey and how those goals could benefit them personally. For students, we discussed in the survey announcements that the reduction in costs of energy consumption could lead to improved resources and lower cost of attendance in addition to a monetary incentive. For faculty and staff, we emphasized how participation in the survey would allow respondents to have their comments and concerns about building comfort delivered directly to the physical plant.

The survey's main function was to provide supplemental information to other parts of the project. For each of the projects, the survey aimed to collect information sought during the observational periods, and gather information campus-wide. There are five sections of the survey. Each section of the survey fulfilled the supplemental goals laid out below:

1) Student Technology Centers
   The STC section of the survey aimed to determine how often students use the STCs, which STCs they used, during what time period, and for what purpose.
2) Printing
   The printing section of the survey aimed to determine student use of STC printers and the wireless printing service.
3) Thin Clients

The Thin Clients section of the survey aimed to determine how students used, if at all, Thin Clients for their computing needs.

4) Personal Electronics

The personal electronic section of the survey aimed to determine how and when students used their personal electronics while on campus.

5) Faculty offices

The faculty section of the survey aimed to determine how the faculty and staff use electronics and personal comfort devices in their office space, and to derive implied information about which buildings seem to have temperature control problems based on the comments and the use of the comfort devices.

B. Methodology

1. Survey Study Design

a. Supporting Overall Research Goals

The survey was placed into the university's electronic survey distribution and analysis software, Qualtrics. The survey was split into two main branches (faculty/staff, students) due to the different research aims for faculty and staff versus students. A complete list of survey questions can be found in Appendix A.

In order to maximize our ability to capture data in one instrument without a follow-up survey, many of the questions allowed for respondents to choose the option "Other" and enter a text answer. These answers were collected, classified, and examined to find information of value to the respondents not originally considered by the project group.

b. The Student Survey

The student survey was designed to gather information about student use of energy and computational resources on campus. Each of the project teams provided questions to gauge how well students are aware of and engaged with the different computer-related resources on campus. The physical plant is interested in identifying how students interact with two specific energy intensive resources on campus: charging of personal electronic devices and Student Technology Center (STC) computational resources. Additionally, the survey for students asks about the individual's knowledge and interactions with Thin Clients and wireless printing resources on campus to better guide future energy reduction efforts.

c. The Faculty Survey

The faculty and staff survey was designed to determine faculty and staff usage of electrical and computational resources as well as gather information about office and work space temperature control. Because the physical plant desires feedback about the environmental state of individual buildings and offices, each respondent was asked to identify in which building their primary office is located and then asked several questions about the temperature and air quality of their office. Specifically, respondents were asked whether their office location's temperature is adequate or needs adjusting. They were also asked about their personal electronic devices, personal comfort and food appliances, and their knowledge of building policies that govern the use of such devices or appliances.

2. IRB Approval

Because the study involved human subjects, it was necessary to obtain approval from the Institutional Review Board (IRB). IRB serves to protect all subjects' privacy and prevent emotional or physical harm (Office of Survey Administration, 2013). After capstone members completed online training for research on human subjects, all survey materials and methodology were submitted for review. Eric Campbell, co-survey team leader, led the application process under the supervision of faculty advisor Dr. Diane Henshel. Ashley Bowers, Director of the Center for Survey Research, provided extensive guidance throughout the process.

This study, IRB Protocol #1404707661, received Exempt Review approval on April 8, 2014.

3. Scope of the Population for Survey Distribution

The target population for the student survey is the entire current IU Bloomington student population, approximately 40,000 undergraduate and graduate students. In order to generalize our results to the entire student body, we needed to obtain a representative sample. The student survey is designed to capture the habits and preferences of any student. Thus, we sought to distribute the survey as widely as possible to all students on the Bloomington Campus.

For the faculty and staff survey, the target population is the entire current IU Bloomington faculty and staff. Many of the questions revolve around the condition of offices and office buildings. Since these conditions vary widely, the decision was made to try and reach the entire population of faculty and staff in order to obtain a cross-sectional view of all of the university buildings. Additionally, the Office group focused their analysis on five specific buildings with diverse characteristics. Providing a broader survey distribution provides independent validation for whether the intensely sampled buildings are indicative of other buildings with similar characteristics.

4. Number of Respondents

Determining how many respondents to aim for is a matter of probability statistics for a population of significant size. "A carefully selected probability sample in combination with a standardized questionnaire offers the possibility of making refined descriptive assertions about a student body, a city, a nation, or any other large population," (Babbie, p. 286). With a student body of approximately 40,000 persons, the population is sufficiently large that the only consideration is what confidence interval (CI) and estimated error we want to be able to claim when reviewing our results. The table below outlines the necessary number of student respondents required for a CI of 95% and a range of estimated errors. We determined that for the student survey, an estimated error of 5% would be our target, requiring at least 384 responses.

Parameter	Value							Notes
p	0.50							Using a value of 50% provides for the largest sample size required to meet error goals
q	0.50							Using a value of 50% provides for the largest sample size required to meet error goals
Z=95% CI	1.960							Student's t-value for a 95% Confidence Interval
E (Estimated Error)	4.380%	1%	2%	3%	4%	**5%**	10%	Possible Estimated Error
n=pq(Z/E)^2	501	9604	2401	1067	600	**384**	96	Necessary Response Rate to ensure a level of estimated error
Sample Size in Percent of Students	1.25%	24.01%	6.00%	2.67%	1.50%	0.96%	0.24%	percentage of the Sample Size to the student population
Is n > 0.05 N (Is Sample Size > 5% of Population)	0	1	1	0	0	0	0	If the sample size is greater than 5% of the population, we must adjust the standard deviation for the Finite-Population Correction Factor.
Finite-population Correction Factor	1	0.0044	0.0099	1	1	1	1	

Table 1. Calculations for Determining Target Number of Survey Respondents.[6]

As previously discussed, the distribution for the faculty and staff survey was the entire population. Instead of a target number of respondents, the aim of this survey is to have most of the buildings on the Bloomington campus represented so buildings with temperature control concerns can be identified. Therefore, the target number of respondents was as many as would take the time to complete the survey.

5. Survey Distribution

Internet surveys are easy and inexpensive to distribute, however, they often come with low response rates and possible biases (Langbein& Felbinger p. 193). One reason is that emailed surveys, which is the internet method employed here, can be impersonal or potentially treated as spam (Couper p. 5). Additionally, people are wary of clicking on links supplied in emails as they may have malicious software attached. Unless the individual sending the email has established their identity and trustworthiness, the email is likely to be ignored by the recipient or placed into a spam filter (Couper p. 5). Therefore, the email subject line must convey enough information so that the recipient will overcome any biases they may have about opening emails from unknown senders asking for their time.

For our research, an internet survey is the easiest way to reach the Indiana University population. The university's Qualtrics software provides a convenient interface for building and analyzing our survey. Since the majority of the population on the Indiana University campus is educated, has extensive experience with the internet, and is accustomed to the university asking for

[6] Methods taken from Rubin, 2011.

their participation in online surveys, we hoped to overcome many of the problems associated with individuals assuming that links from an unknown sender is malicious.

Since the faculty and staff survey was sent by the Indiana University Communications, we anticipated a higher response rate. The survey had the official sanction of the University's Office of the Vice Provost and respondents could be assured that the link was not malicious. Additionally, sending the invitation email through the Indiana University communications office allowed for safeguarding of personal identification information and non-biased distribution.

Timing of the survey was also a question we considered early. For an electronic survey, upwards of 80% of all responses are received in the first week (Survey Monkey 2011). We provided two weeks for responses from students and 5 calendar days for responses from faculty and staff.

a. Student Survey Distribution

The target number of student survey responses was just under 400. Knowing that response rates for electronic survey distribution can be as low, sometimes much less than with paper mailed surveys (which can have response rates in the 30% to 40% range) (Langbein and Felbinger p. 2), we knew that we needed to have our survey viewed by as many students as possible. In order to achieve our goal, we contacted a variety of student organizations on campus with large memberships. Participating organizations included the Graduate and Professional Student Organization (GPSO), Indiana University Student Association (IUSA), Panhellenic Counsel, Interfraternity council (IFC), the Union Board, and other organizations in which the capstone group members were involved. Several of these organizations distributed the link and information about our survey to their membership list as well as provided advertising through Facebook and Twitter.

Individual project members also sent out personal emails with a link to the survey to friends and acquaintances on campus as well as placing an announcement on each of our personal Facebook walls. Some individuals connected to one or more of the project members also sent out personal emails to their network. For example, at least one undergraduate in the College of Arts and Sciences who is personally connected to a project member forwarded the announcement email to everyone in all of her classes from the past two semesters using the online class administration website, OnCourse, which provides contact emails for all students enrolled in a class. The attempts to increase visibility by the members of the capstone class may have created a bias in the respondents, since individuals are more likely to respond when they have a personal connection with the survey administrator (Babbie, p. 288).

With the distribution to the IUSA and the GPSO, theoretically every undergraduate and graduate student should have been contacted via some method, but predicting the response rate from secondary distribution methods is extremely difficult (Babbie, p. 287).

In addition to advertising through on campus student organizations and our personal networks, we utilized the IU Student Online Address Book to collect random email addresses for Bloomington students through searches on last names to broaden the distribution and overcome the potential biases noted above. This information collection conforms with the purpose of the directory as stated on its website and no additional information, such as full name or academic department, was collected along with the email list. The list has not been and will not be, shared with any other individual or organization and once the initial survey and reminder emails were sent, the list was deleted. When evaluating our distribution options, this method stood out as, though not ideal, providing the best opportunity for obtaining the minimum number of responses with the smallest opportunity for response bias. The following table identifies which search terms were utilized in collecting the 1021 emails from the IU Online Address Book.

Search Terms for Collection of Individual Email Addresses from IU Online Address Book	
Campus	**Bloomington**
Role	**Student**
Last Name (Starts With)	**First Initial(s)**
Allen	(any)
Brook	A-J
Storm	(any)
Smith	A-B
Chamber	(any)
Singh	A-P
Lee	A-H, Y-Z
John	A-Z
Z	A-Z
Mo	A-C

Table 2. Search Terms Used for Individual Email Address Collection.

Direct communication to participants with an introduction to the survey and pertinent information as to why the participant should respond has been shown to increase interest and genuine participation, (Langbein and Felbinger, p. 6). Therefore, an introductory letter and a reminder email were sent after seven days in order to boost our response rate (Survey Monkey 2011). Additionally, we offered a drawing open to the students for one of four prizes. The grand prize winner received a $50 gift card to the Scholars Inn restaurant in Bloomington. Three additional winners received a $25 gift card to the same location.

b. Faculty and Staff Distribution

The faculty and staff survey was distributed to the entire Indiana University faculty and staff population through the IU Department of Communications. Our request for a general distribution email to be sent to the entire email list was approved by the Vice Provost, Thomas Gieryn. The survey cover email emphasized that this was an opportunity for the faculty and staff to provide comments to the physical plant on their physical work environment. Email reminders were sent out after two days in order to increase response rates. No monetary incentive was offered to the faculty and staff.

C. Results

1. Distribution and Representativeness

We achieved our statistical goals: the total number of respondents included in the final data set consisted of 500 Students and 1,380 Faculty and Staff Members. The breakdown of respondents is shown below.

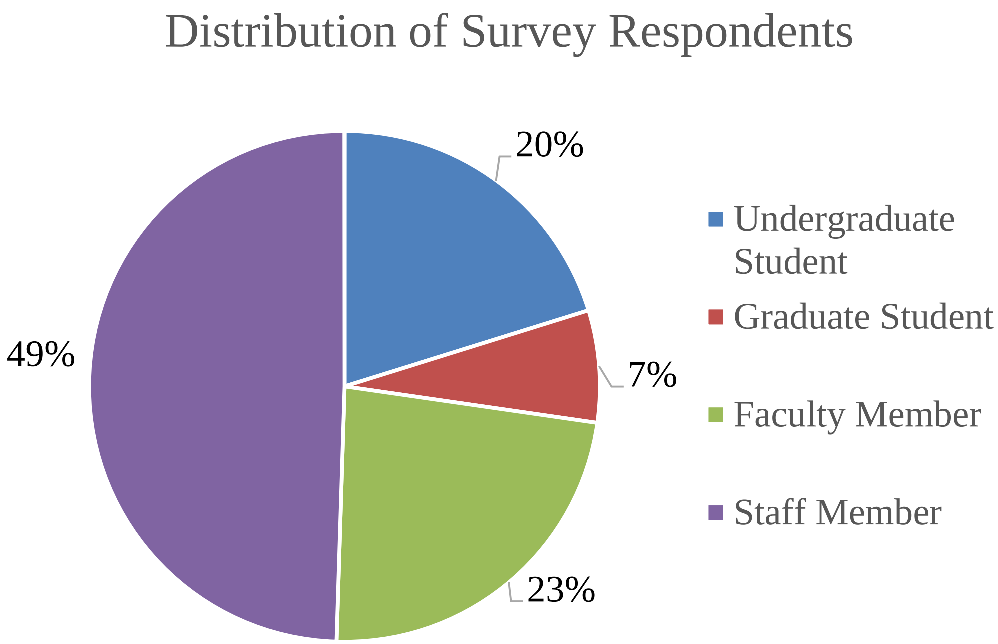

Figure 6. Breakdown of Survey Respondents by Type.

a. Student Survey

Given our distribution plan, it is difficult to determine our actual response rate. Our original hope was to achieve a response rate near 40% for the direct emails sent to just over 1,000 students from the IU Address Book given the monetary incentive. In reality, we know that the response rate for the entire population who saw an announcement for the survey was much lower. We know from distribution to friends and acquaintances that at least another 1,000 students received a personal email announcement, and there is no way to quantify how many students actually saw the announcements sent out by various campus organizations. This leads to the inference that our secondary sources of announcement, such as personal emails to friends, classmates and acquaintances, posting though multiple organizations on campus, and endorsement by the Office of Sustainability, likely significantly increased the number of students who received an announcement with a link to the survey to well above 2,000 students. Due to the extensive use of social media and outside groups for the promotion of the survey, it is not possible to determine how many students the survey reached.

Student Type	Number	Proportion of Total Responses
Undergraduate Student	370	74%
Graduate Student	130	26%
Total	500	100%

Table 3. Breakdown of Student Responses by Undergraduate or Graduate Status.

One major concern with the distribution method was that the survey would be biased based on a disproportionate number of the friends and acquaintances of the project members responding to the survey. In order to determine whether we had a valuable sample of the student population, we asked the students to list their current degree path as a demographic question. Below are the results of this question. The data has been collated into the 20 major categories listed below. An example of this collation is that nursing, optometry, exercise science, public health, dietetics, speech & hearing sciences, MD, health administration, kinesiology, and physical therapy have all been placed into the "Health" category. The large "Management" category consists primarily of various SPEA concentrations. When looking at the final responses, over 125 unique responses were received. The actual responses are available in the Student Survey (Appendix B).

We saw a larger number of respondents from students graduating in the next two years than would be expected of a four year institution. Additionally, from the personal experiences of the project members, many students become active members in on-campus organizations in their second or third year. Finally, it is known that most friends and acquaintances of the group who helped in distributing the survey were reaching an upper-class or graduate level audience. It is also noted that many graduate programs are only two years long. Given that approximately one third of the respondents were graduate students, slightly higher numbers of 2014 and 2015 graduates would be expected. The large representation of SPEA degrees in the responses also seems to confirm our concerns about not reaching as wide of an audience as desired.

Despite these concerns, we believe that the sample of students who responded to our survey is sufficiently indicative of the actual student population that the results can be generalized across campus. SPEA offers a wide variety of courses that attract a diverse subset of students. The variety of "Management" responses indicates how broad the population is. Still, it is important to recognize the limitations of the survey sample when interpreting the results below.

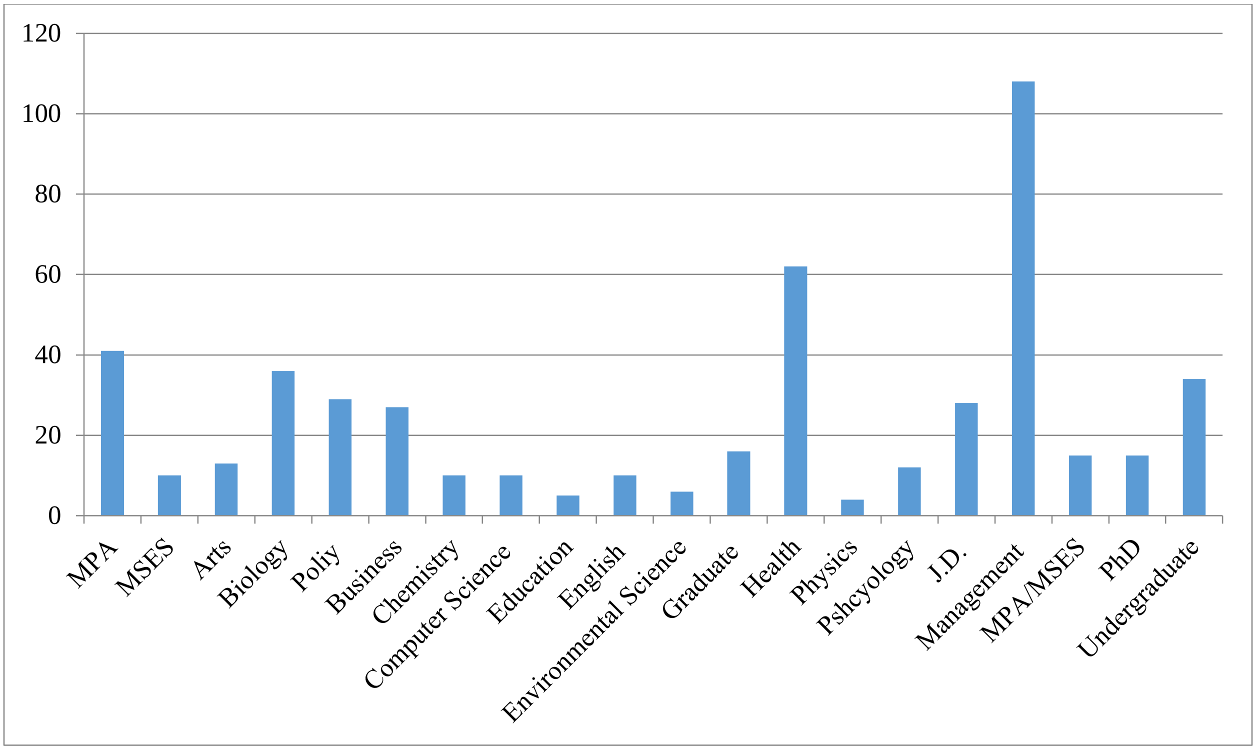

Figure 7. Degrees Represented in Student Responses (by number of responses).

Response	Number	Proportion of Total
2014	169	34%
2015	155	31%
2016	112	22%
2017	54	11%
Beyond 2017	8	2%
Total	498	100%

Table 4. Breakdown of Student Responses based upon Year of Graduation.

b. Faculty and Staff Survey

Distribution for the Faculty and Staff was handled by Mr. Nick McCammon in the Indiana University Communications. The direct email was sent on April 15, 2014 to 6,984 individuals who are either faculty or staff on the Bloomington campus. Due to the shortened time for analysis between the survey going live to the faculty and staff, the final data set for this report was retrieved on April 19 and included 1380 respondents. This is a response rate of 19.8% in only five full days of data gathering. The responses to the survey also represent about 20% of both the entire IU

Bloomington faculty (approximately 2100 total as of May 9, 2014 according to Tom Gieryn) and staff (all remaining sent emails).

Response	Number	Proportion of Total Responses
Faculty Member	443	32%
Staff Member	937	68%
Total	1,380	100%

Table 5. Breakdown of Faculty and Staff Responses by Respondent Type.

In addition to reaching a significant portion of the faculty and staff, we were able to get responses corresponding to 143 buildings on campus. While many of the smaller buildings have only a few responses, this represents nearly every academic and business building on the Bloomington campus. Many of the large academic buildings; such as Ballantine Hall, Jordan Hall, and the Wells Library; had a large number of respondents. From these results we can generalize our physical observations and provide confidence in the overall policy recommendations from the office group.

List of Buildings Represented in the Faculty and Staff Survey:

1125 E. Atwater Ave.	Brisco
1185 W. 2nd St.	Bryan Hall
120 W. Grimes Ln.	Building H
1514 E. 3rd St.	Campus View Apartments
1600 E. 3rd. St.	Career Development Center
316 N. Jordan Ave.	Carmichael Center
324 N. Jordan Ave.	Carter House
326 N. Jordan Ave.	Cedar Hall
410 N. Park Ave.	CEEM
501 N. Park Ave.	Center on Education and Lifelong Learning
506 N. Fess Ave.	Chase Bank
516 N. Fess Ave.	Chemistry
630 E. 3rd St.	CIB
705 E. 7th St.	CIPEC
815 E. 10th St.	CMCL
821 E. 10th St.	Cognitive Sciences
Admissions Office	Communication House
Aerospace Studies	Cook Hall
American Historical Review	East Studio Building
American Indian Studies Research Institute	Edmondson Hall
Art Museum	Eigenmann Hall
Assembly Hall	The Vincent and Elinor Ostrom Workshop
Atwater Eye Care Center	Ernie Pyle Hall
Ballantine Hall	Fine Arts Building
Blank	Folklore Institute

Forest	MSBII
Foster Quad	Music Addition
Franklin Hall	Music Practice Building
Geology	Musical Arts Center
Glenn A. Black Laboratory	Myers Hall
Godfrey Center	Nelson Administration Building
Goodbody Hall	Organization of American Historians
Henderson Parking Operations	Owen Hall
Hodge Hall	PBS Building
Hutton Honors College	Physical Plant
IIDC	Polish Studies Center
IMU	Poplars
Informatics East	Poynter Center
Informatics West	Psychology
Innovation Center	Public Health
Institute for Social Research	Radio-TV Building
International Programs	Rawles Hall
ISAT Hall	Read Center
IU Auditorium	Registrar
IU Warehouse	School of Optometry
Jordan Hall	School of Social Work
Journal of American History	Service Building
Journalism Annex	Showers Building
Kirkwood Hall	Simon Hall
Latino Cultural Center	Simon Music Library and Recital Center
Law	Smith Research Center
Lee Norvelle Theatre and Drama Center	SPEA
Lewis Building	Speech & Hearing Sciences
Lilly Library	SRSC
Lindley Hall	Statistics
Mathers Museum Annex	Student Building
Maxwell	Student Health Center
McCalla School	Student Legal Services
McNutt Quad	Student Services Building
Mellencamp Pavilion	Swain East
Memorial Hall	Swain West
Memorial Stadium	Sycamore Hall
Merrill Hall	Tennis Center
Monroe County Government Center	Teter Quad
Morgan Hall	Tulip Tree Apartments
Morrison Hall	Undergraduate Side (HH)
Motor Pool	Union Street Center

Union Street Market
Unknown
Von Lee
Wells Library
Wildermuth Intramural Center
Woodburn Hall
Woodlawn House
Workshop in Political Theory and Policy Analysis
Wright Ed. Building
Wright Quad
Wylie Hall

Table 6. List of Buildings Represented in Faculty and Staff Survey

D. Discussion

The survey was designed to provide the project teams with information to validate their physical observations and generalize the policy recommendations for application to the entire campus. Therefore, most of the actual results from the survey will be discussed in the appropriate sections below. Here we discuss several interesting results that apply to the survey respondents as a whole.

a. Student Survey

One main goal was to identify how long, where and for what purpose the average student uses the STC computers. Our results suggest that nearly 2/3rds of the student population uses an STC computer more than once a week for up to an hour and 98% (442 of 449) of all respondents using STCs use them for printing. Finally, our respondents listed that they use nearly every official STC laboratory on campus, providing a valuable cross-sectional look at computer usage over the entire campus.

Response	Number	Proportion of Total Respondents
Never use STCs	51	10%
Less than 1 time per week	121	24%
1-3 times per week	236	47%
More than 3 times per week	91	18%
Total	499	100%

Table 7. Frequency of Student Use of STC Computing Resources

Response	Number	Proportion of Total Respondents
Less than 15 minutes	209	47%
15 - 60 minutes	189	42%
Longer than 60 minutes	51	11%
Total	449	100%

Table 8. Duration of Student Use of STC Computing Resources

Response	Number	Proportion of STC Using Respondents
Printing	442	98%
Web Browsing / Email	217	48%
Word Processing	161	36%
Excel or Other Office Suite	106	24%
Math / Statistics / Photoshop or other Specialized Software	134	30%
Other	12	3%

Table 9. Student Uses of STC Computing Resources by Type of Use

These results have some interesting implications for overall student computer technology usage on the Bloomington campus. First, this shows that 90% of students use the campus computing resources and about $2/3^{rd}$s use them on a regular basis. Additionally, we can see from the data that a small portion of students use these resources for intensive computing. As will be discussed later in the STC and Thin Client sections (Sections VI (p. 62) and VII (p. 81), respectively), student use of the computers on campus would be well suited to resources that are less energy intensive than the current machines standard in computer laboratories around campus.

b. Faculty and Staff Survey

A major focus of the faculty and staff survey was on developing an understanding of how individual employees feel about their building environment and how they chose to change an environment they dislike. From the overall data, just over 40% of all the faculty and staff surveyed are satisfied with the temperature in their primary office during both the summer and the winter months. A substantial minority of 26% and 20% find their office space to be too cold in summer months or too hot in the winter months, respectively. These answers indicate potential cost savings from optimizing the heating and cooling within buildings to avoid over-conditioning of the air.

Response	Number	%
Too Hot	447	33%
Too Cold	346	26%
Just Right	561	41%
Total	1,354	100%

Table 10. Summer Months Overall Workspace Temperature.

Response	Number	%
Too Hot	278	20%
Too Cold	522	38%
Just Right	572	42%
Total	1,372	100%

Table 11. Winter Months Overall Workspace Temperature

Another aim of the survey was to gauge people's knowledge about and receptiveness to building policies aimed at reducing the energy consumption of a building. We found that over half of all respondents surveyed were unaware whether or not the building in which their offices were located had such policies in place. This item in particular seems to be a useful starting point for reducing the energy consumption of a building.

Response	Number	%
Yes	170	12%
No	429	31%
Do Not Know	777	56%
Total	1,376	100%

Table 12. Faculty and Staff Building Policy Awareness. Question: Does your building have any policies indicating what devices you are allowed to bring into your workspace?

Our third major goal was to measure the receptiveness of the faculty and staff to changes in computing resources that could lead to a reduction in overall energy used on campus. From a look at the overall data, approximately 50% of the faculty and staff are strongly opposed to the replacement of their desktop workstations with either a Thin Client or a tablet computer setup. A potential move to laptops is not as opposed. Few respondents sought additional information about the change.

Question	Strongly Support	Somewhat Support	Neutral	Somewhat Oppose	Strongly Oppose	Would Like More Information	Do not Currently Use a Traditional Desktop Workstation	Total Responses
Thin Client Computer	61	103	183	131	597	199	79	1,353
Tablet Computer with additional Keyboard and Monitor	82	139	173	188	553	138	80	1,353
Laptop Computer instead of Desktop Computer	188	192	219	199	385	78	100	1,361

Table 13. Receptiveness of Replacement of Desktop Computer with a Low Energy Alternative. Question: How would you feel about replacing your traditional desktop workstation with the following more energy efficient computing-based technologies?

V. Office Plug Load Assessment Task

A. Introduction

Indiana University employs more than 2,000 faculty and 5,400 staff on its Bloomington campus, and provides office space for thousands of these employees ("Faculty and staff," 2014). These office spaces include, but are not limited to, individual offices, shared offices, cubicles, reception areas, break rooms, kitchens, copy rooms, and conference rooms. The buildings housing these office areas vary greatly in age, quality of construction and insulation, energy management policies, and employee culture regarding sustainable energy practices. A number of buildings on campus have Green Teams (registered with the IU Office of Sustainability), which are voluntary groups formed within individual buildings in order to foster sustainable initiatives based on each building's individual needs. In regards to plug loads in office areas are due to a wide range of computing and comfort devices, including: computers, monitors, printers, scanners, refrigerators, microwaves, air purifiers, space heaters, and various other devices.

The capstone team sought to identify energy efficiency improvements possible with office-based plug loads. The primary deliverable for this analysis was to provide data supported office-based plug load energy efficiency recommendations.

Due to time and labor constraints, it was necessary to limit the scope of the energy audits to sample inventories of several buildings. The authors consulted with facilities employees to ensure that sampled office areas represented the overall composition of the audited buildings and that a diverse range of offices were inventoried. The audits were conducted using established methodologies created by organizations such as the American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE, 2009). In consultation with the project clients, we audited five buildings on the IU Bloomington campus: the School of Public and Environmental Affairs (SPEA); Ballantine Hall; the Cyber-Infrastructure Building (CIB); the Graduate Building at the Kelley School of Business; and Swain Hall West.

The following sections provide an overview of the methodology used, energy audit results, and a discussion of both quantitative and qualitative observations made throughout the audits. The final section presents energy efficiency policy recommendations that we believe will result in energy cost savings resulting from decreased office-based plug loads across the Bloomington campus.

1. Literature Review

According to the 2008 edition of the *Annual Energy Outlook,* the Energy Information Administration (EIA) determined that office equipment and personal computers are "two of the three fastest growing [electrical] end uses" with the third being televisions (Moorefield et al., 2008). Studies have been conducted in offices and other commercial building areas to determine the amount of energy consumed from these miscellaneous electrical loads (MELs). Overall energy consumption in the commercial energy sector accounted for approximately twenty percent of United States primary energy consumption, or about 18.3 quadrillion (10^{15}) British thermal units (BTU) per year in 2008 (McKenney et al., 2010). The Department of Energy conducted a study on commercial buildings and identified 28 different MELs in five categories: refrigeration, consumer electronics, other building MELs (such as vending machines and laundry equipment), non-building MELs (such as waste water treatment and mobile phone towers), and medical (McKenney et al., 2010). They were able to determine that 30 percent of the 18.3 quads consumed came directly from the MELs (McKenney et al., 2010). Due to resource constraints, our energy audit focused on consumer electronics such as computers and televisions, heating and cooling devices, and cooking and refrigeration appliances.

When conducting energy audits on MELs, there are traditionally five major methods that can be used. The first method is to use a survey, such as the Commercial Energy Consumption Survey, which was conducted by the EIA (Lanzisera et al., 2013). This method allows office occupants to collect data on their own devices and is combined with annual energy use and weather data. We used a survey to determine the number of devices that faculty and students use. Specific information about power consumption was not included. The second method is to align power-consumption data with activity patterns in order to make estimates on MELs by device (Lanzisera et al., 2013). The office team utilized this method by taking power consumption data and making assumptions about how long a device would be used to figure out total kWh.

The third method is the primary method used in measuring plug loads for this study. This method is known as Device Level Metering and is done in two phases. The first phase is doing in-person examination of offices spaces and recording the plug load devices in those offices (Moorefield et al., 2008). The office team conducted this type of walkthrough when it took inventory in office and shared office spaces of the five buildings that it audited. The second phase is to take actual plug load measurements by using energy measuring devices on various MELs. In one example study, the MELs were plugged into measuring devices and were left in that state to measure power draw over two weeks (Moorefield et al., 2008). Figure 8 shows some of the measured power draw from this study.

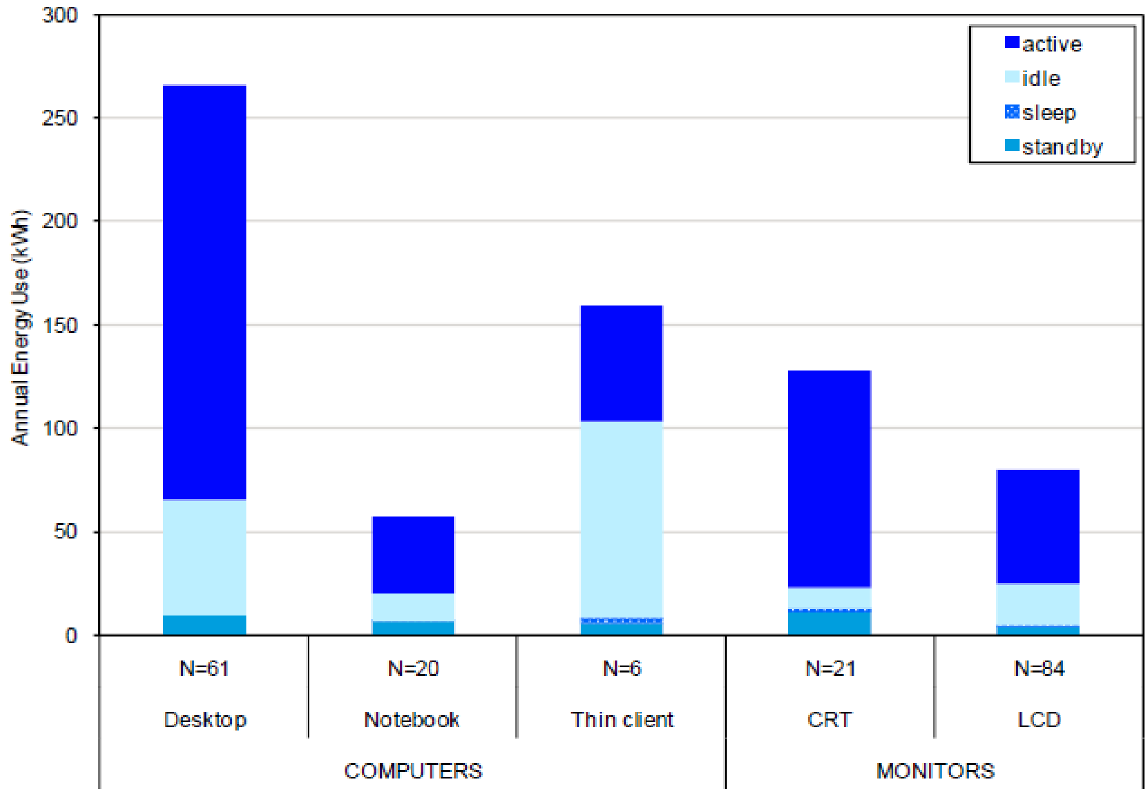

Figure 8. Power Measurement of Selected MEL Devices.

The last two methods of MEL identification are expensive and require specialized equipment and knowledge. The first method is known as Branch Circuit metering and it involves measuring a device at the circuit level. This is usually done with larger loads because many circuits have a large diversity of MELs connected to them and it would be difficult to figure out which of the MELs were having a significant impact on the circuit (Lanzisera et al., 2013). The other method is known as Non-Intrusive Load Monitoring (NLIM) and measures energy loads at the building level and uses existing energy signatures of MELs combined with algorithms to disaggregate the loads and measure power draw and operation time (Lanzisera et al., 2013). One problem with this method is that MELs that have small power draws may not show up in the model. Because of the importance of understanding power draw from MELs, organizations such as the Environmental Energy Technologies Division (EETD) of the E.O. Lawrence Berkeley National Laboratory and the University of California at Berkeley are developing "low cost methods to measure electricity use of electronics" such as installing switching power supplies on electronic devices for little to no additional expense (Lanzisera et al., 2013).

Some of the recommendations that studies have suggested for reducing energy consumption from MELs seem quite simple. After conducting energy audits for home electronics, Pigg et al. of the Energy Center of Wisconsin were able to recommend easy and cheap methods to reduce power consumption by MELs (2010).

- Enable computer power management.
- Unplug any device that is not in use and also draws standby power, such as printers.

- Turn off devices that are left on when not in use.
- Use "smart" power strips to eliminate standby power consumption.
- Use timers to eliminate electricity use by devices that are only used at specific times of the day.

The Energy Center found that many homeowners were unaware that simple methods such as the ones listed above, could produce significant reductions in home energy use. Once learning of these methods, they were quickly implemented; specifically, almost fifty percent of the homeowners executed the energy reduction strategies after the study concluded (Pigg et al., 2010).

B. Methodology

1. Walk-Through Energy Audit Methodology

Improving energy management techniques and reducing energy consumption are essential to achieving higher standards of environmental sustainability and energy efficiency. One of the many ways to improve energy efficiency is to conduct an energy audit. According to the New Jersey Department of Environmental Protection, "an energy audit is a detailed examination of a facility's energy uses and costs that generates recommendations to reduce those uses and costs by implementing equipment and operational changes" (Reyes et al., 2006). Conducting an energy audit has the potential to identify cost saving opportunities as well as methods for improving the efficiency of consumption, which translates into substantive monetary savings and long-term policy improvements.

The scope of our study is limited to recording observational data with a focus on office-based computing devices, comfort devices related to climate control (e.g. space heaters, fans, air purifiers), and other plug-load devices (e.g. refrigerators, coffeemakers, microwaves). While most energy audits often address additional issues such as indoor air quality, lighting quality and ways to improve building-occupant satisfaction, these areas are beyond the scope of this study as the HVAC systems and the in-place lighting are considered part of the building systems and are not, therefore, part of the voluntary plug-load in office spaces.

A walk-through audit involves an examination of a building or facility, with a focus on conducting a visual inspection of plug load devices, recording both the device model and nameplate capacities on all electronic devices (volts, amps, watts), and taking note of the location and effectiveness of heating/cooling systems within different office spaces (Reyes et al., 2006). If available, historic energy usage data or building specific heat maps are also reviewed to analyze patterns of energy use and compare them with existing policies in place in the buildings that were audited. The walk-through audit provides an initial estimate of potential savings and generates a menu of cost reduction and energy management options usually involving the implementation of incremental policy improvements that target a range of operation and maintenance issues (Reyes et al., 2006). Despite the focus on relatively permanent plug load devices, the day-to-day energy efficiency of any building depends largely on the decisions of its occupants and facility managers, all of whom play key roles in whole-building energy consumption. Thus, information from this level of auditing provides a foundation for determining if a more comprehensive audit will be needed in the future, and is the basis for potential policy changes related to energy savings (Lobato et al., 2013).

a. Building Selection

The office group sought input from our clients at the Indiana University Physical Plant, Peggy Maschino and Jeff Kaden, to determine the buildings to include in the assessment. After exchanging ideas about building selection, and with input incorporated from a number of Physical Plant representatives, the office group selected the following buildings for conducting walk-through energy audits:

1) The School of Public and Environmental Affairs (SPEA)
2) Ballantine Hall
3) The Cyber-Infrastructure Building (CIB)
4) The Graduate Building of the Kelley School of Business
5) Swain Hall West

The purpose behind selecting these particular buildings was to:

1) Audit a sample of campus buildings that included a mix of older and more modern structures.
2) Obtain observational plug load data from a number of very different academic departments.
3) Select buildings that were not facing significant renovations within the near future.
3) Choose buildings that not only contained academic offices, but also workspaces and break room areas where secretaries, assistants, and other administrative staff were also primary occupants.

b. Coordinating the Building Audits

The office group met with Greg Fichter, the Assistant Director of Building Services for the Indiana University Physical Plant to discuss the process for physically walking through the five selected buildings. Mr. Fichter indicated that the most effective way to conduct our plug load audits was to coordinate a time to walk through each building with the each building's cleaning crew supervisor. During this time, our office group entered into a number of offices, secretarial spaces, break rooms, and copier rooms to record observational data about the types of devices that were drawing plug load electricity. Cleaning crew supervisors accompanied our auditors to provide access to office-related areas and workspaces and ensure the integrity of our assessment process. Mr. Fichter provided our group with the contact information for his cleaning crew supervisors and our group engaged in direct contact with these individuals in order to agree on which dates were optimal for conducting our walk-through audits. All five building audits were completed over a two-week timeframe in the beginning of March 2014.

The times when the audits were completed, as well as the names of the cleaning crew supervisors that accompanied our group during the audit, are:

3/3/2014: Ballantine Hall from approximately 10:15pm-2:30am
Cleaning Crew Supervisor: Jennifer Krebbs
3/5/2014: SPEA and Graduate Business Building from approximately 10:15pm-2:30am
Cleaning Crew Supervisor: Tom Chambers
3/10/2014: Cyber-Infrastructure Building from approximately 6pm-9pm
Cleaning Crew Supervisor: Steve Waldrip
Swain West from approximately 10:15pm-2:30am
Cleaning Crew Supervisor: Char Terry

c. Meeting with Tim Gates

The third step of our process was to meet with Tim Gates and ask for advice about conducting our walk-through audits at the five aforementioned buildings. Tim Gates is a Masters student in SPEA who had previously conducted an electricity plug load audit and formal assessment of the Indiana University Health Center for the Indiana University Office of Sustainability (Gates, 2013). By meeting with Mr. Gates, our office group gained a better understanding of his assessment process, how he specifically recorded his observations, the manner by which he analyzed the data that was collected, and how he developed policy recommendations for the Health Center that could produce more efficient energy management and consumption techniques in the future. Mr. Gates also provided a data template used to record his observations, which was modified and reused for our study.

d. The Observation Process

The fourth step of our process involved a physical walk though of our chosen buildings. This activity was pre-arranged with the custodial managers who were responsible for each separate building. A custodial supervisor systematically led our audit team through the designated office and common spaces in each building. Room by room, we looked for any item plugged into a wall receptacle from computer equipment to coffee pot. Observations were also made as to age of the building, use of space, general heating and cooling comfort, and any particular observation that might speak to personal comfort devices that might be plugged into a wall outlet. For example, if an individual office contained a personal mini-refrigerator, the fullness of that appliance would be noted. Or, we would identify the type of bulb in a floor or desk lamp.

In teams of two, we made a thorough investigation of all electrical appliances in any given space. This included items that were not currently plugged into a wall outlet and might be utilized on a more intermittent basis. Such devices included: personal space heaters and fans; coffee pots; lap-top computers; mobile phone chargers; floor and desk lamps for supplemental lighting and other miscellaneous items. Typically, in the two person team, one person would physically identify the observed items by general item type, make, model number, name plate electrical capacities in watts and amps, and any other noteworthy information. These details would be logged by the other team member.

e. Areas of Inventory

The fifth step in our process was to identify the relevant areas in each building that would be a part of the physical audit process. The team identified three common office area types to inventory during the audit:

1. Individual Offices (Including Reception Desks)
2. Kitchens, Break Rooms, and Copy Rooms
3. Conference Rooms

These three areas were identified after consulting maps provided by Julie Stines at the IU Architect's Office. The maps classify rooms in university buildings according to internal room type codes including "Faculty Office" and "Support Staff" office. We aggregated individual offices and reception desks because similar color coding schemes made it impossible to delineate between individual offices and reception desks on the maps. In addition, we aggregated kitchens, break rooms, and copy rooms because all three room types are classified as "Office Service" rooms on the maps. Classrooms were not included in our audits; neither were pieces of scientific equipment that were found in any office/lab type of situation.

Time constraints did not allow us to enter each room in a studied building. Therefore, with the assistance of the custodial managers and chaperones, we identified portions of the building that could serve as a smaller sample from which we could generalize the greater building inventory. In some buildings, entire departments were investigated and equated to similarly functioning departments (Ballantine). Specialized administrative areas such as the accounting and book keeping department in the Dean's office of the graduate business building were also investigated and offered a unique itemization. Almost every break room was unique, and no two conference rooms seemed to be alike. Swain Hall had the widest ranging computer and server configuration from office to office. Swain Hall also included several computer clusters not identified in the Student Technology Center (STC) inventories.

f. Recording Daily Energy Use Data

The final step of our energy audit methodology was to take our Kill-A-Watt meters (P3 International, New York, New York; on loan from the IU Physical Plant, IU Office of Sustainability and Diane Henshel) to assess the efficiency of plug load devices by taking daily energy use readings from a range plugged-in appliance and thermal comfort devices. The office group measured a microwave, coffeemaker, space heater, air purifier and small refrigerator. The results of this daily energy-use data serves as the foundation for making comparisons with the observational data that we collected from approximately 130 different spaces in five different campus buildings. Kill-A-Watt meters allow calculation of electrical expenses by the day, week, month, even an entire year; they also provide an opportunity to assess the quality of your power by monitoring voltage, line frequency, and power factor (Amazon.com, 2014). According to the U.S Department of Energy, approximately 20% of commercial building electric bills come from items that are left plugged in when they are not in use, or items that are in standby mode. Thus, Kill-A-Watt meters can help cause a shift in the behavioral tendencies of building occupants by determining which plug load devices are costing the most to run.

2. Data Analysis Methodology

The first objective of the data analysis was to estimate the average daily energy consumption in three types of office areas and to compare these estimations across the five audited buildings. Our team also performed a sub-analysis on the usage of thermal comfort and food-related devices in the audited buildings. The second objective of the data analysis was to estimate the percentage of total electricity demand in the audited buildings that was attributable to office-based plug loads. The intended outcome of these objectives was to identify the buildings that possessed relatively low and high levels of office-based plug loads. As a result, the data analysis served to inform the policy recommendations made by the team.

a. Energy Audit Data Quality Assurance

During the data collection process, the team collected the following data points for individual appliances and devices: Building Name, Floor, Room Number, Type of Appliance/Device, Brand Name, Model Number, Voltage/Wattage/Amp Rating, and Additional Notes. If certain fields could not be identified during a walk-through energy audit, the team collected available information from the Internet; if the information was not available, the team noted this in the data collection spreadsheet.

The team first aggregated all observations into one data collection spreadsheet and standardized the observations in terms of Type of Appliance/Device, Brand Name, and Model Number. Then, all operational power ratings that were listed as voltage/amp ratings were converted to operational wattage ratings in order to provide consistency across the observations. It was then necessary to identify standby power ratings for applicable appliances and devices. The Lawrence Berkeley National Laboratory (LBNL) defines standby power as "electricity used by appliances and equipment while they are switched off or not performing their primary function" ("Standby Power," 2014). Standby power ratings exist for multiple appliances and devices such as microwaves, televisions, printers, and computers. The team identified standby power ratings as they were made available during the walk-through energy audits. If certain fields could not be identified during the audit, the team collected all available information on the Internet.

b. Estimating Average Energy Use of Office Areas

In order to estimate average daily energy consumption of office areas, the team first calculated the daily kWh consumption of individual appliances and devices. To determine energy consumption, we used the following formula:

$$\text{Daily Energy Consumption (kWh)} =$$

$$\text{Operational Wattage (kW)} * \left(\frac{\text{Hours of Use}}{\text{Day}}\right) + \text{Standby Wattage (kW)} * \left(24 - \frac{\text{Hours of Use}}{\text{Day}}\right)$$

The team considered appliances and devices not in operational mode to be in "standby" mode. If appliances and devices did not have a standby power rating, then we put a zero in the data collection spreadsheet. Assumptions for duration of use per day were based on the following information:

1. The Kill-A-Watt meter data collection process provided hours of use per day assumptions for all microwaves, coffeemakers, space heaters, and air purifiers.
2. Previous energy audits, conducted by organizations such as Ecos Consulting, provided assumptions for printers and scanners (Moorefield, 2008).
3. All remaining hours of use per day assumptions were estimated and agreed upon internally by the office plug load team. This assumption was based on faculty and staff working for approximately eight hours per day.

The individual estimates for daily energy consumption were organized according to building name and room number and further separated into the three office types: Individual Offices, Kitchens/Copy Rooms/Break Rooms, and Conference Rooms. To estimate average daily energy consumption for each office type, we separated and averaged the daily energy consumption for each of the three office types. These estimates were broken down further into average energy usage of thermal comfort and food-related devices.

c. Estimating Percentage of Total Demand from Office Plug Loads

The team estimated the percentage of total electricity demand in the audited buildings that was attributable to office-based plug loads to identify buildings that possessed relatively high and low levels of office-based appliance and devices energy consumption. The team used an energy balance equation to explain the estimated amount of total building electricity demand that could be attributable to office-based plug loads. We categorized the various energy demands in a building as presented below.

$$E_{\text{Total}} = E_{\text{Office Based Plug Loads}} + E_{\text{Other}}$$

Ian Yarbrough at the IU Physical Plant provided Duke Energy bill information containing daily electricity demand information between January 22, 2014, and February 20, 2014 for each of the five audited buildings. We calculated the days in the period by eliminating Saturdays and Sundays. This calculation more accurately estimated total building electricity demand during the days when faculty and staff would be reasonably expected to be present in their offices, using their appliances and devices for an average of eight hours.

In order to estimate the percentage of total electricity demand in the audited buildings that was attributable to office-based plug loads, it was first necessary to calculate total office-based energy consumption for each of the five audited buildings. To do so, the team completed the following steps, using the IU Architect's Office maps for reference:

1. Summed both the square footage of the rooms we audited and the square footage of total office areas for each building;
2. Organized the above information according to the three aforementioned room types;
3. Determined the daily energy consumption per square foot for the rooms we audited;
4. Multiplied the daily energy consumption per square foot by total office area square footage;
5. Summed the totals to determine total daily office-based energy consumption for each of the five audited buildings, organized by the three room types.

The team then determined the percentage of total electricity demand in the audited buildings attributable to office-based plug loads using the formula below:

$$\%\text{ of Total Demand} = \frac{\text{Office Based Consumption}\left(\frac{\text{kWh}}{\text{day}}\right) * 22\left(\frac{\text{days}}{\text{period}}\right)}{\text{22 Day Period Usage}\left(\frac{\text{kWh}}{\text{period}}\right)}$$

Using the same information, the team calculated an estimation of annual plug load energy demand for the entire building. The total office area in each category was then used to calculate the energy demand for each area on a per square foot basis.

d. Estimating Potential for Cost Savings

The office team then estimated potential cost savings associated with reducing office-based plug loads on the IU Bloomington campus. The analysis focused on the potential savings associated with individual office spaces and reception areas. The team used the CIB as a guide for hypothetical, energy efficient situations because, on average, the individual offices, or office cubicles, at CIB consume the least amount of energy on a daily basis. In addition, the building energy management policies at CIB provide a realistic model for other buildings to follow in terms of promoting a culture of energy efficiency and promoting policies such as reduced use of thermal comfort devices. In other words, the CIB provided a target level of average daily energy consumption that was both desirable and theoretically feasible for other buildings to obtain.

To estimate potential cost savings, we first identified the total Duke Energy bill that IU paid for the five audited buildings for electricity during the billing period between January 22, 2014, and February 20, 2014. Duke Energy calculates the total electricity bill using the following formula:

$$\text{Building Bill (\$)} = \text{Calculated Usage Charge} * \left(\frac{\$}{\text{kWh}}\right) + \text{Calculated Demand Charge} * \left(\frac{\$}{\text{kW}}\right)$$

$$\text{Calculated Usage Charge} = \left[\text{Usage over period (kWh)} * \text{Usage Charge}\left(\frac{\$}{\text{kWh}}\right)\right]$$

$$\text{Calculated Demand Charge} = \left[\text{Demand at Time of Campus Peak (kW)} * \text{Demand Charge}\left(\frac{\text{S}}{\text{kW}}\right)\right]$$

The demand charge for each building is calculated according to campus demand at the time of total campus peak for that billing period, not the highest demand the building itself reached. The team then created hypothetical models to estimate cost savings that could be realized through energy efficient building management policies. These hypothetical situations include policies that 1) eliminate the use of thermal comfort devices and, 2) eliminate the use of food-related devices.

It is reasonable to assume that all potential cost savings the team calculated will be underestimated because savings were calculated according to an inflated demand charge. That is, the demand charge in the hypothetical situations is equal to a total campus peak demand that does not represent a decrease in office-based plug loads. In the case that multiple buildings, or the entire campus, enforced energy efficient building management policies, the total demand at time of campus peak would decrease and further reduce the bill charged to campus buildings.

C. Results

1. Audit Results

A number of descriptive statistics are presented in order to depict the role that miscellaneous electrical loads (MELs) play in the overall electricity demand profile for the University. The first table provides a breakdown of plug-load electricity consumption (in kWh) for each building, and is categorized by different types of spaces contained at each of the five buildings where energy walk-through audits were conducted.

Building	Audited Total Daily Consumption (kWh)	Total Office Daily Consumption (kWh)	Percentage of Total Building Demand
Ballantine Hall	**119.7**	**1,205.7**	**24.1%**
Office & Reception	82.5	1,036.0	20.7%
Kitchen/Copy/Break Rooms	34.8	132.4	2.6%
Conference Rooms	2.4	37.3	0.7%
Kelley	**93.3**	**747.6**	**7.0%**
Office & Reception	78.3	453.3	4.2%
Kitchen/Copy/Break Rooms	11.7	251.3	2.3%
Conference Rooms	3.3	42.9	0.4%
CIB	**123.5**	**927.7**	**14.4%**
Office & Reception	51.3	911.8	14.1%
Kitchen/Copy/Break Rooms	70.1	7143.7*	N/A
Conference Rooms	2.0	15.9	0.2%
SPEA	**158.0**	**705.7**	**7.5%**
Office & Reception	119.6	397.4	4.2%
Kitchen/Copy/Break Rooms	28.2	276.7	3.0%
Conference Rooms	10.3	31.6	0.3%
Swain West	**86.6**	**232.0**	**5.5%**
Office & Reception	86.6	232.0	5.5%

Table 14. Building Audit Plug-load Consumption Breakdown on a per building basis.

*In the estimation of total office daily energy consumption (in kWh), we assumed that the audited area was representative of total office area square footage. This assumption does not hold for the CIB. The CIB Kitchen/Copy/Break Rooms category has an inflated total building consumption because of different plug load densities between the audited areas and the overall building category. Thus, this value was not included in the total calculations.

Variance in the percentage of total building demand in Table 14 is due to other building systems that draw electricity, such as lighting fixtures and heating, ventilation, and air conditioning (HVAC). These systems typically make up a larger share of the total building electricity demand and are different for each building. Table 14 provides a snapshot of plug-load electricity profiles for each audited building. Each audited area is assumed to be representative of the larger area of the same type for each building. The analysis of the CIB break rooms shows the limits of this assumption. Our estimates indicate that this area used much more energy than in other buildings. In fact, this area alone would account for more than the total CIB energy consumption over the 22 day metering period. This is because the audited area had a much higher density of devices compared to the rest of the Break Room category in the CIB. Due to the aggregation of break rooms with other usage areas in the architect maps, and the large amount of area falling into this category in the CIB, generalization of the break room power draw for the building on a square foot basis is not possible. Applying the same methods used for the other buildings to the CIB results in values that show power demands greater than the actual metered building consumption. This overestimation is marked in Table 14 with an asterisk. Thus, the CIB break room category has not been included in the power consumption model for the CIB. Similar problems were not observed in the audits of the other buildings; however, if shown, the existence of substantially dissimilar areas compared to audited areas in other buildings would cause similar problems.

While plug-load electricity consumption totals are helpful for assessing respective building energy demand profiles, consumption averages provide a baseline estimate for making reliable comparisons across different buildings as well as across different types of spaces. Table 15 provided below, contains estimates of annual plug-load energy consumption (in kWh) for the five buildings that were audited.

Office Area	Building	Annual Energy Consumption (kWh / Building)	Annual Energy Consumption (kWh / sqft.)
Offices & Reception	Ballantine	378123	6.4
	CIB	332,808	9.9
	Godfrey Center	165,456	6.6
	SPEA	145,043	5.7
	Swain West	**84,691**	**5.0**
Kitchen/Copy/Break Rooms	**Ballantine**	**48,327**	**8.7**
	CIB	*	*
	Godfrey Center	91,731	12.7
	SPEA	100,978	16.2
	Swain West	#	#
Conference Rooms	Ballantine	13,613	5.4
	CIB	**5,813**	**0.7**
	Godfrey Center	15,671	2.4
	SPEA	11,542	6.8
	Swain West	#	#
Total of Audited Areas	Ballantine	440,068	
	CIB	338,621	
	Godfrey Center	272,858	
	SPEA	257,564	
	Swain West	84,691	

Table 15. Annual Energy Consumption of Audited Areas. Area calculations are based on the total area of each type. This information was gathered from the IU Architect's Maps. The least energy intensive building on a square foot basis is marked in bold.

* These values are not available because the audited area was not representative of similarly denoted areas in the entire building. See Table 15 above.
# No areas of this type were audited in Swain Hall West.

Table 15 shows the estimated annual plug load energy consumption for the entire building for the types of areas audited. It also presents the same information on a consumption per square foot basis. The square foot metric is problematic. It is commonly accepted that the CIB has the most energy efficient office space at IU. Furthermore, the CIB enforces many polices designed to reduce plug loads. Our walkthroughs provide an easy explanation. The cubicles in the CIB are much smaller than the traditional offices in other buildings. Thus, there is a greater energy demand per square foot in the CIB because the same amount of space contains more occupants. Table 16 shows an average daily plug load for individual spaces in each building.

Building Area	Building	Average Daily Consumption (kWh)
Offices & Reception	CIB	1.56
	Ballantine	3.17
	Swain West	3.21
	SPEA	3.42
	Kelley	3.92
Kitchen/Copy/Break Rooms	Ballantine	11.61
	Kelley	11.69
	SPEA	28.15
	CIB	35.05
Conference Rooms	CIB	0.51
	Kelley	1.63
	Ballantine	2.43
	SPEA	10.26

Table 16. Average daily energy consumption on a per room basis. Buildings are ordered by efficiency.

Table 17 shows the percentage of offices containing various food related devices in each audited building. The CIB has implemented an informal policy that has physically shifted food-related devices away from being contained in individual office spaces and reception areas compared to other buildings.

Building	Refrigerators	Microwaves	Coffee or Hot Water Devices
Ballantine Hall	13.0%	0.0%	30.4%
Kelley	7.7%	0.0%	15.4%
CIB	0.0%	0.0%	0.0%
SPEA	31.0%	6.9%	24.1%
Swain West	14.8%	22.2%	48.2%

Table 17. Comparison of food-related devices in audited buildings.

Table 18 presented below, demonstrates that the restrictions imposed at CIB, with respect to using thermal comfort devices in office spaces or reception areas, have been internalized by the CIB workforce. The very small percentage of thermal comfort devices used at CIB is tied to a specific design feature of the building itself. Individuals at CIB have direct control of heating and cooling at their workstations because of controllable vents that run along the floor next to where each person sits in their cubicle. This is a unique design feature because no other buildings with centralized office areas have vents that allow for individualized temperature control (C. Stewart, personal communication, April 28, 2014). The ban on thermal comfort devices at CIB provides a foundation for filling plug-load policy vacuums at other buildings on the IU Campus. For instance, buildings like SPEA and the Graduate Kelley Building may benefit significantly from corrections to the heating and cooling systems in the building and the subsequent banning of the use of thermal comfort devices in office spaces and reception areas.

Building	Percentage of Audited Offices Containing Thermal Comfort Devices
Ballantine Hall	12.50%
Kelley	80.00%
CIB	2.13%
SPEA	41.46%
Swain West	17.24%

Table 18. Percentage of Audited Offices Containing Thermal Comfort Devices.

Thermal comfort devices, especially space heaters, have large operational electricity loads and are a major contributor to plug-load electricity costs. The two categories of thermal comfort devices that were recorded during the energy walk-through audits were space heaters and personal fans. The graph, provided below, presents a building-by-building breakdown of the number of space heaters, fans, and the total number of thermal comfort devices in each of the five buildings that were audited.

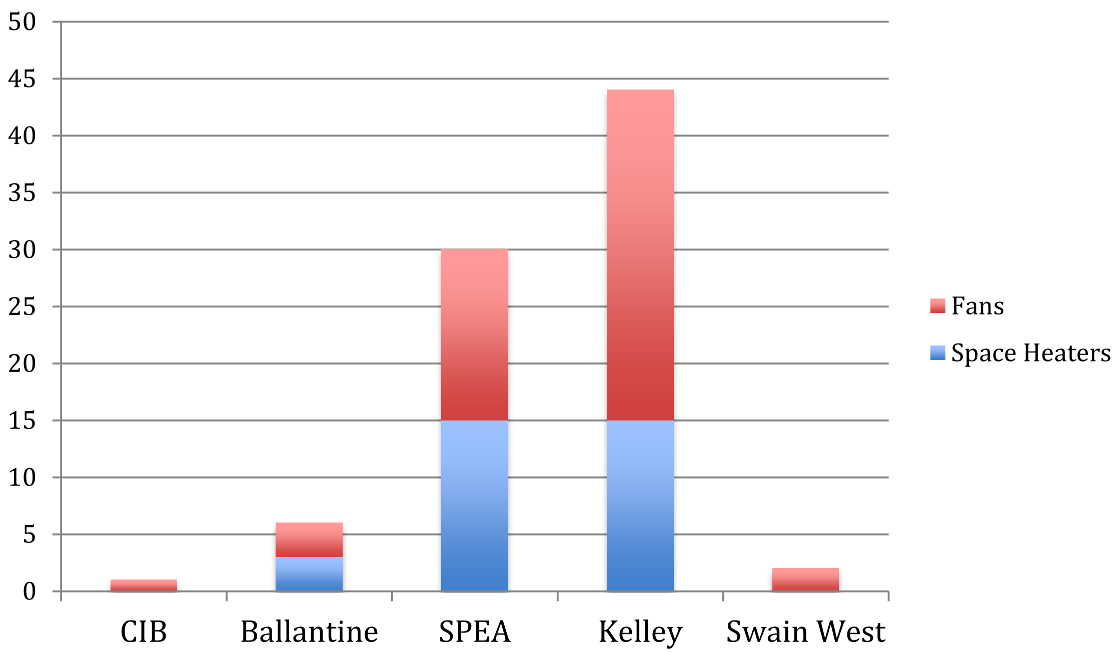

Figure 9. Number of Thermal Comfort Devices by Building.

Although CIB has restricted the use of food-related devices and thermal comfort devices in individual workspaces, its building manager has accommodated the needs of its workforce by making heavy-duty office and food-related devices available in their kitchen, copy, and break room areas (N. Maier, personal communication, April 9, 2014). This type of tradeoff is reinforced by the data provided in Table 16 which highlights the average energy consumption in each building across various categories of spaces.

The office group audited the following percentages of the five buildings that were part of our study:

- Ballantine Hall – 9.4%
- Kelley – 13.3%
- CIB – 2.7%
- SPEA – 26.5%
- Swain West – 25.1%

The percentages of audited square footage in each building were determined using the architect's maps on file at the Indiana University Physical Plant (see Appendix for percentages disaggregated by types of office areas). A comparison of the types of spaces audited in each building is provided below in Figure 10. Each chart shows the relative percentages of different areas that were audited within each building, which includes: office and reception areas, kitchen, copy, and break rooms, and conference rooms.

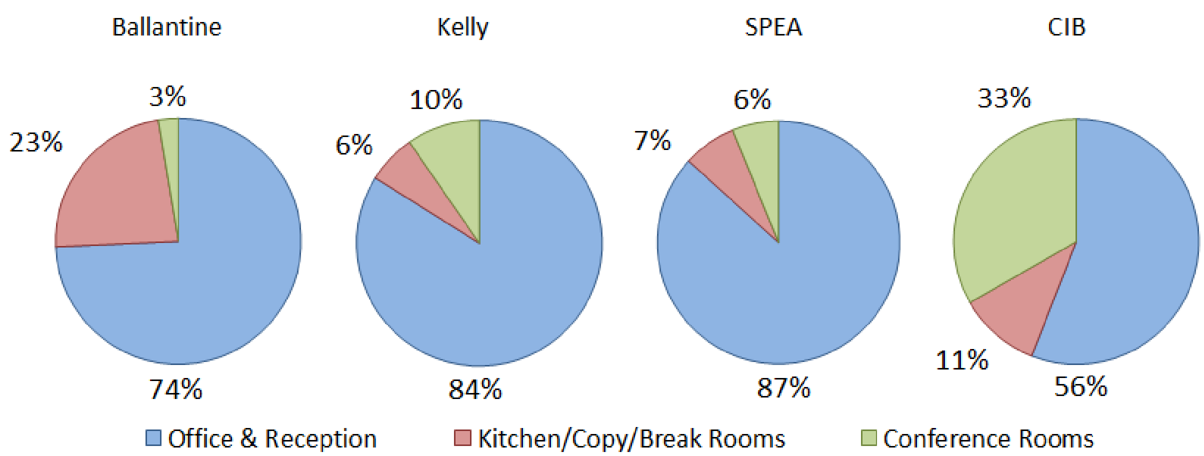

Figure 10. Comparison of Audited Areas by Room Type.

The CIB contained a disproportionately large number of conference rooms in comparison to the other four audited buildings as the conference rooms provide private group work space not enabled by the cubicle layout. Swain West was not included in Figure 10 because office and reception areas were the only types of spaces that were audited in that particular building.

The office group also estimated the annual electricity cost savings associated with the removal of both thermal comfort devices and food-related devices in individual offices and reception areas. These savings were estimated for each of the audited buildings, excepting the CIB due to the virtual nonexistence of thermal comfort and food-related devices in individual offices, reception areas, and workstations. We defined thermal comfort devices to include fans and space heaters and defined food-related devices to include the following appliances: microwaves, refrigerators, coffee grinders, coffee makers, cappuccino makers, and tea kettles. Tables 19 and 20, provided below, summarize the annual cost savings potential information. Annual energy savings were estimated using data collected during the month of March. The office group made the assumption that cost savings will remain constant over both the winter and summer months.

Building	Annual Cost Savings Potential ($)
Ballantine Hall	**$ 700**
Godfrey Center	**$ 2,540**
SPEA	**$ 1,400**
Swain West	**$ 330**

Table 19. Annual Cost Savings Potential from Thermal Comfort Device Removal.

Building	Annual Cost Savings Potential ($)
Ballantine Hall	**$ 6,390**
Godfrey Center	**$ 560**
SPEA	**$ 1,530**
Swain West	**$ 1,000**

Table 20. Annual Cost Savings Potential from Food-Related Devices Removal.

Finally, the office group estimated the annual electricity cost savings potential associated with the removal of both thermal comfort devices and food-related devices in individual offices and reception areas across the entire IU Bloomington campus. The definitions for thermal comfort devices and food-related devices remain the same as the aforementioned calculations. Table 21 below summarizes the annual cost savings potential information. Again, the office group made the assumption that cost savings will remain constant over both the winter and summer months.

Annual Campus Cost Savings Potential ($)	
Thermal Comfort Device Removal – Individual Offices and Reception Areas	**$74,500**
Food Device Removal - Individual Offices and Reception Areas	**$134,000**

Table 21. Campus Wide Potential Cost Savings Associated With Thermal Comfort and Food Devices

The values in Table 21 are estimations based on applying the rate of thermal comfort and food devices observed during the audits to the number of faculty and staff as a whole. The value was calculated by averaging the number of thermal comfort and food devices in each office. This value provided a number that was then multiplied by the total number of faculty and staff workstations on campus (assumed to be 7,000) to arrive at this figure.

VI. Student Technology Center Assessment Task

A. Introduction

1. Background

Indiana University operates 59 Student Technology Centers (STCs) across the Bloomington campus. These facilities contain an estimated total of 1,931 computers (some departments maintain their own separate computing facilities, the computers in which are not included in this total).

The goal of this part of the project was to determine the potential for decreasing energy costs associated with the Student Technology Centers (STCs). This objective had the following sub-tasks:

a. Evaluate current utilization of STC Computers during peak and non-peak electricity usage times;
b. Review management of STCs and compare to existing UITS management policies;
c. Quantify equipment energy costs;
d. Detail STC-related behavior of managers and students through detailed surveys;
e. Identify the potential for increased use of wireless printing capabilities, which may include recommendations for raising student awareness as well as other appropriate policy recommendations;
f. Develop energy reduction policy recommendations for UITS management;
g. Develop policy recommendations for getting students to shift energy consumption related to computing to non-peak electricity usage times;
h. Develop policy recommendations for equipment energy savings.

To accomplish these goals, the STC group required three distinct categories of data:

1. Measurements of energy consumption by individual STC computers and devices in different usage states.

2. An inventory of computing devices present in STCs.

3. Data on patterns of student usage of STC devices.

Obtaining these data required separate data gathering programs. We obtained most student usage data from the student survey (conducted by the survey group, see Section IV above) and supplemented the survey data with our own observations. For the other two data categories we collected our own data or obtained data from Chris England, the Manager of Information Technology at SPEA.

The following sections will provide a literature review, detail the methodology the STC group developed to carry out its tasks, show the results gathered through those testing procedures, and give some conclusions and policy recommendations to reduce the energy costs associated with STCs.

2. Literature Review

Above, the office group determined that of all the Miscellaneous Electrical Loads (MELs) located in offices and computing labs at IU, computers have the highest power demand. Computers and monitors account for 40-60% of energy used by office equipment in commercial buildings in the United States (Bray, 2006). Measuring power consumption is done by plugging the computer into a watt measuring device and then running different programs and scenarios on the machine to measure power draw when those different scenarios are being run. Procaccianti et al. listed a 12 step process for use in measuring power consumption from computers (2011). The first process was measuring power draw during its idle state. The second step of this process was to measure power consumption during web browsing. The third step in this process was to measure power consumption when sending and receiving E-mails (Procaccianti et al., 2011). The authors continued by measuring common non-internet functions of the computer, such as using interactive applications, data transfer, image presentation, and multimedia playback (Procaccianti et al., 2011). Finally, Procaccianti et al. measured power consumption from online video calls and peer to peer software. Sample results from this study are shown in Table 22.

	Mean	**Median**	**S.E.**	**C.I.**	**Variance**	σ	**Var.Co.**	**VMR**
0 - Idle	86.81	86.69	0.007	0.013	0.424	0.650	0.007	0.005
1 - Web	89.09	88.57	0.011	0.022	3.372	1.836	0.021	0.038
2 - E-Mail	88.03	87.11	0.024	0.047	5.195	2.279	0.026	0.059
3 - Prod	90.12	89.40	0.025	0.500	5.862	2.421	0.027	0.065
4 - Disk	94.12	97.21	0.048	0.095	21.12	4.595	0.049	0.224
5 - USB	96.41	97.10	0.024	0.046	5.047	2.246	0.023	0.052
6 - Image	91.97	91.48	0.041	0.081	15.474	3.934	0.043	0.168
7 - Skype	91.87	91.69	0.015	0.029	1.981	1.407	0.015	0.022
8 - SkypeV	95.40	95.75	0.020	0.040	3.844	1.960	0.020	0.040
9 - Audio	88.14	87.94	0.013	0.025	1.429	1.195	0.013	0.016
10 - Video	88.61	88.57	0.009	0.017	0.677	0.823	0.009	0.008
11 - P2P	88.46	88.25	0.010	0.019	0.842	0.917	0.010	0.009

Table 22. Measured Computer Power Consumption by Task.[7]

A review of studies on desktop computer power use determined that desktop computers have a power demand of between 36 W and 250 W when in use, 1W to 27W in standby mode, and 1.5W to 3W when turned off (Bray, 2006). When measuring power draw on monitors during use, lower power mode, and when turned off, the power consumptions range from 66W to 135 W, 0W

[7] Table taken directly from Procaccianti et al., 2011.

to 19W and 0 W to 5W, respectively (Bray, 2006). Greenberg et al. measured active power demand for a personal computer[8] at an average of 66 Watts and idle power demand at 63 Watts (2001).

Because of the increase in use of personal computers and the resulting increase in power demand, the Environmental Protection Agency (EPA) included personal computers in the Energy Star Energy Conservation Program (U.S. Environmental Protection Agency, 2014). The purpose of this program is to allow consumers to be able to determine which personal computer is using a power management technology that reduces energy consumption and energy waste (Roberson et al., 2002). At the same time, the Energy Star Program forces manufacturers to meet certain energy efficiency criteria before their products can bear the Energy Star name. Some more cost-effective methods of reducing energy waste can be effected by replacing or removing key energy demanding components of a computer such as replacing a disk drive with more energy-efficient nonvolatile memory or adding a better, more energy efficient graphics card to a computer to increase overall energy efficiency (Ranganathan, 2010). IT managers can create a process known as "energy proportionality" or "energy scale-down" which automatically turns off or turns downs a system by creating a set algorithm that knows when a machine is being used, is not being used, and when it needs to be used again. (Ranganathan, 2010). Kawamoto et al. found that power management strategies save 23 TWh/yr and could achieve additional savings of 17 TWh/yr in the United States (2001). If power management strategies were implemented for machines that do not need to operate at night, there could be an additional national savings of 7 TWh/yr (Greenberg, 2001).

A final option in reducing energy costs in computing centers is the removal of traditional workstations and their replacement with a more energy efficient alternative such as thin clients. Greenberg et al. determined that PC's drew seven times more power when in use[9], when compared to thin clients: 70 W to 10 W, respectively (2001).

B. Methodology

1. Student Use Categories

Eight categories of student use states for the STC computers were identified:

a. Standby: The computer and monitor are in a low power state (sleep or hibernation) after not being used for an extended period of time. This is the lowest theoretical power state.

b. Login Screen: The computer is awaiting the input of credentials for login to the IU Network. The monitor is on in this state.

c. Web Browsing – Email & Text: In this state, the computer is being used to check email, use online services like OnCourse, do basic internet research using web-based services and general internet browsing.

[8] The tested computer used a Pentium Pro 200 processor; the specific computer model was not provided.
[9] "Use" here consisted of work being done by Ameriwest Insurance employees during their work week, including use of Microsoft Office programs and Internet Explorer.

d. Web Browsing – Streaming Video: This state is for the use of the computer to play streaming video over a web browser.

e. Light Office Tasks. The computer is being used to perform office tasks that do not require intensive processing power. These tasks include the use of word processing software like Microsoft Word and Adobe Acrobat.

f. Demanding Office Tasks. This category is for the use of more demanding office software such as Microsoft Excel.

g. Numeric Processing: This category is for the use of software such as Matlab or SAS that utilize the computer to preform large numbers of mathematically intensive calculations.

h. Graphical Processing: In this category, the computer is being used for graphically demanding tasks such as GIS or Photoshop.

These categories were the framework for recording student use and served as the basis for the tests developed in the Computer Usage State Test Plan.

2. Computer Usage State Test Plan

The computer test plan was the procedure for testing the power demand of STC computers. It contained detailed instructions for the testing of each category of student use. The test plan was developed in parallel with the student use categories. When a category of student use was identified, programs associated with that use were identified.

Under the computer test plan, a watt meter was used to measure both the duration and total power used during a task. The Watts up? meter (Watts up?, Denver, Colorado) was used. The tests were performed with the computer plugged into the meter. Thus, speakers, keyboards, and other accessories powered by the computer were recorded as part of the overall computer power demand. Monitors and other associated devices plugged in separately were also tested separately, but scanners and attached printers (not plugged in to the computer) were excluded from the study. STC computers generally included a monitor, keyboard, and mouse.

Specific software products were used to replicate the student uses during each energy state, as detailed below. Each computer was tested for a minimum of one minute in each power state. On several machines, multiple tests were run to determine the repeatability from test to test using the mean energy draw during the test and the standard deviation (Core i5 W7: 33.8 W $\pm$ 1.23; Core 2 Duo W7: 98.3 W $\pm$ 4.70; Core 2 Duo OS X: 52.6 W $\pm$ 0.15). Except for the graphical processing category, the categories were tested in the order that they are listed. Graphical processing was also tested separately, and was performed on all tested machines by the same person to ensure consistency in running the task. Software files required for testing were provided by members of the capstone group and used data files generated for this project. All files used for testing are available upon request. Except where mentioned, all tests were performed on computers logged into the IU network under a student account.

The computer test plan for each category is reproduced below.

a. Standby:

This energy state was tested by recording the energy use of the computer in a standby state.

b. Login Screen:

The login screen was tested in the same way as the Standby state.

c. Web Browsing With Email & Text:

This test was performed on a machine that had completed logging in under a student account. A minimum of two minutes was provided between login and the beginning of the test, to ensure background tasks associated with logging in were completed before the test starts. This test consisted of visiting three websites and performing tasks on each. Internet Explorer was used as the test browser. First, the student accessed their OnCourse account and navigated to the V600 Capstone Messages page. Next, the operator logged into their IU or Gmail account and composed a one paragraph email that they sent to themselves. For consistency, the email body contained the first verse of the Star Spangled Banner. The email included the Computer Test Plan document as an attachment. Finally, the student navigated to scholar.google.com and searched for papers published by Diane Henshel.

d. Web Browsing With Streaming Video:

The student navigated to http://www.youtube.com/watch?v=7ECf2DFc_10 using Internet Explorer and watched the entire video. Headphones were plugged into the computer for this test to ensure that any electrical demands associated with sound were measured.

e. Light Office Tasks:

The student opened the computer test plan in MS Word and typed the first verse of the Star Spangled Banner at the bottom of the document. They then changed the format of this new paragraph to bold and copied the paragraph to the beginning of the document. Next, they saved the new document to the desktop. Once this was completed, the student opened the file leaky-leviathan.pdf and used the built-in search function to search for "permissive neglect." They then scrolled through all instances of the phrase in the document using the "Previous" and "Next" buttons in the Adobe Acrobat XI search box.

f. Demanding Office Tasks

First, the student opened Numeric Integration.xlsx. The user modified the sheet to change the value of the definite integral from 0 to 1.5708 to 0 to 3.1416 and back for the Simpsons Method worksheet only. Next, the student opened the file NSS merged excel.xlsx and browsed through the data. Finally, they opened Apartment Costs.xlsx and used the Goal Seek function to set cell F15 equal to zero by changing cell B15. The edited files were then saved to a shared drive on the IU Network (IU Box or similar). Copies of these files are in the Capstone folder.

g. Numeric Processing

The student started the local copy of Matlab and ran PrimesCalculator.m. This file calculates the prime numbers between two integers and displays the number of primes found. Matlab was asked to perform this task for the range of numbers from 1 to 1,000,000.

h. Graphical Processing

This test used a GIS viewer to open several GIS files and manipulate them. By zooming in and out, the computer was asked to redraw items in the GIS display.

All observations were entered into a spreadsheet in the capstone Box folder and included in Appendix I. This spreadsheet recorded the power usage as well as information about the model of the machine being tested, the machine's location, and the date and time of the test.

3. Student Use Observations

Student use observations were determined by observing two STC labs and recording student use in those STC labs throughout the day. The student use categories were already established when the initial student use observations were recorded and were used as the template for recording student uses. The observed labs were the SPEA/Kelley Info Commons and the Wells Library Info Commons. These are two of the larger labs on campus and the Wells Library lab is one of the largest on campus.

STC Lab	Number of Times Observed	Range of Times Observed
SPEA/Kelley Info Commons	7	11:00 a.m. – 5:40 p.m.
Wells Library Info Commons	17	2:05 p.m. – 12:15 a.m.

Table 23. STC Labs tested for student usage patterns by number and range of times observed.

A comprehensive list of STC computers and labs was obtained by repeatedly querying the IU Computer Finder website at https://stcweb.stc.indiana.edu/public/SiteRes/LabInfo.cfm. This website exists to provide students with information about where they can find open computers that can use particular software. Since only open computers are displayed, the website was repeatedly queried to create a comprehensive inventory of STC machines. This inventory is available in Appendix H.

Observations were conducted by direct observation of types of programs being used (by category) in the computer lab being observed. The categories used were the same as in the usage state testing. Detailed information of open programs was not collected. When a particular computer appeared to be in use for more than one software category at a time, the category that the current work fell into was used. For example, if a particular machine had both an internet window and a Word document open simultaneously, and the user was actively manipulating the internet window, the recorded use would be Light Internet. This determination was made because most applications used very little processing time while waiting in standby, and use most processing time during the opening and manipulation of files.

C. Results

1. Computer Energy Use

a. Computer Inventory

The STC group's review of the STC inventory indicated that there are 1,931 computer systems in use in IU's STCs. A breakdown of these computer systems by operating system and processor type follows:

- 541 employ Core i5 processors and Windows operating systems.
- 1,018 employ Core 2 Duo processors and Windows operating systems
- 302 employ Core 2 Duo processors and Apple operating systems.
- 70 employ other processors (all of these use Windows operating systems).

This list does not include computers that are not accessible through the inventory method explained above. Many additional computer labs exist on campus. For instance, the Law Library contains a lab with 17 computers that is not included as part of the larger inventory. Similar labs have been observed in the Kelley Godfrey Center, SPEA, Swain West, and the Wells Library. Many others are likely to exist. A personal communication with Rebecca Bertoloni-Meli, the Head of Circulation and Patron Services at the Law Library, and Enrique Perez, former IT specialist at the Law School, indicated that these computers were purchased and maintained by the law school. Still, the software is largely identical to that available in most STC labs, as are the print release stations. UITS personnel have been observed working on broken machines. The exact relationship between these computers and UITS is not known, nor is there a reliable estimate of the number of these machines on campus. We were unable to locate a comprehensive inventory of campus computers from a centralized source.

b. Computer Usage State Testing

The STC group's data indicates that different usage states do not significantly affect the power demand of desktop computers. However, there are significant differences in the power demand of different types of computers resulting from the different processors used in each computer type. Based on the test results, computers were grouped into three categories according to processor and operating system.

The newest processors were the Intel Core i5 processors found in some Dell Windows 7 PCs. These were more energy efficient than the older Intel Core 2 Duo processors used in the majority of computers in the STC inventory. Core 2 Duo Processors are no longer manufactured. All tested Apple computers used Core 2 Duo Processors, but had power draws similar to the Core i5 systems. Since the Apple power draw also includes the integrated monitors, these machines are far more energy efficient than the newest Dell machines. Tables 24 through 27 show the mean power load for each processor type tested and the maximum and minimum power associated with a 95% confidence interval.

Processor Type	Weighted Average Power Demand	Minimum Tested Power Demand	Maximum Tested Power Demand
Core i5 (Windows 7)	37.53 W	26.9 W	54 W
Core 2 Duo (Windows 7)	92.19 W	72.5 W	114.9 W
Core 2 Duo (Apple OS X)	53.75 W	49.5 W	55.13 W

Table 24. Weighted average, maximum, and minimum tested power demand for computer processor types tested. The weighted average power demand was computed by weighting power demand in the seven tested usage states according to the proportion of usage time indicated by the student use data. Where power demand for a specific usage state was not available, it was assumed to be the weighted average of the available usage states.

Category	Mean (W)	Min (W)	Interval	Max (W)
Login Screen	36.5	19.8		53.3
Internet (Web & Email)	39.5	26.7		52.4
Internet (Video)	37.7	26.2		49.1
Light Office	35.6	23.3		48.0
Demanding Office	39.6	26.1		53.2
Numeric	45.1	33.0		57.3

Table 25. Core i5 (Windows 7) processor mean power demand by usage state (n = 16). The min and max values reflect a 95% confidence interval of the mean power draw across computers of this type. The interval bars show scaled minimum, mean, and maximum values for each category.

Category	Mean (W)	Min (W)	Interval	Max (W)
Login Screen	92.0	64.6		119.3
Internet (Web & Email)	90.3	65.9		114.8
Internet (Video)	99.5	74.8		124.3
Light Office	92.9	71.7		114.2
Graphical	100.4	88.4		112.5

Table 26. Core 2 Duo (Windows 7) processor mean power demand by usage state (n = 8). The minimum and maximum values reflect a 95% confidence interval of the mean power draw across computers of this type. The interval bars show scaled minimum, mean, and maximum values for each category.

Category	Mean (W)	Min (W)	Interval	Max (W)
Login Screen	50.4	46.7		54.1
Internet (Web & Email)	54.6	52.9		56.2
Internet (Video)	53.5	48.4		58.6
Light Office	51.9	50.1		53.7

Table 27. Core 2 Duo (Apple OS X) processor mean power demand (n = 4). The minimum and maximum values reflect a 95% confidence interval of the mean power draw across computers of this type. The interval bars show scaled minimum, mean, and maximum values for each category.

The STC group conducted tests on computers with three different processor and operating system combinations. The results are stated in the tables above. Within each processor type, differences in usage state do not cause a significant difference in power demand; the ninety-five percent (95%) confidence intervals for the mean power demand of each usage state within each computer type all overlap (this conclusion is limited by the small sample sizes, particularly for the Core 2 computers).

The confidence intervals were created using the t-distribution with the appropriate degrees of freedom. The t-distribution was chosen due to the small sample size of tested computers. Small sample sizes were due to several factors. First, the standardized computer test plan took over 30 minutes to execute for each machine. Additionally, many STC computers are plugged into desks that utilize conduit, locks, and other measures to prevent students from tampering with the plugs. Testing also had to be scheduled around times of peak student use.

For the t-distribution to produce statistically meaningful results, the underlying distribution must be normally distributed. For all use categories except Login, assuming normality makes sense. Each computer will have a minimum power draw in its Login state. As the processor is tasked with more demands, for instance by running the test, power usage will increase. Variability in power usage depends on many factors including, but not limited to, the cleanliness of the machine, processor location, the number and type of background processes running on the machine. Furthermore, modern processors, like those studied here, utilize complex algorithms to operate efficiently. This can also affect the power demand of the machine at any time.

There is no statistically significant difference between power draw of any of the three processors across the student use categories Larger sample sizes would have helped to reduce this variability, but accurate results might require automating the tests. The test operators observed large differences in the time it took to perform the tests. Typical differences included long delays in opening or saving files, especially from IU Box. Delays or even failure of machines to open Internet Explorer on the first try were also observed. Although automated testing or benchmarking software might be a tempting solution for reducing test variability, it is ultimately the power demand of the machines when they are being used by a student that is of interest. Thus, the observed variability is best considered to be the natural result of human operators interacting with the machine. Since student use is what we are interested in measuring, care should be taken in future efforts to preserve the variability inherent to the human operator.

Significant differences between the power demand of computers with different processor types do exist. Computers with Core i5 processors use significantly less power than those with Core 2 Duo processors. The difference is most apparent between Core i5 and Core 2 Duo systems both running Windows operating systems; on average the Core i5 systems, for all usage states, demand less than half the power than the Core 2 Duo systems demand. The range of power demand for Core 2 Duo computers with Windows operating systems (42.4 W) was larger than the range for Core i5 Windows computers (27.1 W), indicating that Core 2 Duo computers have greater variability in power demand; the Core 2 Duo Apple OS X computers had the smallest range (5.63 W).

c. Monitor Inventory and Power Demand

After verifying manufacturer data on monitor power demand, which seemed to be very accurate, the STC group did not independently test monitors for different usage states. Instead, we relied on manufacturer data to determine the power demand of various monitors. A listing of the power demand of monitors commonly used in IU STCs follows (note that Apple monitors are not listed here, as it is not possible to separate the power demand of Apple monitors from the demand of the attached computers).

Monitor	Number Used in STCs	Power Demand (On)	Power Demand (Standby)
Dell P2210	1052	22 W	0.35 W
Dell 1907FPt	552	37.1 W	0.6 W
Dell 1707FPc	111	32 W	2 W

Table 28. Inventory and power demand of commonly used STC monitors.

2. Student Usage

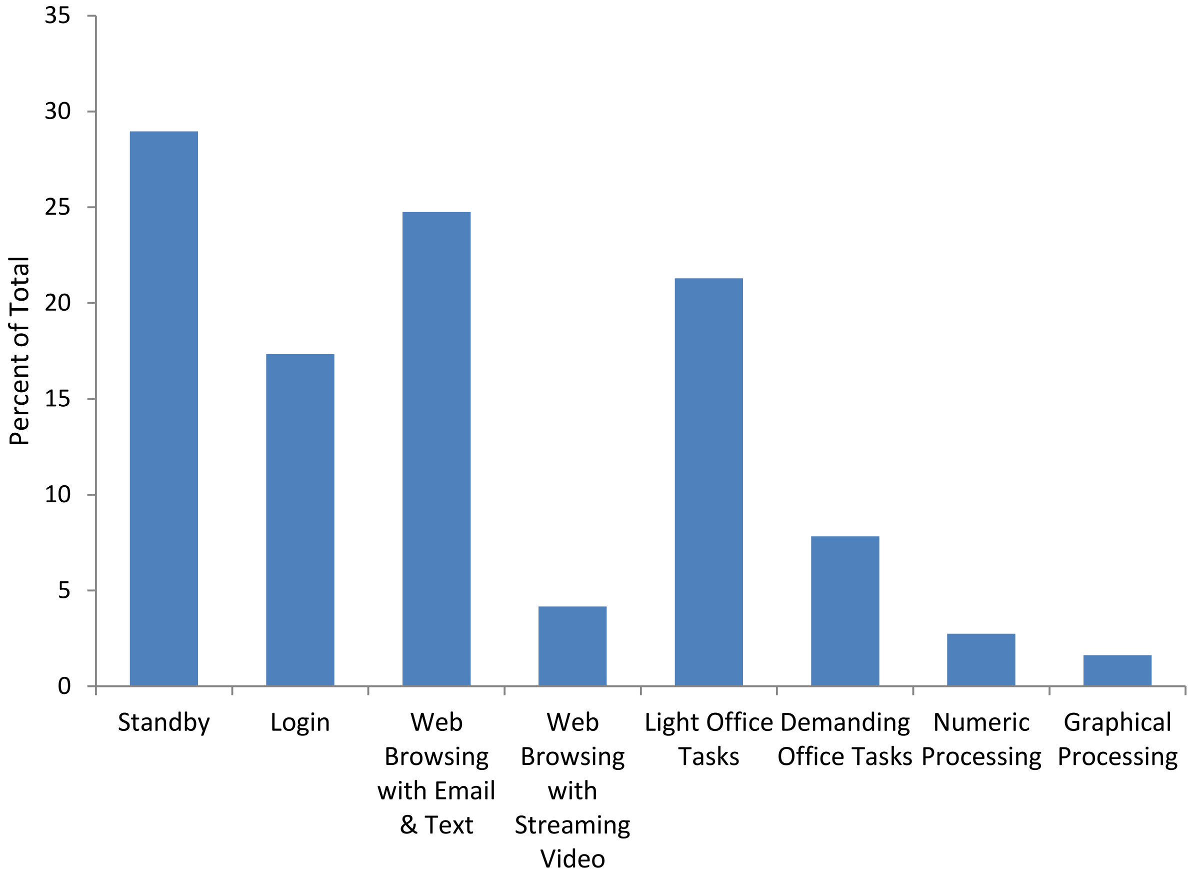

Figure 11. Computer usage states by proportion of all computers observed. Computer usage states by proportion of all computers observed (n = 2609). Computers were observed in Student Technology Centers in Wells Library and the SPEA Info Commons.

Observations of student usage of STC computers indicated that STC computers are primarily used for web browsing and Microsoft Office tasks rather than specialized numeric or graphical processing software.

Forty-three percent of STC computers observed were unoccupied and either in standby mode or at the login screen when observed. This figure includes observations taken throughout the day; more computers are in active use between 10 AM and 5 PM than in the remaining part of the day. At no time were all of the computers in either location observed to be in active use.

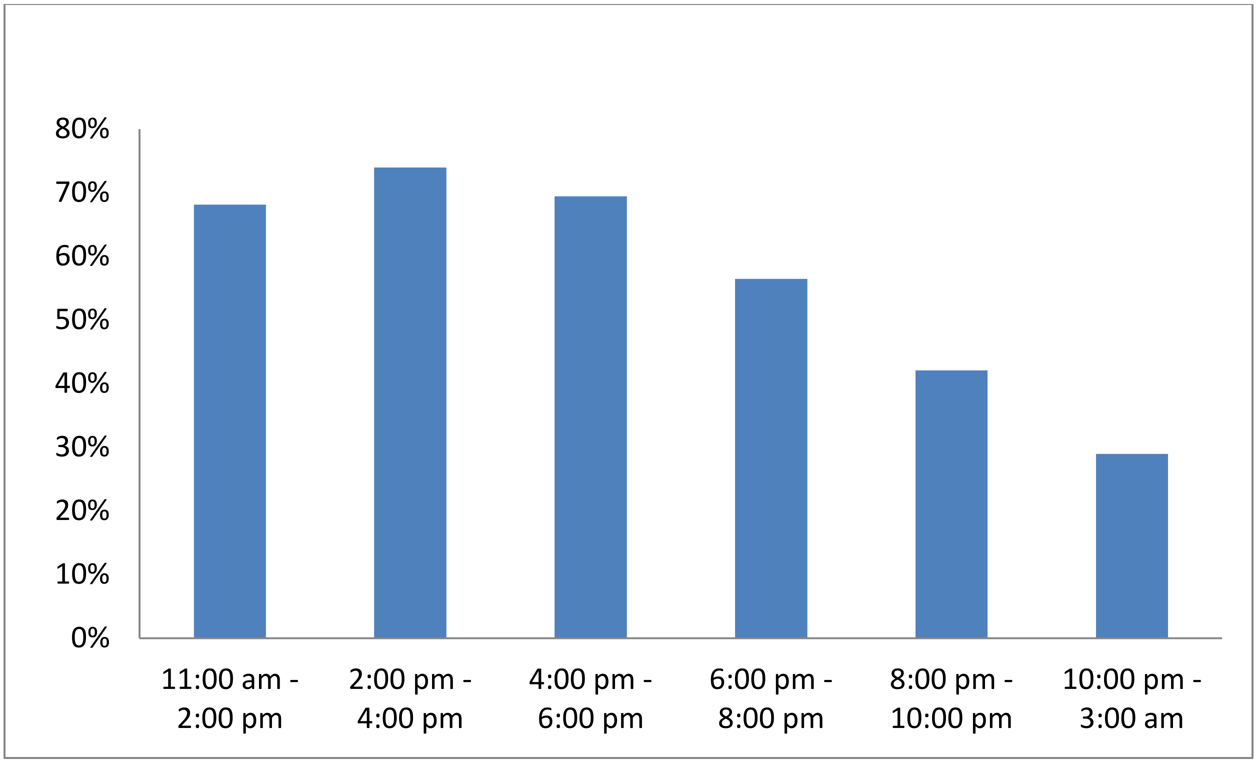

Figure 12. Percentage of observed computers in active use in observed STC labs at tested times of day.

As can be seen in Figure 12, the largest measured proportion of STC computers in use occurred in the mid-afternoon. Usage drops off in the evening hours and increases again in the morning. This matches the student responses from the survey, where students who expressed a specific time of use for the STCs indicated that they used the STCs in the middle of the day.

The proportions of the types of student use varied little with the time of day, except that during non-peak hours the proportion of computers in standby or login is increased. Figures 13 and 14 show the percentage of computers in each state during peak (10:00 am – 5:00 pm) and non-peak (5:00 pm to 10:00 am) times. The percentage was calculated by taking the mean number of computers in each student use category across all observations during that time period.

The results in this section largely agree with the responses from the student survey, which are discussed in detail in the next section.

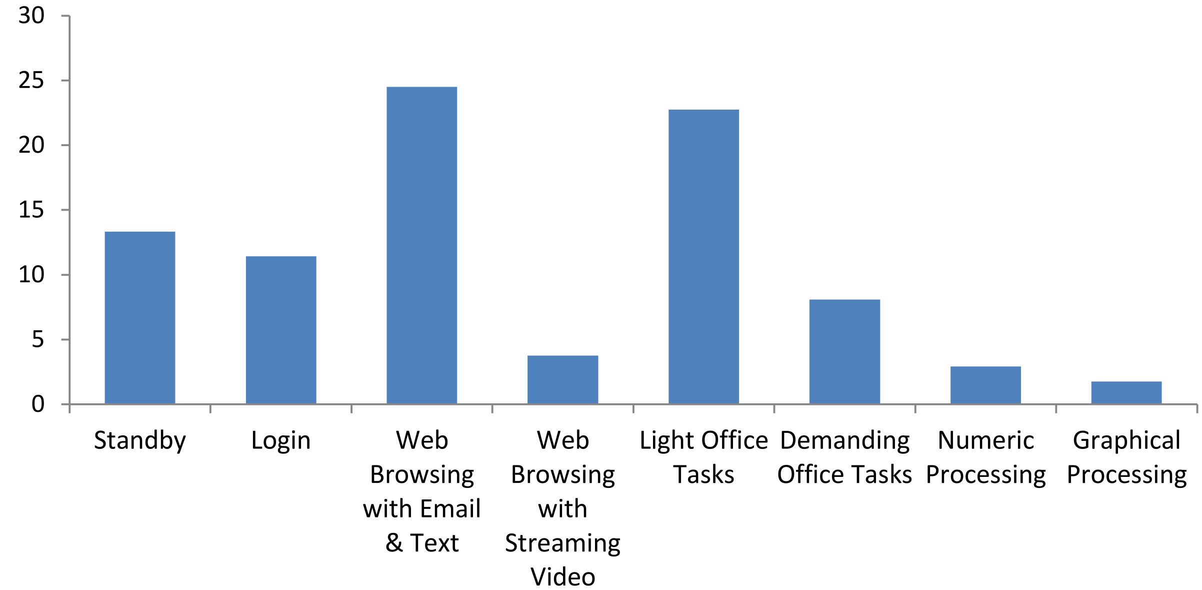

Figure 13. Percentage of computers observed in different usage states in two STC labs between the hours of 5 PM and 10 AM.

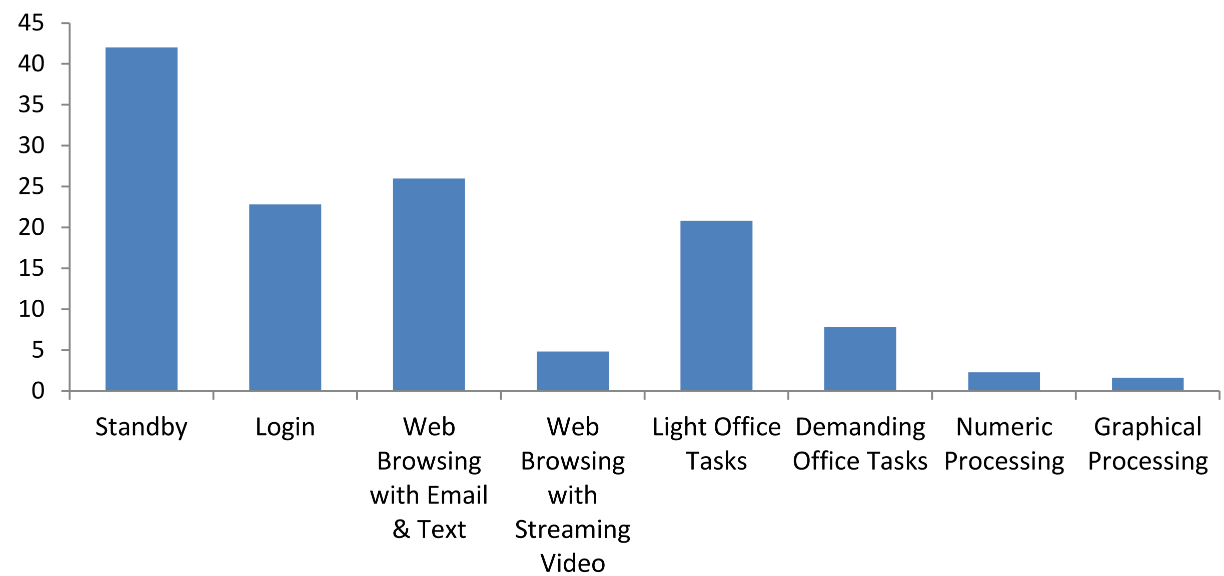

Figure 14. Percentage of computers observed in different usage states in two STC labs between the hours of 5 PM and 10 AM.

3. Survey Results

The STC group also used the survey, discussed earlier in the report, to gather information on student and faculty use of the STCs.

Survey responses indicated that most students make use of STCs at least once a week:

Response	Number	%
Never Use STCs:	52	10%
Less than 1 time per week:	128	24%
1-3 times per week:	247	47%
More than 3 times per week:	97	19%
Total	524	100%

Table 29. Student responses to survey question, "How often do you use STCs?"

The most commonly used STCs are the STCs in the Wells Library and in the SPEA/Kelly Info Commons, which is where the STC group conducted its student usage observations. This data may be biased because, as stated by the survey group, it is likely that a disproportionately high number of the survey respondents were SPEA students.

Building	Number	%
Ballantine Hall	169	36%
Briscoe Quad	25	5%
Kelly School of Business	97	21%
Eigenmann Hall	21	4%
Griggs Lounge (Ashton)	9	2%
Information Commons	94	20%
Law School Library	30	6%
Wells Library	264	56%
Lindley Hall	19	4%
McNutt Quad	18	4%
Music Library (Simon)	23	5%
Psychology	35	7%
RAB 113	0	0%
SPEA	245	52%
Speech and Hearing Clinic	3	1%
Student Building	35	7%
Teter Quad	36	8%
Union Building	131	28%
Wendell Wright Ed. Building	14	3%
Wilkie Quad	24	5%
Woodburn Hall	39	8%
Wright Quad.	16	3%
Other.	52	11%

Table 30. Student responses to the survey question, "In which buildings do you use the STCs? Check all that apply."

Student responses to the question of when they use STCs were difficult to interpret. Although students who gave a specific answer indicated that they used STCs mostly between 12:00 p.m. and 5:00 p.m., forty-eight percent (48%) of student respondents indicated that they use the

STCs at "various times," so it is difficult to say at what time STC use is truly highest. The inference that STC use is highest during the afternoon hours is supported generally by the STC group's student usage observations (see Figure 12).

Response	Number	%
In the morning, before 12:00 PM	53	11%
Between 12:00 PM and 5:00 PM	145	31%
After 5:00 PM	42	9%
I use the STCs at various times	226	48%
Total	466	100%

Table 31. Student responses to the survey question, "What time of day do you most often use the STCs?"

A majority of student respondents indicated that they use STCs primarily for printing, web browsing, or Microsoft Office programs. This is consistent with the STC group's student usage observations (in those observations, printing would fall under either web browsing or light office tasks, as most printing requires either opening up a web browser or an office document). Use of the STCs for printing was also hard to capture through our student use observations because of the short term STC stay for these tasks.

Answer	Number	%
Printing	459	98%
Web Browsing / Email	229	49%
Word Processing	168	36%
Excel or Other Office Suite	110	24%
Math / Statistics / Photoshop or other Specialized Software	139	30%
Other	13	3%

Table 32. Student responses to the survey question, "What are your uses of the STCs? Select all that apply."

Twenty-four percent of students indicated that they need STC computers to use a program that they cannot otherwise access. Eleven percent of students indicated that they use IU's wireless printing service. Forty-two percent of students indicate that they know about the wireless printing service but do not use it, and forty-seven percent of students indicated that they are not familiar with the service.

Many students, who are aware of the wireless printing service, appear to be concerned by its lack of functionality. A majority of students who do not use the program say that they do not use it either because of technical issues or because it is incompatible with their computer, and even among students who do use the service, sixty-five percent have issues with its functionality.

Response	Number	%
Incompatible with my computer	30	14%
Printing service is unreliable / technical issues	83	38%
I prefer the convenience of the STC computers	60	28%
I do not use IU-owned printers	5	2%
Other	38	18%
Total	216	100%

Table 33. Student responses to the survey question, "If you know about the wireless printing program, but do not use it, why not?" Includes only respondents who indicated that they were aware of the wireless printing service.

Response	Number	%
Printing service is unreliable / technical issues:	20	36%
Printing service is too slow:	6	11%
Printing service does not connect to the printer that is most convenient for me:	8	14%
Printing service program is difficult to use:	2	4%
I do not have a concern with the program:	17	30%
Other:	3	5%
Total:	56	100%

Table 34. Student responses to survey question "As a user of the wireless printing program, please identify the number one concern you have with using the program." Includes only respondents who indicated they used the wireless printing service.

4. Cost Saving Calculations

Testing revealed large differences in energy use between various types of machines in the STCs. From our tests and inventory data, we estimate current electrical costs from Windows based STC computers alone to be $80,000 annually. This figure does not include costs from monitors or printers. Computer costs were estimated by using the weighted averages and inventory figures reported in Table 28 and Appendix H. Only Windows machines were considered because we did not have an Apple computer with a Core i5 processor to use for comparison. Monitors add another $7,650 annually to this amount. This number was based on testing that showed an average monitor power draw of 7 W during a week-long test.

By replacing older Core 2 Duo computers with models using newer Core i5 processors the annual electrical costs from STC computers could be reduced by nearly half. Since Core 2 Duo processors are no longer manufactured, these savings will be realized naturally as older computers are replaced over the next few years. A more immediate savings could be realized by implementing a low power state setting for all STC computers. Assuming each Windows computer draws 5 W in its low power state and that each computer is in a low power state for an average of 8 hours per day, the computer costs could be reduced by 30%. Because monitors already enter a low power state after 15 minutes of non-use, similar savings do not exist. Table 35 shows a comparison of potential cost savings associated with different actions in the STCs. In calculating annual savings a cost per kWh of $0.08 was used. All computers were assumed to follow the same 16 hour use 8 hour standby schedule for the entire year. Potential savings associated with the implementation of thin clients will be discussed in the thin clients section.

Type of Machine Replaced	Replaced With	kWh Saved per Year	Annual Savings
Core 2 Duo (W7) (1018 Machines)	Core i5 (W7)	487,440	**$38,000**
Current Machines	8 Hours of low power (5W) state	310,566	**$24,500**
Ideal State	All Core i5, 8 hours low power	635,526	**$50,500**

	kWh Used / Year	Annual Cost
Current State	999,982	**$ 79,500**
Ideal State	364,456	**$ 29,000**

Table 35. STC Lab Estimated Cost Savings.

5. Effect of IUanyWare on STC Computer Power Demand

The STC group also conducted a test to examine the power demand of a Core i5, Windows 7 computer running Matlab on IUanyWare. The tested computer used 32.6 W to complete the numerical test task, less than the mean power demand of 45.1 W for running this program locally on the same machine. Because the Citrix Receiver service loads when the machine is logged in, there is no additional power consumption to open IUanyWare other than the consumption associated with using an internet browser. Due to the large variability of the student tasks, and since any corresponding increase in the power demand of the central server running the program through IUanyWare was not able to be tested, the statistical significance of this reduced power demand is not able to be determined.

D. Discussion

Throughout the process of gathering our observations, we also noted any issues or findings we came across that pertained to student STC use but that could not be directly captured by our numerical data.

One observation made was that STC computers do not enter standby mode when not in use. Although the monitors go into standby after 15 minutes of idle time, the computers remain at the login screen. This setting may serve to facilitate student use and minimize waiting time for students. However, it also significantly increases the electricity consumption of STC computers. A week long test of a Core i5 computer located in the SPEA Graduate Lounge (PV224) showed a weekly average power draw of 40 W. This is consistent with a finding that the STC machines never power down.

Another set of observations pertained to issues with the STC computers' performance. The STC group noted that:

- Login times for STC computers that students have not logged into before can be very long, usually around 5-10 minutes.
- Some basic programs, like Microsoft Word and Excel, take a long time to load on STC computers. This varies by computer, but was still noticeable.

The lack of significance of differences in power demand for different computer usage states was surprising to the STC group, and the group took steps to verify that the usage states tested were actually causing the computers tested to use significant amounts of their processing capacity. Examination of the central processing unit (CPU) usage of multiple test computers while using numeric processing software (Matlab) indicated that the software was fully utilizing one of the tested computer's processing cores. This was verified by opening Windows Task Manager during the Matlab portions of the computer test. On all machines where this was examined, the numerical processing task utilized twenty-five percent of the processor for nearly two minutes. In comparison, most other tasks, including streaming video, required less than five percent of the CPU at any time. The STC group was satisfied from this analysis to conclude that the tested usage states were actually placing significant loads on the processors.

E. Conclusions and Recommendations

The central finding of the STC group's computer usage testing was that different usage states on the same computer do not significantly affect the computer's power demand. A possibly more useful finding was that there are significant differences in power demand between different models of computer, with computers that use newer Core i5 processors drawing significantly less power than Windows computers using older Core 2 Duo processors. Apple computers with Core 2 Duo processors, considering both monitor and computer power demand, draw even less power than do Windows computers with Core i5 processors. This is because they have an integrated monitor. When this is considered they are far more efficient than even the Core i5 Windows machines. Apple computers with newer processors were not tested, but presumably would draw less power than the Core 2 Duo Apple computers. The majority of IU's STC Windows computers have Core 2 Duo processors. As the university replaces its older computers with new machines, it can expect the power demand from STCs to fall, so long as the overall number of computers does not increase. As will be discussed in the thin clients section, this reduction in power demand could be even greater if the older computers are replaced with thin clients rather than standard computers.

To reduce energy consumption immediately, IU should consider allowing STC computers to enter standby mode after some period of inactivity. Monitors in the STCs currently go into standby mode after fifteen minutes of inactivity. A similar setting for computers would allow for a reduction in power demand and energy consumption. If fifteen minutes is considered too short a timeframe, a period of half an hour or even a full hour could also be considered, and would also save money. Using software that allows computers to turn on from standby mode on command could reduce administrator inconvenience from this change.

Ninety-eight percent (98%) of IU students surveyed reported that they used the STCs for printing, and only eleven percent (11%) of students indicated that they used IU's wireless printing service. To reduce the demand for STC computers, IU should consider increasing awareness of the wireless printing service, which allows students to send printing orders directly to a printer rather than needing to first log on to an STC computer. Increasing the functionality of the wireless printing service could possibly motivate students who are aware of the service but choose not to use it to start using it, further reducing demand for STC computers.

VII. Thin Client Assessment Task

A. Introduction

The Capstone group examined the applicability of thin clients to IU computing needs and calculated the energy savings associated with transitioning from desktop computers to thin clients in both the STCs and faculty and staff offices. Many of the STCs are used for tasks that do not require a desktop computer. For instance, using software like Microsoft Office or conducting online research requires only a small fraction of the processing power of a typical desktop, which is what many staff, and some faculty only need their machines for, such as word processing, internet resources and light spreadsheet calculations. Similarly, many students use STC desktop computers just for light tasking software and would not necessarily need desktop computers. Though UITS plans to main the STCs and still issue computers to faculty and staff, UITS is considering replacing desktop computers with thin clients, which are a much more energy efficient type of computer that can still perform most of the tasks for which students, faculty, and staff currently use desktops (Perez, 2014).

Desktop computers, sometimes referred to as "thick clients" are the primary type of computer currently being utilized at IU (Hayes, 2009). These systems include a monitor, keyboard, and a computer attached to the monitor. In the case of Macintosh computers, all the computer processing needs are built into the monitor itself. Thick clients have an operating system (OS) built into them. This system can be some variation of the Windows OS, Macintosh OS, or in rare cases a Linux OS. In addition to the operating system, much of the software that IU has licenses is also often installed onto the computer, including Microsoft Office, Adobe software packages, and statistical software packages like SAS, SPSS, or STATA. When software is used, and information is processed in the computer work station, more energy is consumed than when the information is processed on a distant server. The energy consumed by a computer depends on what software is open and how much work (processing) is being done by the software, with more energy consumed by greater computer processing (see the computer testing results in the STC section, and the test results below). Thick client computers are relatively energy inefficient, especially when multiple software programs are open and running simultaneously. By comparison, thin clients are more energy efficient because they offload their processing demands to virtual servers, which allows for more efficient distribution of processing demands.

Thin clients are small, lightweight computers that are attached to a monitor and keyboard (Hayes 2009). They have very little processing power and run a weaker version of an operating system. The thin client connects to a central server, in this case the IU Data Center, which provides access to most of the software available to the thin client user. Once connected to the server, the thin client can open and use any software available on the server. This means that most of the computer processing-dependent energy is being consumed at the data center rather than by the individual thin client computer. Since server rooms are designed to be as energy efficient as possible, it can be more efficient to maintain the more demanding computer processing at a single centralized point (the data center) rather than having the processing carried out on multiple standalone thick client computers. In addition, by offloading processing demand to remote servers, the processing capabilities of each server can be optimized for energy efficiency. In contrast, most desktop computers rarely use more than a fraction of their available processing power for any significant length of time.

Currently, there are about 180 thin clients being used across campus. These thin clients can be found in standup stations around campus, usually in clusters of about five to seven. They are frequently updated and improved by UITS; and UITS hopes that once the thin clients reach a certain level of capability and reliability, UITS can begin to replace some of the thick client computers in the STCs with the newer model thin clients. Unless UITS plans to upgrade to a newer model thin client, UITS could begin upgrades to all thin clients to the Rx0L model over Summer 2014 to be used in Fall 2014.

The idea of using thin clients has existed since the 1960s, and was originally implemented in conjunction with large mainframe computers (Vereecken, 2010). The idea was that the server would perform "the computational intensive functions" and transfer all necessary data to "very constrained devices" (Vereecken, 2010).

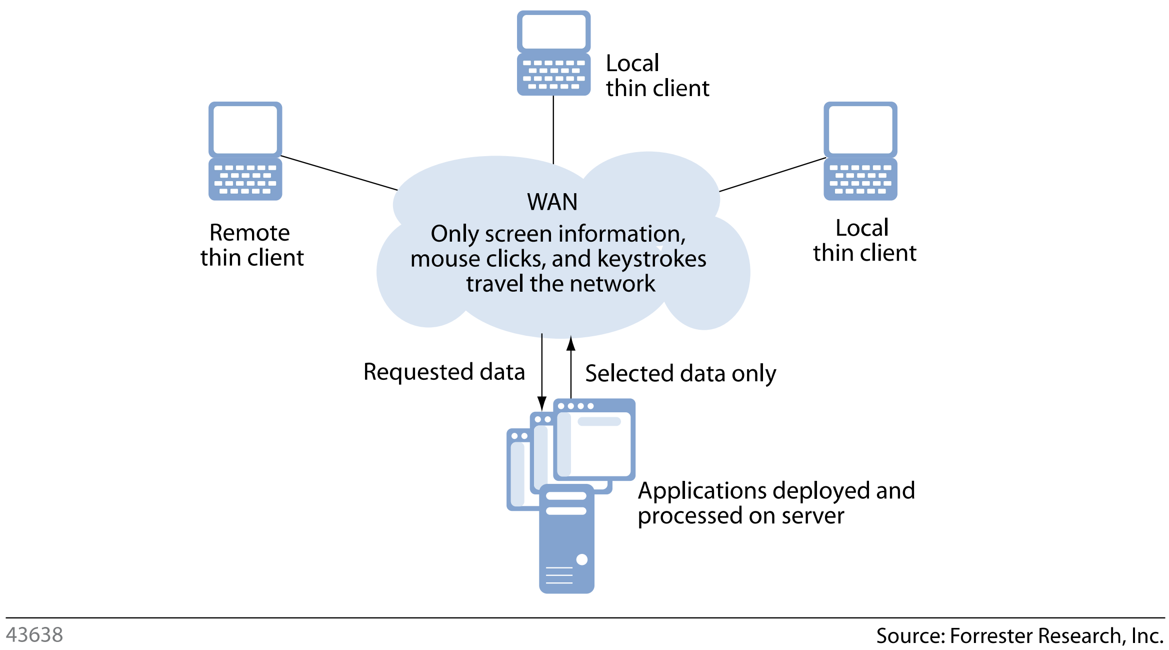

Figure 15. Visual representation of how thin clients work.[10]

This is still the approach used in implementing thin client systems, but it has only been in the past decade that the potential energy benefits of thin clients have been considered. Three percent of all electricity consumed in the United States can be attributed to desktop computers, with the annual

[10] Figure taken directly from Davis, 2008.

cost at $10 billion (Nordman, 2009). For commercial buildings, on a per building basis, desktop computers are responsible for 5 percent of total building electricity. In terms of actual data, one typical desktop computer consumes approximately 70 watts while a thin client only consumes 10 Watts (Greenberg, 2001) (See Table 24 in the STC section). Thin clients weren't being utilized commercially from their conception in the 1960s up to the 2000s because thin client systems were relatively expensive to implement. The actual costs of a thin client is cheap compared to a desktop; $250 vs. $1000 (Perez 2014). However, the fixed costs of server systems, providing storage, processing power, and networking, remained comparatively expensive from the late 1980s through the 1990s making the use of thin clients more expensive than traditional desktops or early laptops and limited to commercial settings (Davis, 2008). In recent years, technology has improved considerably, reducing costs, thereby making thin client use more appealing.

Other benefits of increased use of thin clients include better security for data. Because all the applications are located on the server, IT administration is also more efficient (Hayes, 2009). Yet another advantage to thin client use is that they are quiet when compared to desktop computers because there are no moving parts inside the thin clients, like a fan (Mitwicki et al., 2013).

Davis cites three disadvantages of thin clients (2008). The first one is that not every application that can run on a desktop will run as efficiently on a thin client. Particular problems occur with applications that do complex mathematical equations or graphical processing applications, such as the applications crashing or freezing when trying to perform functions or the application not being able to be opened at all. Recent studies still show that thin clients still have difficulty when dealing with high intensive applications, such as software that do heavy graphical processing, but research is being conducted to compensate for this problem. (Mitwicki et al., 2013; Tang et al., 2013) Thin clients also require constant network connectivity and connection to a server. Finally, thin clients limit user access to some programs and internet resources by controlling or prohibiting access to downloads and application plug-ins (Davis, 2008). Though many of these functional differences might be considered insignificant, users may still be upset by a perceived "loss of personal control" (Davis, 2008). Thin clients remain a new technology; as they continue to evolve many of these shortfalls are likely to be addressed.

B. Methodology

Thin clients were evaluated in three steps. The first stage involved conducting a literature review about how thin clients compare to desktop thick clients, focusing on the advantages and disadvantages of thin clients. During this time, the team also met with Nitocris Perez and Chris England to research thin client use at IU.

In addition, energy readings were measured on thin clients, using those located on the first floor of the School of Public and Environmental Affairs' atrium. The thin clients were plugged into a Watts Up (Think Tank Energy Products Inc., Vermont) energy meter and then tested using a testing plan essentially similar to the Computer Testing Plan used for the evaluation of the STC computers (see Section VI in this report):

a. The energy state was tested by recording the energy use of the thin client in a standby state.
b. The login screen was tested by measuring the power draw while a student logged into the Thin Client

c. Web Browsing: Once the student had successfully logged into the thin client, the student opened up the Google Chrome web browser (the default browser on thin clients) and began to conduct web searches. The student first went to the New York Times web page, then to YouTube and finally their email.
d. Web Browsing with Streaming Video: The student navigated to YouTube and conducted a search for a video to stream. For consistency purposes, the following video was used: https://www.youtube.com/watch?v=OqVyRa1iuMc.
e. Light Office Tasks: The student navigated to IU Box and downloaded a copy of the IU Project Proposal out line and opened the document in Microsoft Office. Once opened, the student began to re-write the first paragraph of the document.
f. Demanding Office Tasks: The student opened up the NSS Merged Excel document. This document had over 100,000 rows and many columns of data. Each column was selected and the mathematical functions of addition, subtraction, multiplication, and division were conducted for each column.
g. The student then went to IUanyWare and opened SPSS and conducted descriptive statistics on the same excel spreadsheet that was used when the student measured power consumption in Microsoft Excel
h. Finally, the student went back to IUanyWare and opened ArcGIS Maps and performed basic GIS functions with a pre-made map that the student had on an external disk.

Once all the thin clients' average power consumption was measured, the average power consumption was calculated. Using data gathered from the survey, the STC group and the Office Group, total energy and monetary costs saved if various percentages of users would replace their current computer workstations with thin clients were calculated. Assumptions were made that both computers and thin clients would be plugged in continuously and electricity was assumed to cost $0.08/kWh. For faculty & staff computers, kWh/year and cost/year were sorted by computer wattage instead of by computer model, like with STCs.

An analysis on docking stations was also done for both STCs and faculty & staff. Total kWh and energy cost savings were calculated based on whether 10%, 15%, 25%, 50%, and 100% would use docking stations for those students, faculty, & staff who bring their laptops to school.

C. Results

1. Energy Consumption of Thin Clients

Two types of thin clients are currently being utilized at IUB; the Dell WYSE Rx0L and the Dell WYSE Dx0D, with the Rx0L the more advanced model of the two and the type of thin clients that power consumption was measured from. These thin clients can be found in many print stations around campus. Campus wide there are about 180 thin clients (Perez 2014). The thin clients come installed with a stripped down version of Windows XP and have Google Chrome, Microsoft Office, and other light to medium taxing software installed on them. More taxing software, such as Adobe Photoshop, statistical packages such as SPSS or SAS, and math packages such as Matlab are not installed on the computer but can be used via IUanyWare. Once there is a server for the thin client to connect to over a network, the actual physical installation of thin clients is very easy and fast, and should only take about five minutes (Perez 2014). Once installed, updates to the thin clients are done remotely by UITS. Perez said that an average workstation in the STCs cost about $1200, while a thin client and a monitor would cost $400. Because STCs already have monitors, the cost would only be $250, resulting in savings of $950 for every thin client purchased instead of a workstation.

	Standby	Login	Web Browsing	Streaming Video	Light Office Tasks
Machine 1	11.5	11.5	12.2	14.5	12.8
Machine 2	11.2	11.5	12.1	14.2	12.7
Machine 3	11.2	11.4	12.1	14.1	12.9
Average Across All 3 Machines	11.3	11.5	12.1	14.3	12.8

	Demanding Office Tasks	Numeric Processing	Graphical Processing	Machine Average
Machine 1	11.7	12.5	12.1	12.5
Machine 2	11.5	12.1	12.3	12.3
Machine 3	11.5	12.0	12.5	12.3
Average Across All 3 Machines	11.6	12.2	12.3	12.4

Table 36. Thin client power demand by tested category. The Rx0L model was tested.

2. Energy and Cost Savings

a. Thin Clients

Thin clients use significantly less energy than work stations. The average watts that a thin client consumes is 12.3 W, compared to the Core i5 Windows 7 that draws 39 W, the Core 2 Duo Windows 7 that draws 95 W and the Core 2 Duo Apple OSX which draws 52.6 W. Thin clients only draw an average of 11.5 W the login screen, compared to Core i5 Windows 7 that draws on average 36.5 W, Core 2 Duo Windows 7 that draws 92.0 watts, and the Core 2 Duo Apple OSX that draws 50.4 W. Thin client's highest energy consumption is web browsing & streaming video at 14.3 watts, which is significantly when compared to the Core i5 Windows 7 at 37.7 W, the Core 2 Duo Windows 7 at 99.5 W, and the Core 2 Duo Apples OSX at 54.6 W. When comparing the annual energy consumptions and costs of thin clients v. STC computers, thin clients have significantly lower consumption and energy costs.

STC Computer Type	Number of computers	Mean Power Demand (W)	Annual kWh Consumed	Annual Cost
Core i5 (W7)	541	39	184,932	**$ 14,500**
Core 2 Duo (W 7)	1018	95	847,841	**$ 67,500**
Core 2 Duo (Apple OSX)	302	52	139,233	**$ 11,000**
Total	1,861	186	1,172,008	**$ 93,500**

Table 37. Annual costs of traditional STC workstations.

Significant energy savings can be obtained by the replacement of STC machines with thin clients. Table 38 shows estimated savings for replacing STC Windows 7 workstations with thin clients. Apple machines were not included in these calculations due to their processor power demands being inseparable from the power draw of the entire machine, which includes a monitor. To obtain the savings values, a mean thin client power draw of 12.4 W was assumed. Both STC computers and thin clients were run continuously, which is the current operating method for STC computers. It was assumed that less energy efficient computers (i.e. Core 2 Duo machines) would be replaced first. Monitors were not considered because their usage is not likely to vary depending on whether a thin client or traditional computer is connected.

Percentage of Windows 7 STC Workstations Replaced	Annual Thin Client kWh Consumed	Annual Thin Client Cost	Annual kWh Saved	Annual Cost Saved
10%	20,063	$ 1,600	112,805	**$ 9,000**
15%	30,095	$ 2,400	169,208	**$13,500**
25%	50,158	$4,000	282,014	**$ 22,500**
50%	100,316	$8,000	564,027	**$ 45,000**
75%	150,475	$12,000	771,844	**$ 61,500**
100%	200,633	$16,000	904,998	**$ 72,000**

Table 38. Projected annual energy and cost savings from replacing STC Windows 7 machines with thin clients.

Table 38 shows that significant energy savings can be obtained through the increased use of thin clients across campus. However, the annual energy savings per machine is only $57.00. Since thin clients cost about $250 to purchase, and machines tend to be replaced on a three- to five-year cycle, the energy savings alone will not pay for the transition to these systems. However, savings will accrue from replacing the regular laptops with thin clients as part of the ongoing replacement of older STC machines. Furthermore, the savings per machine decreases as the replaced machines become newer. The savings calculated above represent a peak amount that will decrease over time. Replacing a Core i5 machine with a thin client only saves $18.00 annually. Assuming that few STC machines are more than five years old, in five years all STC machines will be of the newer Core i5 (or better) type. If thin client energy demand stays constant, replacing all STC computers with thin clients five years from now will only save $29,000 compared to a present day savings of $72,000. This gap is likely to increase over time as traditional computers become more energy efficient.

Power Demand of Audited Office Computers	Percentage of Audited Offices	Campus Wide Computer Annual Energy Use (kWh)	Campus Wide Computer Annual Cost	Annual Thin Client Cost Savings Compared to Replaced Machine
35.6	57%	1,246,300	$ 99,500	$ 16.00
39.4	2%	56,879	$ 4,500	$ 18.00
44	2%	47,640	$ 3,500	$ 22.00
51.9	11%	355,895	$ 28,000	$ 27.00
57	1%	20,571	$ 1,500	$ 31.00
79.8	4%	201,605	$ 16,000	$ 47.00
93	15%	872,684	$ 69,500	$ 56.00
98	1%	35,369	$ 2,500	$ 59.00
130.6	1%	47,135	$ 3,500	$ 82.00
144	1%	51,971	$ 4,000	$92. 00
167	6%	602,722	$ 48,000	$108.00
Total		3,538,775	$ 283,000	

Table 39. Inventory and costs associated with faculty and staff computers. The inventory is based on computers observed during building audits.

The audited offices contained a greater variety of computers than the STCs. Table 39 shows the breakdown of computer models by power demand found during the building office audits. Cost savings were calculated using the same assumptions as used for the STC calculations shown in Table 38. The most critical assumption is that office computers do not enter a low power state. While we believe this to be true for most faculty and staff computers, it is possible that individual faculty and staff have more control over their machines and could be putting them into a low power state each evening. This could reduce the estimated cost savings by as much as 75% if the computers are only on for 40 hours each week.

Estimated annual savings for various levels of thin client replacement in faculty and staff offices is calculated by extrapolating the annual savings for each faculty computer type. For example, when calculating the cost savings from replacing 10% of faculty and staff computers with thin clients, it is first assumed that the proportions of computers in Table 39 can be expanded across campus. Then, assuming a total of 7000 faculty and staff computers campus wide, savings were calculated by replacing 10% of each type of computer with thin clients. The savings for each computer type were then added together to obtain a cumulative amount saved. Results for this calculation are provided in Table 40.

Percent of Faculty Computers Replaced	Annual Energy Savings (kWh)	Annual Cost Savings
10%	277,633	**$ 22,000**
25%	694,082	**$ 55,500**
50%	1,388,163	**$ 111,000**
75%	2,082,245	**$ 166,500**
100%	2,776,326	**$ 222,000**

Table 40. Annual energy and cost savings associated with replacing faculty computers with thin clients.

Like the estimated energy savings for thin clients used in the STCs, the faculty and staff calculations represent an estimate based on the current types of computers in use by faculty and staff. As mentioned in the STC calculations, this means that these savings will be reduced over time as older faculty and staff computers are replaced with newer models that are more energy efficient. Another source of uncertainty in these numbers is due to the assumption of proportional replacement. It is likely that some of the faculty and staff computers with the highest energy load were purchased with special equipment (e.g. faster processors) for a specific purpose. If true, this means that these computers are very unlikely to be replaced by thin clients in the near future. This would also act to reduce the size of these savings.

Though the power consumption of the tested thin clients appears lower than desktop machines in the STCs, these results do not represent overall energy consumption. Additional energy consumption will occur in the servers that the thin clients are utilizing. It is unknown at this time how much energy the servers will consume when connected to a thin client, compared to a workstation. However, the servers at IU have been designed to maximize efficiency and minimize energy use, and when a larger percentage of the server processing power is being used, the server is more energy efficient. Thus, even though thin client usage is likely to be more efficient than similar usage of STC machines, at least some of the described savings may be shifted to increased costs at the Data Center.

b. Docking Stations

A cost savings analysis on power consumption of docking stations in the STCs was not performed for several reasons. First, student laptops have a wide range of electrical loads. Additionally, these laptops draw different amounts of power depending on the charge of their battery. When charging, many laptops use more energy than desktops of the same generation. Due to time constraints a thorough quantification of laptop electrical loads was outside the scope of this project. Similarly, no docking stations proposed for use in the STCs were tested. These factors combine to make an accurate estimation of electrical demand associated with docking stations to be problematic.

Docking stations might also affect the underlying use of the STCs. If large amounts of docking stations were provided, it is possible that this would increase number of students using the STCs. At the same time, expanded use of docking stations might reduce the demand for traditional STC workstations. It is also possible that adding docking stations would increase the demand to

STCs for people using laptops, but not actually reduce the demand for traditional workstations from their current levels. If this is true, then adding docking stations may actually increase the power consumption of the STCs.

These concerns required us to make several assumptions in order to calculate docking station cost savings. First, the docking station itself was assumed to be very minimalist. Basically the STC docking station would consist of an empty desk with an outlet for charging and a wired network connection. It is assumed that no monitor or keyboard would be provided. Thus, the power draw of this type of station would be equal to the power draw of a charging laptop. Power draw due to charging was assumed because most students are more likely to use a STC docking station when their laptops need charging. Measurements of several student laptops showed an average energy draw of 45 W while charging. It was also assumed that these stations would replace older model STC computers first and be occupied for 40 hours per week on average.

Percentage of Windows 7 STC Workstations Replaced	Annual Docking Station kWh Consumed	Annual Docking Station Cost	Annual kWh Saved	Annual Cost Saved
10%	14,592	$ 1,150.00	115,148	**$ 9,000**
15%	21,888	$ 1,750.00	172,722	**$ 13,500**
25%	36,481	$ 2,900.00	287,869	**$ 23,000**
50%	72,961	$ 5,800.00	575,739	**$ 46,000**
75%	109,442	$ 8,750.00	789,411	**$ 63,000**
100%	145,922	$ 11,650.00	886,084	**$ 70,500**

Table 41. Estimated cost savings from the replacement of STC computers with docking stations.

Docking stations for faculty and staff have a different set of problems. It is reasonable to assume that faculty and staff would use a UITS issued laptop that is part of the Dell Latitude series with a compatible Dell docking station. The problem with issuing docking stations to faculty and staff is that the currently manufactured Dell docking stations use a lot of energy. According to the Dell website, they are shipped with either 130 W or 210 W power adapters. (Dell, 2014). Though it is clear that a docked laptop will not always draw the maximum amount of power, it is also unclear whether or not the additional loads associated with the station itself will make it less efficient than a modern Core i5 desktop. One of the main reasons laptops are viewed as more energy efficient than desktops is because they do not use a separate monitor. One of the primary purposes of docking stations is to allow laptop users to have full size monitors and peripheral equipment like a keyboard, mouse, and speakers. Since all of these items contribute to the power load of docking stations, the docking stations are not likely to operate much below the 65 W (computer and monitor) average of Core i5 desktops. Indeed, they might operate at levels above 65 W. Thus, it is possible that conversion of faculty computers to laptops and docking stations on a wide scale will actually increase the energy consumption of office computers compared to replacement of older machines with new Core i5 desktops.

D. Discussion

There are additional advantages to using thin clients beyond the energy savings. Because the thin clients are connected to the server, any work that is being done on the thin clients is constantly being backed up by the server. This means that even if the network connection to thin clients were to fail or if there was a power outage, the user data would still be saved on the servers and could be retrieved. In comparison, if a computer were to crash or if there was a power outage and the user had not saved their work, that data could be lost. Login time on thin clients, compared to login time on STC workstations, was very fast and there were no apparent differences in speed when opening software on thin clients compared to opening the same software on an STC work station. When conducting power consumption tests on thin clients with watt meters, the programs were taking about 5 seconds to open. When performing actual tasks, such as in SPSS or Excel, the thin client was able to manipulate and calculate data in this spreadsheet without a delay. For example, a spreadsheet that had 100,000 rows of data was used for testing in SPSS. When descriptive statistics were used to calculate mean, median, mode and other basic statistical parameters, thin clients were able to calculate the various statistics in about 1-2 seconds. The same operations on STC computers take at least this long to execute. This is as expected, because the actual work is being done on the servers, which have far more processing power than the local machines, and thin client speed is mostly limited by the internet connection.

The biggest drawback of using thin clients is that if the network is down, then the thin clients won't be able to connect to the server, thus not allowing any applications to be used. Also, if the servers crash for any reason, applications could not be run on the isolated machines and any dependent users would be effectively stranded. However, the risk of data loss is minimal, even with a crash, whether the network crashes or the server crashes. UITS plans to create a network of graphic processing units (GPU), which would expand the usefulness of thin clients to run virtually any software that IU has available. This technology is still being developed (Perez 2014).

E. Conclusions and Recommendations

Thin clients are currently only being used at standup stations. According to Perez, UITS had found from a survey that 99.9% (virtually all) of incoming students are bringing portable computing devices such as laptops or tablets with them to IU. This provides a good argument for replacing some of the traditional desktops with docking stations, or at least connectivity stations providing a power outlet and a LAN cable. In addition, UITS is currently improving IUanyWare to make it easier to use for students and faculty. Though UITS does plan to replace some workstations in the STCs with thin clients, they are also planning to replace workstations with docking stations for laptops. Currently, there are no universal docking stations that can work with all brands of laptops, as in they provide power and allow data transfer from laptops to the machine that it is connected to (Perez 2014). However, there are currently monitors that come equipped with cables that allow connecting a laptop to the monitor and allowing those laptops to also connect to the local network; in this case being the local IU Secure network. Thin clients could also replace many desktop computers that staff and faculty use; however, current policy on technology for faculty is that the provided technology is based on the needs of each faculty member. For example, if a faculty member wants a desktop, then UITS's policy is to provide them with a desktop of the operating system of their choice. Even if the problems with thin clients are resolved, a policy mandating faculty and staff to use thin clients will probably not exist in the near future because of the strong resistance to change indicated by the survey.

The final barrier to utilization of thin clients is the negative perception of thin clients. As recently as two years ago, thin clients were far less functional than they are currently. Thin clients could not efficiently run programs like Microsoft Word or Excel and their functionality with IUanyWare was not as efficient as it is currently. Many faculty, staff, and students have a negative perception of thin clients based on their observations of past thin clients. This perception will have to be changed prior to widespread acceptance of thin client technology by most faculty and staff members.

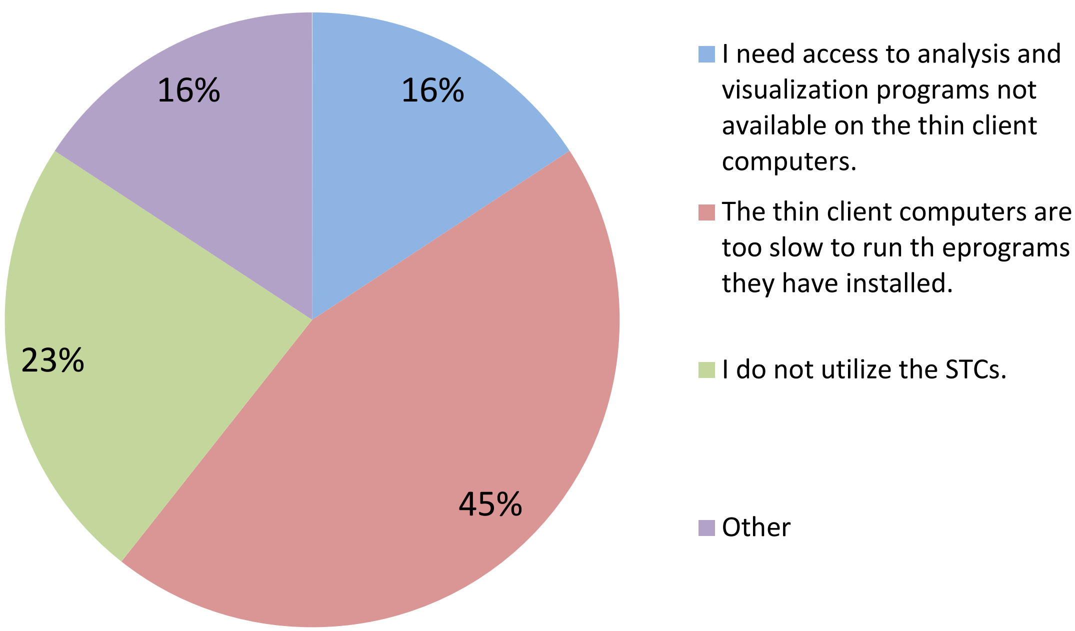

Figure 16. Student Perception of Problems with Thin Clients.

Figure 16 shows that many students believe that thin clients are either too slow to run or that they are unable to run heavy tasking software such as SPSS or GIS, though this isn't the case for current thin clients being utilized at the pop-up kiosks. Out of all the respondents who commented on utilization of thin clients over traditional desktops, 51 percent opposed implementation. Figure 17, shown below, shows the percent of willingness to change of respondents to less energy intensive technology. The data shows about 12 percent of all respondents would switch to thing clients, while about 53 percent of respondents oppose thin client utilization. The rest of the respondents are either indifferent about switching or would like more information before making a decision.

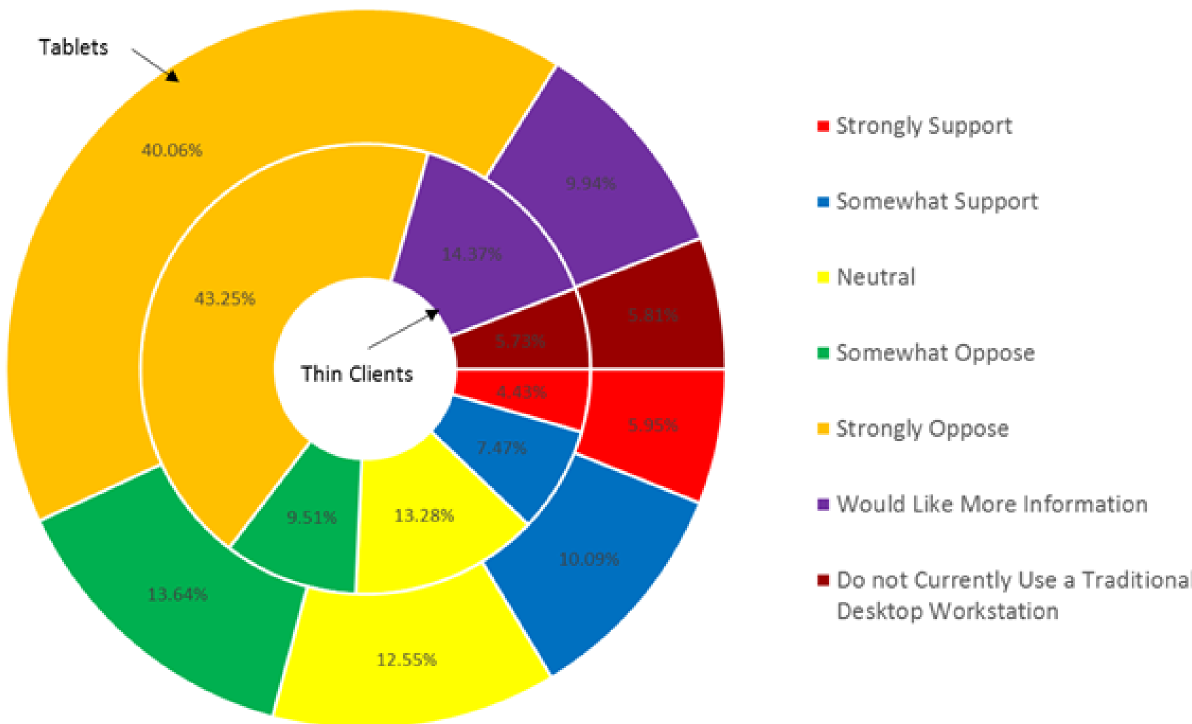

Figure 17. Willingness to adopt laptop or thin client technology. Percentage of all respondents.

UITS does not need permission to replace thin clients in the STCs, but they must consider student desires. Furthermore, UITS still needs permission from faculty to replace their desktops with thin clients, especially for those faculty members who will be able to do their work on thin clients. UITS should consider conducting workshops or classes for faculty to observe these that the faculty and staff can experience and learn to appreciate to functionality of the improved thin client models. A limited promotional campaign might even be appropriate. This should help improve the perception of thin clients and might convince more faculty and staff members to be open to replacing their workstations with thin clients.

VIII. IT-28 Task

A. Introduction

IT-28 is an Indiana University computer risk security policy promoting computer server centralization that was adopted on May 17, 2013. According to the policy, Indiana University's academic and administrative subunits, auxiliary units, and any affiliated organizations ("Units") on all campuses that use IU's information technology infrastructure must abide by this policy. According to the policy, "All Units of Indiana University will deploy and use IT systems and services in ways that vigilantly mitigate cyber security risks, maximize physical security for IT systems, and minimize unacceptable risks to IT systems and data from natural disasters (collectively, "Cyber Risks") (Indiana University, 2013). In order to comply with IT-28, prior to server centralization, all computer related (Information Technology [IT]) services within a unit must be inventoried, risks must be documented and analyzed, and a comprehensive evaluation plan (including a risk mitigation plan) must be completed. The deadline for submitting these plans is May 17, 2014. These plans must also document every server that is still in a particular building or department, state when each server will be moved into the Data Center, or make an argument for why the server should remain in the department and not be moved to the centralized secure location such as the Data Center. In order to be considered a server, the machine needs four items: 1) a processor, 2) memory, 3) a way to store data, such as a disk, and 4) a network for an access point. A sample of an evaluation plan, including an IT-28 Planner sample and an IT-28 Comprehensive Evaluation Sample can be found in Appendices M and L, respectively.

The purpose of IT-28 is to help reduce cyber risks. "Every additional physical computing device – particularly servers that are a primary target for cyber attacks – increases Cyber Risk as it adds a potential target and is another device that must be physically secured, powered, cooled, maintained, patch, and monitored for malicious activity" (Indiana University, 2013). IU has taken several steps to decrease the risk of cyber attacks as well as physical threats (flood, tornados) to the data servers. Some of these steps include investments in IT infrastructure, IT services, and centralized secure physical facilities. There are policies in place in the Data Center to make it more secure from both physical hazards and cyber attacks. For example, 11 servers housed in the Data Center are behind a firewall. When a server is installed in the Data Center, it cannot communicate on the network until the administrator has set up the proper firewall rules (Herring, 2014). The Data Center provides more security against physical hazards compared to other buildings on campus because of its construction. The walls are 18 inches thick and can withstand an F-5 tornado; The Data Center contains backup generators that can power the building in case of a power outage.

The main objective of IT-28 is to reduce Cyber Risks, but there are also many indirect benefits that may come as a result of the policy. One of these benefits is a reduction in campus energy use. This could occur in two significant ways. The first is by moving servers out of individual buildings into the Data Center and enabling server virtualization. The Data Center installs VMwareESX as the hardware that enables virtualization. VMwareESX allows the server to be utilized more efficiently. Currently, a physical server may only be servicing the needs of a single department. Virtualizing the machine allows other departments or services to be performed on that same server, instead of having a different server for each department. UITS' current standard is that they can put 27 virtual servers onto one physical server, depending on what processes the server is used for. The potential to drastically reduce the number of physical servers on campus may lead to large energy savings.

The second way that moving servers out of individual buildings reduces energy use is by the effect on building cooling demand. Regardless of where servers are located, servers produce a lot of hot air in the rooms in which they are located. Because of the temperature sensitivities of the server components, the servers must be kept within strict temperature ranges. It is very important for the rooms in which servers are housed to be cooled consistently. A lot of energy goes into ensuring that these server rooms are kept at the proper temperature, even during periods of campus peak energy use. A popular measure is the Power Usage Effectiveness (PUE). A PUE of 1.0 is the most efficient, meaning that virtually all of the power going to a Data Center is used for computing equipment. The

IU-Bloomington Data Center has a PUE of approximately 1.7. This means that for every 1.7 watts of power used by the Data Center, one watt is used by computing equipment, while 0.7 watts are used for cooling, lights, and other building support needs (i.e. power used by non-computing equipment). A recent report found that the average Data Center PUE for large companies is 2.9 (Clark, 2013), demonstrating that the IU Data Center is relatively energy efficient. By removing servers and server rooms from individual buildings not designed for the energy intensive requirements of servers, the need to cool these server rooms (outside of normal cooling procedures) is either eliminated or reduced.

The Data Center was built approximately five years ago to be energy efficient. Greenberg, et al (2006) identified several best practices for data centers. These practices included: improved air management (controlling hot and cold streams); on site generation with chillers for cooling the waste heat; direct liquid cooling of racks; air and water economizers. In addition to these, there are several more reasons why Indiana University's Data Center uses less energy than a standard data center. From discussions with Craig Stewart and Dan Miller, these include:

- Reinforced concrete walls that are 18 inches thick. This helps to maintain a more consistent ambient temperature inside, not allowing the extreme hot and cold temperatures on the outside have an effect on the inside temperature.
- Earthen berm, which consists of native plants on the outside of the building that grow to a height of approximately six (6) feet.
- The building is built to withstand an F-5 tornado.
- The rooms that store the servers have hot and cold aisles. This means that server racks are placed in such a way that allows the hot air to be blown in in the same direction as the servers on the other side of the aisle. By centralizing the warmer air from the servers in each aisle, the cooling from the floor can be sited in alternate aisles. A picture of this can be found in Appendix N.
- The server racks are 208 volt, which means that there is less step-down in voltage which allows for fewer losses and greater efficiency.
- The Data Center has its own cooling towers and air economizers. The cooling towers are outside and are used to cool the air coming from the servers. The air economizer works by taking air from the outside (when the temperature allows), filtering it, and using it to heat or cool the part of the building that houses people. This technology saves the Data Center about $100,000 a year in energy costs (Miller, 2014).
- Cooling jackets on the back of some server racks. The purpose of these jackets is to use water from the cooling towers in order to cool the air being blown out of the servers.

All of these features help the Data Center to be more energy efficient than standard data centers. The Data Center also has its own emergency backup generators (two 16 cylinder, 2,200 HP diesel engines; 1.5 MW generators with space for a third; a buried 10,000 gallon diesel fuel tank) if the power goes out for any length of time. The Data Center has power for networking equipment that consists of two 1,800 Amp, 48 volt direct current (DC) power system for routers, switches etc.

The trend in computing is moving from physical servers to virtualization, with cloud computing being another associated trend for the future of computing. One motivation for virtualization is increased energy efficiency. Berl, et al (2010) and Barrosos and Holzle (2007) reported that this is in part due to the disproportionate use of energy and utilization of the server. Barrosos and Holzle (2007) report that most of the time, "servers operate at between 10 and 50 percent of their maximum utilization levels" (Barroso & Holzle, 2007, p. 34). Energy efficiency increases as utilization of the server increases.

In their report, Berl, et al (2010), find that, "even when run at a low utilization, servers typically need up to 70% of their maximum power consumption. Such services can be virtualized and run within a virtual machine (VM) resulting in significant increases in overall energy efficiency" (Berl, et al., 2010, p. 1047). The idea is that less physical hardware and greater server utilization equals greater energy efficiency.

B. Methodology

IT-28 is a complex policy with many unknowns. In determining the past, current, and future state of IT-28, the following people were consulted: Dr. Craig Stewart, Executive Director, Pervasive Technology Institute and Associate Dean, Research Technologies, Robert Henschel, Jennifer Van Horn, Todd Herring, Ulrik Knudsen, Martin Wagner, Noma Maier, Daniel Miller, Charles Escue, Troy Williams, Bennet Brabson, Thom Sulanke, Charles Crabb, Dan FitzSimmons, Christopher Preston, James Sturgeon, Michael Taylor, Chris England, and Donna Arkins.

While all of these people added valuable and interesting information to the project, I was not able to completely quantify the numbers of servers located in buildings outside of the Data Center. In an effort to supplement conversations, information on IT-28, including Frequently Asked Questions, Templates, Samples, and Best Practices were all reviewed. Various UITS webpages were reviewed in an attempt to identify server types and server numbers in different buildings across the campus.

To estimate the potential energy savings from moving physical servers out of buildings and into the Data Center, calculations were carried out using power information and specifications of the identified servers located in Swain West, the Athletics Department, and the School of Education. Representatives from each of those departments provided information on the number of servers housed in their departments or buildings, in addition to either the wattage that each machine uses, or the average wattage of all of the machines. The data received from the different departments were based on the actual power usage of the machine, as opposed to the general model specifications. Because of this, the data from the departments were considered more accurate. From this information, I calculated the energy demand in kilowatt hours used by the machines in that department on a daily basis.

A model involving calculations with a virtual system was done to show the potential of Intelligent Infrastructure. Data used were from a grant proposal completed just two years ago by Troy Williams of UITS. This real data showed savings from switching to a new type of server, with virtualization. With his permission, I extended the work to calculate and show the kWh saved by consolidating 27 physical servers onto one physical server through virtualization. These results are discussed below.

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C. Results

1. Findings: Energy and Number of Servers

The first sub-task was to identify the number of servers that are still housed in buildings around campus (non-Data Center or other secure facilities). According to Todd Herring, the University knows of 3,656 servers across the campus. Of these servers, Todd estimates that as of April 2013, 3,080 servers have been moved out of individual buildings, leaving approximately 576 servers in campus buildings. There are a few points to note about this number. The first is that these are the servers that are known to UITS management. UITS also does not know if these servers were moved physically (i.e. the physical server moved from point A to point B) or if they were moved to the Intelligent Infrastructure (Virtualization). The last point of note is that there are more secure locations than just the Data Center that UITS manages, including the Health, Physical Education, and Recreation (HPER) complex on Bloomington's campus and the Education/Social Work Building (ES) on the campus of Indiana University-Purdue University Indianpolis(Herring, 2014).

The next step was to identify which buildings or departments still house known servers. In addition, some buildings were identified as having removed all or almost all of their servers. Results can be seen in Table 42.

Location	Number of Servers remaining	Aggregate Power Draw (W)	Potential Energy Savings (Yearly)	**Annual Cost Savings**	Comments
SPEA:	0	N/A	N/A	**N/A**	According to Chris England, all of the servers have been moved out of the SPEA building.
Business School:	2-3	(400)	(3,504)	**($200)**	According to Jennifer Van Horn, approximately 100 have moved out of the Business School buildings and only a few remain.
Sociology:	2	400	3,504 kWh	**$200**	Data from Jack L Thomas.
Athletics:	30	10,462	91,644 kWh	**$7,000**	Data from Chris Preston. Some servers will be retired, some moved.
Physics Department:	60	12,000	105,120 kWh	**$8,000**	According to Thom Sulanke, there are approximately 60 servers remaining.
School of Education:	20	(4,000)	(35,040 kWh)	**($2,500)**	Attempts to identify specific wattage were unsuccessful.
Indiana Geological Survey	16	(3,200)	(28,032 kWh)	**($2,000)**	Attempts to identify specific wattage were unsuccessful
School of Informatics:	Unknown				Unknown at the present time; conducting inventory for May 17

Table 42. Location and Number of Servers Housed in Buildings / Departments. Sources: Email, personal, and phone communications with Greg Glassley. Note: Dollars savings calculated at a cost of $0.08 per kWh. Savings are to the buildings in the event every server was removed. Numbers in parentheses represent best estimates.

There are a few interesting points of note related to Table 42. Todd Herring identified the School of Informatics, the US Geological Survey, and the School of Education as buildings and departments that had server rooms. Mr. Herring also stated that he thought that Jordan Hall, the Business School, and the School of Public and Environmental Affairs had moved servers out of their respective buildings (Herring, 2014). There is still a chance that each building houses at least a few servers, especially ones maintained outside of the control of UITS, but the numbers remaining and potential for energy reduction should be minimal.

The information regarding the Physics Department was from email and personal communications with Thom Sulanke. He stated that he had recently done an inventory and identified approximately 60 computers that are not work stations. These were classified as servers and Mr. Sulanke made the comment that "they would serve the same purpose regardless of where they were located" (Sulanke, 2014). He also stated that the average power draw for those servers was 200 W. From this information, I calculated the energy use of those 60 servers for a full calendar year, assuming they run 24 hours every day (see Table 42) For a calendar year, the servers located in Swain West use 105,120 kWh at a cost of approximately $8,410. In addition, I learned from Mr. Sulanke that a few years ago, Physics spent $250,000 remodeling the computer room in Swain West.

The School of Education is located in the W. W. Wright Education Building and has its own Data Center. The School has 20 physical servers, UPS battery backups, and one Liebert data center emergency cooling unit (Taylor, personal communication, 2014). The School of Education already utilizes virtual servers in their data center. The School has a fault-tolerant Hyper-V Cluster, which allows them to power dozens of virtual machines on fewer than 5 pieces of equipment, as opposed to having dozens of separate, physical servers (Sturgeon, personal communication, 2014).

Information from the Athletics Department was in the form of a spreadsheet inventorying computer assets. Athletics houses approximately 30 servers. According to Athletics' plan, 13 servers will be eliminated, some to be replaced, and some to be moved, as required by IT-28.

2. May 17, 2014 Deadline for Departmental Submission of IT-28 Evaluation Plans

May 17th, 2014 is the deadline for each unit (department, building, school) to have the Comprehensive Evaluation and IT-28 Planner submitted. After the deadline, the plans will be reviewed by one of seven teams and either accepted or rejected. Each team consists of UITS staff and one or two IT people from schools across campus, such as the Kelley Business School. The one or two IT people involved in the team are people with titles such as managers, directors, and executive directors. If the plan is rejected, the departments and the decision teams will negotiate on the parts of the plan that the teams deemed unacceptable.

The Comprehensive Evaluation will include a background and mission statement for each department. The department will give an overview of its IT services. This will include an *inventory of all IT assets* - how many of each type of machine and what service it provides. The locations of their machines will be identified – where are the office support servers (i.e. file, print, web, database) and any research servers? Are they housed in the building, in the Data Center, or are they in Intelligent Infrastructure? How the building physically protects the servers will be detailed.

The Evaluation will also include a section on risk assessment – what best practices are either currently being done or are planned. This will include server room environmental controls. Along with a risk assessment, there will be a risk mitigation plan. This will identify when and where servers will be moved in order to comply with IT-28.

The second part of the submission will be the IT-28 Planner. This will identify the name of the unit (school or department), who heads up the unit, and a line-by-line inventory of IT assets. Each line will identify an IT asset, describe what it does, give a primary and secondary function of the asset, identify the location of the server, and whether it is virtualized or physical. The Planner will also have a data analysis section in which it again lists each IT asset, states what is on the asset, and classifies the data on that asset (i.e. public, critical, or restricted data). More risk assessment is done, and there will be a section devoted to transition planning. In this section, the departments will discuss whether or not they are planning to move services to a UITS service. If they plan on moving the asset, they will give a timeline on moving. If they don't plan on moving the asset, they will have to explain why not.

Once the plans are submitted, the decision teams will either agree with the proposed plan and evaluation, or disagree and ask for a re-submittal. It is important to note that not all servers will have to be moved into the Data Center (or another secure location). As an example, if a department recently bought new servers, or invested heavily in some equipment or building, they will state this and then explain why they should keep the servers. But they will also have to state what the plan will be as the equipment they purchased gets older. There are also some servers that must be physically connected to a machine. If this is the case, moving the server would disrupt, or cause the unit to lose functionality. A server in this case would most likely be allowed to stay.

The importance of the deadline is that the IT-28 server plans will enable UITS to know exactly which buildings and departments house what number of servers. Once a more exact picture is created, the potential for energy savings will be better understood. Moving a physical server from one building into the Data Center only results in cooling savings in the building in which the server was moved. Thus, there is little potential for savings from the physical moving of servers. The potential for greater energy and cost savings is realized when the servers are moved into a virtual environment (Intelligent Infrastructure). Section D.2 discusses Intelligent Infrastructure in more detail. An estimate of the potential savings from virtualization is provided in Table 43. Savings are calculated using UITS' estimate of 27 physical machines to one physical server.

Number of physical servers moved into Virtual Environment	Percent of Total servers	Energy Savings (Annual kWh)	**Cost Savings (Annual)**
27	5%	19,176	**$1,500**
54	9%	38,352	**$3,000**
81	14%	57,528	**$4,500**
108	19%	76,704	**$6,000**
135	23%	95,880	**$7,500**
162	28%	115,056	**$9,000**
189	33%	134,232	**$10,500**
216	38%	153,408	**$12,000**
243	42%	172,584	**$13,500**
270	47%	191,760	**$15,000**
297	52%	210,936	**$16,500**
432	75%	306,816	**$24,500**
576	100%	409,088	**$32,500**

Table 43. Estimated annual energy and cost savings by moving physical servers into virtual environment.

The calculations represent the estimated potential annual energy and cost savings from moving physical servers into the virtual environment. The savings do not include cooling savings as a result of fewer servers in a building.

D. Discussion

1. Intelligent Infrastructure

Intelligent Infrastructure is the system at IU of virtualizing computing and servers. Currently, when departments move physical servers out of a building, they can choose to physically move them into a secure location such as the Data Center, or they can choose to virtualize them. With all of the physical servers on campus, there is not enough room in the Data Center to just move them over (Williams, 2014).

Another benefit of the Intelligent Infrastructure is that the service will be provided by UITS. UITS is able to update the hardware on the server every 36 to 48 months without interrupting service. Updating not only improves the system but also increases efficiency, further reducing costs.

Virtualization means less space is needed to house servers, hot air is coming from fewer machines, and less energy is consumed by the servers. As a rough example, I used data from Troy Williams to show potential energy savings based on utilizing the estimate of 27 virtual machines to one physical machine. In Troy's data, he compared one type of server (R610) running at a 30% load and 110 volts to a second server (R810) running at an 80% load and 220 volts. The combination of my calculations and Troy's data is found in Table 44.

Machine 1 (R610); 110 volt, 30% load		Machine 2 (R810); 220 volt, 80% load	
Volts	110	Volts	220
Amps	0.9	Amps	2.2
Watts	99	Watts	484
27 machines would use	2673 Watts	27 virtual machines:	484 Watts
kWh/year	23,416	kWh/year	4,240
Cost/year	**$1,500**	**Cost/year**	**$300**

Table 44. Hypothetical Comparison of 27 Physical Servers to 27 Virtual Machines House on One Server. Data from Troy Williams, with permission.

This hypothetical example shows that the power draw stays relatively constant when you add virtual machines. While moving a physical server can save one building in energy costs, the Data Center would still house the server, meaning energy is still being used. Virtualization results in even greater energy savings by reducing the number of physical servers needed.

As it currently is set up, when a department moves physical servers into the Data Center, they are charged a fee to rent a full server rack or a half rack, regardless of whether or not they use the entire space. The costs to the department decrease with virtualization because departments can choose to rent only the virtual space they need, not a full or half rack required for physical servers if they don't need that space. In essence, the department can rent a server based on the number of gigabytes or terabytes they need. The University has been virtualizing servers since approximately 2003. The costs have continually decreased for virtual services, while the efficiency has increased.

2. Physics Department in Swain West

The following observations and insights were obtained during a tour of Swain West with Dr. Bennet B. Brabson and Thom Sulanke in the Physics Department.

- Approximately $250,000 was spent to upgrade the secure computer room located in the basement of Swain West just a few years ago. This room houses servers and is kept very cool with two large cooling units. The IT department and those who manage the servers have already taken several steps to make the room more efficient.
- The person responsible for filling out the Comprehensive Evaluation plans form was unsure of how to answer some of the questions because there was no computing policy to follow or to guide him on how to answer the questions.
- The Physics Department does high energy research as part of the Worldwide Large Hadron Collider Computing Grid (WLCG), a global collaboration of computer centers. This research involves a tremendous amount of calculations that can take weeks to do. However, this very intense computing is not done on campus, but carried out in supercomputers elsewhere in the WLCG. To simplify the system, the Worldwide LHC Computing Grid has four tiers. Tier 0 is the CERN Data Center. This tier distributes output to Tier 1. Tier 1 consists of 11 sites across the world, including two in the U.S (Fermilab and Brookhaven National Laboratory). Tier 2 is made up of 140 sites, with Indiana University Purdue University at Indianapolis (IUPUI) being one of these sites. (CERN, 2014) One Tier 3 site is located in the Indiana University Physics Department. This allows the users to send out data

for the calculations to be performed on a supercomputer; when the results are returned, those results stay on servers on campus to ensure quick access. Although members of the Physics Department require many high intensity calculations, these calculations are not done on campus.

3. Other Energy Saving Programs and Devices

The University has additional avenues it can take to reduce energy costs across campus. One example is the GoGreen gadget. The School of Education completed a pilot program to test and determine energy savings from the gadget. The GoGreen gadget is a tool that can be used to alter computer power management settings (turning them off, standby mode). For the School of Education, this application is being used on over 400 machines, setting the machines to go into sleep mode after 2 hours and 15 minutes of inactivity (Indiana University School of Education, No Date). The gadget shows how much electricity and carbon dioxide emissions are saved by the new power management settings. It also shows the total savings for the building and for the campus as a whole (University Information Technology Services, 2014).

Another potential tool for energy savings is the System Center Configuration Manager (SCCM). This is a software management tool that allows for the remote management of a large number of computers. It is a Microsoft product that can manage desktop computers that utilize Windows (Computer Hope: SCCM, No Date). While the use of the SCCM is again driven by security concerns, this tool results in energy related cost savings. By remotely operating power settings, including automatic shutdowns, computers can be put in standby mode from afar, which saves energy (Craig A. Stewart, 2014). As a commercial product, it is supported directly by Microsoft and has been designed specifically to manage large interconnected networks. (Microsoft, 2014)

E. Conclusions and Recommendations

1. Conclusions

The best estimate is that approximately 3,080 of 3,656 (84%) servers have been moved out of buildings and into the Data Center (or another secure UITS facility) (Herring, 2014). Among other locations, the Physics Department in Swain West, the School of Education, the School of Informatics, Indiana Geological Survey, and the Athletic Department still house servers (Herring, 2014). As reported earlier, the Physics Department has approximately 60 servers, the School of Education about 20, the Athletic Department still houses 30 servers, and Indiana Geological Survey contains 16 servers. The plans for movement of these servers are included in the plans that will be submitted by May 17. Many buildings, such as Jordan Hall, Kelley School of Business, and the School of Public and Environmental Affairs (SPEA), have moved either all or the majority of their servers into the Data Center.

The Athletics Department stated that they plan on moving many of their servers into the Data Center, while the Physics Department and the School of Education do not plan to move their servers. The Physics Department recently spent $250,000 on upgrades to the building for their server room, and the School of Education also has their own dedicated server room. While the decision about whether or not servers should be moved into the Data Center will be up to the different teams who grade the evaluations and plans, there will be cases like the Physics Department in which servers will likely be allowed to stay in their present buildings.

It is difficult to determine exact energy savings for the full implementation of IT-28 without knowing specific department plans. Many of the buildings and departments are currently in the process of inventorying their IT assets. The comprehensive evaluation and the IT-28 planner that are part of a department's submission for the May 17, 2014 deadline should provide a clearer picture of not only the number of servers, but also the type of environment in which they are housed. For example, the Athletics Department houses 30 servers. Of these, their plan is to eliminate 13 servers. The annual energy and cost savings associated by eliminating these 13 servers is found in Table 45.This number does not include the savings that would also come from avoided cooling costs. There is a legitimate chance that the Department of Education, Physics Department, and some of the other buildings will be allowed to keep their servers in-house since they have their own secure server rooms.

Servers being Eliminated	Power Draw (Aggregate Watts)	kW	kWh saved (annual)	**Cost Savings (annual)**
13	4,594	4.594	40,243	**$3,000**

Table 45. Annual energy and cost savings by eliminating servers from Athletics Department.

The main goal and purpose of IT-28 is to reduce threats to cyber security. While implementation of IT-28 will aid in this reduction, the policy will also result in other potential cost savings, including savings in electricity costs. As an example of non-energy cost savings, the cyber security breach that occurred at IU in February resulted in the University spending over $80,000 (and 700 personnel hours) responding to the breachInvalid source specified.. Implementing IT-28 doesn't guarantee the elimination of security breaches, but it does reduce the possibilities.

2. Recommendations

The decision about which servers will be moved into the Data Center will be made by one of seven teams, and some servers will be moving into the Data Center and others will stay in their current buildings. The servers that duplicate a service provided by UITS should be moved into the Data Center. UITS already offers a number of services that can be performed from the Data Center. There is not a need for an individual building to house a server that performs basic functions, such as printing or payroll, when UITS offers the same service in a secure facility.

An important recommendation is to move servers into a virtual environment. The optimal move would be moving all of the servers into a virtual environment in the Data Center. This would reduce electricity and cooling costs in the buildings from which they were moved. The Data Center was built with energy efficiency in mind. The data center environmental controls, such as back-up generators, the building's own cooling towers, and the layout of the space (hot and cool aisles), all aid in increasing energy efficiency.

Some servers will be allowed to stay in their current buildings. The School of Education has already moved some of their servers into the virtual environment within their own server room. If buildings are allowed to house a number of their servers, virtualizing them should be considered. This will reduce the number of physical servers that are housed which will result in greater energy efficiency and less cooling. If departments keep their servers, they should attempt to house them as energy efficiently as possible. This should include exploring the possibility of upgrading cooling units and other equipment to increase efficiency (i.e. W.W. Wright Building has a Liebert emergency cooling unit) and hot and cold aisles. More efficient cooling technologies in these server rooms would reduce the amount of overall cooling provided by the physical plant.

The IT-28 policy states that formal reviews will be updated every two years (Indiana University, 2013). Some of the managers that I spoke to over the last two months told me that they were in the process of inventorying their IT assets for the first time. If departments kept up to date inventories of their assets, this would reduce the time they spent on upcoming reviews and allow for expediting the review process.

At the same time, departments should develop computing policies. This should involve determinations about which types of servers they need (what is the use of the server? Does UITS offer the same service?), and development of a five and ten year plan for the type of IT assets they will need. For buildings that have and keep their own computer or server room, they should find ways to better utilize the square footage of the server room, if available. As an example, the computer room in Swain West has additional, unused square footage that UITS will be utilizing in the near future for network functions. If a building has a properly equipped and secured computer room with available square footage, the University should explore options of utilizing this space.

IX. Overall Cost Savings

The Spring 2014 Capstone group identified potential electricity cost savings related to office and computing plug loads at IU. The potential savings identified would result from implementing these policy recommendations:

- Remove all thermal comfort devices from faculty and staff offices and reception areas
- Remove all food devices from faculty and staff offices and reception areas
- Replace 25% of faculty and staff office computers with thin clients
- Replace 25% of STC computers with thin clients
- Replace 25% of STC computers with docking stations
- Activate low-power standby mode for remaining STC computers
- Replace remaining STC computers with Core i5 processor models
- Virtualize 100% of remaining servers under IT-28

Full implementation of these policy recommendations would result in estimated annual savings of $366,000 as shown in Table 46 below.

Recommendation	Annual Amount Saved Compared to Current State	
Remove Thermal Comfort Devices from Faculty and Staff Offices and Reception	$	74,500
Remove Food Devices from Faculty and Staff Offices and Reception Areas:	$	143,000
Replace 25% of Faculty and Staff Computers with Thin Clients:	$	55,500
Replace 25% of STC Computers with Thin Clients:	$	22,500
Replace 25% of STC Computers with Docking Stations:	$	23,000
Activate Low Power Standby for Remaining STC Computers. Replace Core 2 Duo Machines with Core i5:	$	15,000
Virtualize 100% of Identified Servers Under IT-28:	$	32,500
Total Savings:	**$**	**366,000**

Table 46. Overall Cost Savings from Recommendations.

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XI. Appendices

Appendix A: Final Survey Instrument

Separation Question

IRB Survey # **1404707661**

INDIANA UNIVERSITY STUDY INFORMATION SHEET FOR
Spring 2014 Energy and Computer Usage Survey

You are invited to participate in a research study of energy and computational use on the Indiana University-Bloomington campus. You were selected as a possible subject because you are a current student, faculty, or staff member on the Indiana University-Bloomington Campus. We ask that you read this form and if you do not feel comfortable with the goals, privacy notice, or any other aspect of the survey please close your web-browser and do not participate.
The study is being conducted by Dr. Diane Henshel of Indiana University (IU) School of Public and Environmental Affairs. The project is a student-led capstone course working with the Office of Sustainability and IU Physical Plant. As such, the project is unfunded student research.

SURVEY PURPOSE
The purpose of this survey is to measure how students, faculty, and staff members use electricity and the computational resources on the IU-Bloomington campus.

PROCEDURES FOR THE STUDY:
If you agree to complete our survey, you will continue with this electronic form and answer a series of questions about your interactions with the electrical and computational resources at IUB. Your responses will be used to validate physical observations that have been made on campus as well as provide a view of how the general population uses the resources available. Ultimately, your responses will help us guide future determine how to efficiently reduce the financial burden of providing electrical and computational resources without lessening community access to necessary resources.

CONFIDENTIALITY
This survey instrument is not collecting any personal identification information that you do not provide explicitly. Efforts will be made to keep any personal information provided confidential. We cannot guarantee absolute confidentiality. Your personal information may be disclosed if required by law. Your identity will be held in confidence in reports in which the study may be published and databases in which results may be stored. **No unique identifying information will be collected during the interview. Your name and contact information will not be recorded. The only information that will be kept temporarily is your email address, if you provide such information, in order to contact you in the event you win one of our participation prizes.**

Organizations that may inspect and/or copy our survey answers for quality assurance and data analysis include groups such as the study investigator, her research associates, and the Indiana University Institutional Review Board or its designees.

PAYMENT
Students, if you chose to provide your contact information via an @indiana.edu email address, you will be entered to win one of four prizes; one $50 gift card to Scholars Inn or one of three $25 gift cards to Scholars Inn. Eligibility is not based on any of your answers nor is it based on your successful completion of each question presented to you in this survey. Students who skip questions will still be eligible to win a prize. Faculty and Staff members will not be financially incentivized for their participation.

CONTACTS FOR QUESTIONS OR PROBLEMS
For questions about the study, contact Dr. Diane Henshel at (812) 855-4556.

For questions about your rights as a research participant or to discuss problems, complaints or concerns about a research study, or to obtain information, or offer input, contact the IU Human Subjects Office at (317) 278-3458 or (812) 856-4242.

VOLUNTARY NATURE OF STUDY
Taking part in this survey is voluntary. You may choose not to take part, may leave the survey at any time, or may choose to leave any individual question blank for any reason. Leaving the survey or not completing each question will not result in any penalty or loss of benefits to which you are entitled. Your decision whether or not to participate in this survey will not affect your current or future relations with IU.

- ○ I Agree to take this Survey
- ○ I Do Not Agree to take this Survey

Which of the following most accurately describes your role on IU Bloomington's Campus?

- Undergraduate Student
- Graduate Student
- Faculty Member
- Staff Member

Student STC Questions

The Student Computer Centers (STCs) are computer labs located around campus where anyone with an IU computer account can access the University's computing resources. Please answer the following questions about your interactions with the STCs on the IU Bloomington Campus.

How often do you use STCs (Student Technology Centers)?

- Never use STCs
- Less than 1 time per week
- 1-3 times per week
- More than 3 times per week

Which buildings do you use the STCs? Please Check All That Apply:

- [ ] Ballantine Hall
- [ ] Briscoe Quad
- [ ] Kelly School of Business
- [ ] Eigenmann Hall
- [ ] Griggs Lounge (Ashton)
- [ ] Information Commons
- [ ] Law School Library
- [ ] Wells Library
- [ ] Lindley Hall
- [ ] McNutt Quad
- [ ] Music Library (Simon)
- [ ] Psychology
- [ ] RAB 113
- [ ] SPEA
- [ ] Speech and Hearing Clinic
- [ ] Student Building
- [ ] Teter Quad
- [ ] Union Building
- [ ] Wendell Wright Ed. Building
- [ ] Wilkie Quad

- [ ] Woodburn Hall
- [ ] Wright Quad.
- [ ] Other.

When you do use STCs, for how long do you use them?

- ○ Less than 15 minutes
- ○ 15 - 60 minutes
- ○ Longer than 60 minutes

What time of day do you most often use the STCs?

- ○ In the morning, before 12:00 PM
- ○ Between 12:00 PM and 5:00 PM
- ○ After 5:00 PM
- ○ I use the STCs at various times

What are your uses of the STCs? Please Select all that Apply.

- [ ] Printing
- [ ] Web Browsing / Email
- [ ] Word Processing
- [ ] Excel or Other Office Suite
- [ ] Math / Statistics / Photoshop or other Specialized Software
- [ ] Other

Do you need access to the STCs for a program that you cannot otherwise access?

- ○ Yes. Please Identify the Program
- ○ No

Wireless Printing

Indiana University has a wireless printing program available to any student with IU-Connect installed on their personal computer which allows students to send documents straight to the Printer Release Stations. Please answer the following questions about your interactions with the wireless printing program.

Do you know about IU's Wireless Printer-Finder program that allows you to send documents from your laptop or mobile device to the IU print release stations directly?

- ○ Yes, and I use it as a method of printing.
- ○ Yes, but I do not use it.
- ○ I am not familiar with the program.

If you know about the wireless printing program, but do not use it, why not?

- Incompatible with my computer
- Printing service is unreliable / technical issues
- I prefer the convenience of the STC computers
- I do not use IU-owned printers
- Other

As a user of the wireless printing program, please identify the number one concern you have with using the program.

- Printing service is unreliable / technical issues
- Printing service is too slow
- Printing service does not connect to the printer that is most convenient for me
- Printing service program is difficult to use
- I do not have a concern with the program
- Other

Thin Client Questions

Thin Client Computer are limited functionality machines that are currently utilized at some print release stations around IU's campus. These machines have Internet, word processing, Adobe PDF, and printing capabilities but will not run analysis,visualization, or other memory intensive programs. Please answer the following questions about your interactions with and expectations of Thin Client Computer.

Are you familiar with the Thin Client Computers?

- Very Familiar
- Somewhat Familiar
- Not Familiar

Would you consider using a thin client machine instead of a full functionality computer in the STCs?

- Yes
- No

Why would you reject using a Thin Client Computer in the STCs? Please identify your Number 1 Concern.

- I need access to analysis and visualization programs not available on the Thin Client Computers
- The Thin Client Computers are too slow to run the programs they have installed
- I do not utilize the STCs
- Other

Student Personal Electronic Devices

Do you own a laptop (or tablet used as a laptop)?

- ○ Yes, and I bring my laptop/tablet to school most days.
- ○ Yes, but I rarely/never bring my laptop/tablet to school.
- ○ No, I own a personal computer kept at my residence.
- ○ Do not own a personal computer.

If you bring a laptop to campus, would charging and / or docking stations that provide charging and full sized keyboard with mouse in the STCs be useful to you?

- ○ Yes
- ○ No

How many personal electronic devices (cell phone, laptop, tablet, e-reader, etc.) do you bring to campus each day? Please provide an integer greater than or equal to 0.

How many of your personal electronic devices identified in the previous question connect to the IU Secure Network or the AT&T Campus WiFi when you bring them on campus? Please provide an integer greater than or equal to 0.

Do you charge your personal electronic devices in an on-campus building? (academic buildings, library, Union, Dormitory building, SRSC, or other)

- ○ Yes
- ○ No

Approximately how many hours per week do you charge your personal electronic devices in an on-campus building? (Example: laptop about 10 hours per week + phone about 5 hours per week + e-reader about 5 hours per week = 20 device charging hours per week.) Please provide an integer greater than or equal to 0.

Student Demographic Questions

Do you live in On-Campus or Off-Campus Housing?

- ○ On-Campus
- ○ Off-Campus

What is your current Degree Path?

What is your anticipated year of graduation from your current degree path?

What is your anticipated year of graduation from your current degree path?

- ○ 2014
- ○ 2015
- ○ 2016
- ○ 2017
- ○ Beyond 2017

If you would like to be entered into the drawing for a chance to win one of our prizes, please enter your @indiana.edu email address in the box below. Only @indiana.edu email address will be used in the random drawing. Your information will not be retained except to contact you in the event you win our prize.

Possible Prizes: One (1) $50 gift card to Scholars Inn; Three (3) $25 gift cards to Scholars Inn

Faculty Questions

In what department or school do you serve as a faculty member or administrative staff?

In which building is your primary office located?

Do you have a secondary office?

- ○ Yes
- ○ No

In which building is your secondary office located?

Do you have a tertiary office?

- ○ Yes
- ○ No

In which building is your tertiary office located?

Office Space Questions

Which of the following best describes your primary office space?

- ○ Enclosed Office (Private)

- ○ Enclosed Office (Shared)
- ○ Cubicle
- ○ Reception Desk
- ○ Laboratory
- ○ Other

How would you describe the typical temperature of your primary office space in the Summer Months?

- ○ Too Hot
- ○ Too Cold
- ○ Just Right

Do you use any of the following to adjust the temperature of your primary office space in the Summer Months? (Check all that Apply)

- ☐ Electronic Space Heater
- ☐ Electronic Personal Fan
- ☐ Non-Electronic Temperature Control such as blankets or Opening the Windows
- ☐ None
- ☐ Other

How would you describe the typical temperature of your primary office space in the Winter Months?

- ○ Too Hot
- ○ Too Cold
- ○ Just Right

Do you use any of the following to adjust the temperature of your primary office space in the Winter Months? (Check all that Apply)

- ☐ Electronic Space Heater
- ☐ Electronic Personal Fan
- ☐ Non-Electronic Temperature Control such as Blankets or Opening the Windows
- ☐ None
- ☐ Other

Do you feel that the air quality in your primary office space is adequate?

- ○ Adequate
- ○ Somewhat Adequate
- ○ Neutral
- ○ Somewhat Inadequate
- ○ Not Adequate

Do you use any of the following to adjust the air quality in your primary office space? Check all that apply.

- ☐ Personal Air Filter
- ☐ Dehumidifier
- ☐ Humidifier
- ☐ None
- ☐ Other

Office Space Computing Usage

Which if any of the following computing device(s) do you typically utilize in your primary office space? Please check all that apply.

- ☐ Desktop with Single Monitor
- ☐ Desktop with Multiple Monitors
- ☐ Laptop without Supplementary Monitor
- ☐ Laptop with Supplementary Monitor
- ☐ Tablet
- ☐ Smart Phone
- ☐ Printer
- ☐ Scanner / Fax Machine / Copy Machine
- ☐ E-Reader
- ☐ Other

Other than your primary office computer, do you charge any personal electronic devices in your primary office space?

- ○ Yes
- ○ No

Do you keep your personal electronic device plugged in continuously or do you only charge the device when needed?

- ○ Plugged in Continuously
- ○ Only Plugged in when Devices Need to be Charged

Does your primary office space have a printer that is specifically for your individual usage (or use by only you and your office mates in an enclosed shared office space)?

- ○ Yes
- ○ No

Do you use other areas with computing capabilities outside of your individual workspace such as a dedicated printer release station for your department or a faculty/staff computer lab?

- Yes
- No

Thin Client Computers

Thin Client Computers are limited functionality machines that are currently utilized at some print release stations around IU's campus. These machines have Internet, word processing, Adobe PDF, and printing capabilities but will not run analysis,visualization, or other memory intensive programs. Additionally, these options use less energy than a traditional desktop workstation.

How would feel about replacing your traditional desktop workstation with the following more energy efficient computing-based technologies?

	Strongly Support	Somewhat Support	Neutral	Somewhat Oppose	Strongly Oppose	Would Like More Information	Do not Currently Use a Traditional Desktop Workstation
Thin Client Computer	O	O	O	O	O	O	O
Tablet Computer with additional Keyboard and Monitor	O	O	O	O	O	O	O
Laptop Computer instead of Desktop Computer	O	O	O	O	O	O	O

Personal Electronic Devices

What additional plug-in personal electronic devices have you brought into your workspace? Please check all that apply.

- ☐ Refrigerator (any size)
- ☐ Coffee Maker
- ☐ Toaster / Toaster Oven
- ☐ Microwave
- ☐ Teapot
- ☐ Desk Light
- ☐ Pencil Sharpener
- ☐ Clock
- ☐ Radio
- ☐ Music Playing Device (iPod Docking Station, CD Player, etc.)
- ☐ Other

Does your building have any policies indicating what devices you are allowed to bring into your workspace?

- Yes
- No
- Do Not Know

Please Identify which of the following areas are covered by the building policy. Please Check All that Apply.

- [ ] Personal Computers
- [ ] Personal Printer / Fax / Scanner
- [ ] Personal Microwaves
- [ ] Personal Coffee / Tea Makers
- [ ] Personal Temperature Control Devices (ex space heaters and fans)
- [ ] Supplementary Lighting (ex desk lamps)
- [ ] Do Not Know
- [ ] Other

Please Identify which of the following programs you use on a regular basis. Please Check All that Apply.

- [ ] Office Word / Office PowerPoint / Office Project (or equivalents)
- [ ] Office Excel (or equivalent)
- [ ] Office Visio (or equivalent)
- [ ] SAS / SPSS / State / R / MatLab / GIS(or equivalent statistics analysis program)
- [ ] @ Risk (or equivalent)
- [ ] Kuali (or equivalent)
- [ ] AIM / MMS (or equivalent)
- [ ] Cboard (or equivalent)
- [ ] PeopleSoft
- [ ] TIME
- [ ] Graphics Visualization Programs
- [ ] Music Compositional Programs
- [ ] Adobe Design Products
- [ ] Other Specialty Design or Analysis Program: Please Identify

Final Question

Thank you for completing our survey. Please provide any feedback or additional information in the block below.

Appendix B: Student Responses to Survey

1. IRB Survey # 1404707661

INDIANA UNIVERSITY STUDY INFORMATION SHEET FOR
Spring 2014 Energy and Computer Usage Survey

You are invited to participate in a research study of energy and computational use on the Indiana University-Bloomington campus. You were selected as a possible subject because you are a current student, faculty, or staff member on the Indiana University-Bloomington Campus. We ask that you read this form and if you do not feel comfortable with the goals, privacy notice, or any other aspect of the survey please close your web-browser and do not participate.

The study is being conducted by Dr. Diane Henshel of Indiana University (IU) School of Public and Environmental Affairs. The project is a student-led capstone course working with the Office of Sustainability and IU Physical Plant. As such, the project is unfunded student research.

SURVEY PURPOSE
The purpose of this survey is to measure how students, faculty, and staff members use electricity and the computational resources on the IU-Bloomington campus.

PROCEDURES FOR THE STUDY:
If you agree to complete our survey, you will continue with this electronic form and answer a series of questions about your interactions with the electrical and computational resources at IUB. Your responses will be used to validate physical observations that have been made on campus as well as provide a view of how the general population uses the resources available. Ultimately, your responses will help us guide future determine how to efficiently reduce the financial burden of providing electrical and computational resources without lessening community access to necessary resources.

CONFIDENTIALITY
This survey instrument is not collecting any personal identification information that you do not provide explicitly. Efforts will be made to keep any personal information provided confidential. We cannot guarantee absolute confidentiality. Your personal information may be disclosed if required by law. Your identity will be held in confidence in reports in which the study may be published and databases in which results may be stored. No unique identifying information will be collected during the interview. Your name and contact information will not be recorded. The only information that will be kept temporarily is your email address, if you provide such information, in order to contact you in the event you win one of our participation prizes.

Organizations that may inspect and/or copy our survey answers for quality assurance and data analysis include groups such as the study investigator, her research associates, and the Indiana University Institutional Review Board or its designees.

PAYMENT

Students, if you chose to provide your contact information via an @indiana.edu email address, you will be entered to win one of four prizes; one $50 gift card to Scholars Inn or one of three $25 gift cards to Scholars Inn. Eligibility is not based on any of your answers nor is it based on your successful completion of each question presented to you in this survey. Students who skip questions will still be eligible to win a prize. Faculty and Staff members will not be financially incentivized for their participation.

CONTACTS FOR QUESTIONS OR PROBLEMS

For questions about the study, contact Dr. Diane Henshel at (812) 855-4556.

For questions about your rights as a research participant or to discuss problems, complaints or concerns about a research study, or to obtain information, or offer input, contact the IU Human Subjects Office at (317) 278-3458 or (812) 856-4242.

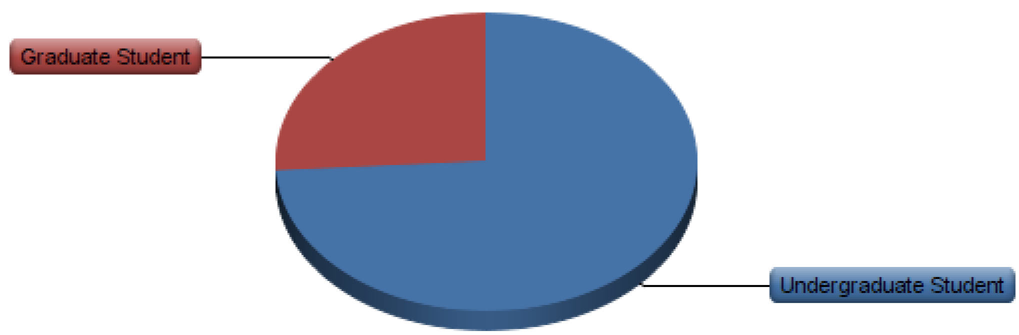
VOLUNTARY NATURE OF STUDY

Taking part in this survey is voluntary. You may choose not to take part, may leave the survey at any time, or may choose to leave any individual question blank for any reason. Leaving the survey or not completing each question will not result in any penalty or loss of benefits to which you are entitled. Your decision whether or not to participate in this survey will not affect your current or future relations with IU.

#	Answer		Response	%
1	I Agree to take this Survey		500	100%
2	I Do Not Agree to take this Survey		0	0%
	Total		500	100%

Statistic	Value
Min Value	1
Max Value	1
Mean	1.00
Variance	0.00
Standard Deviation	0.00
Total Responses	500

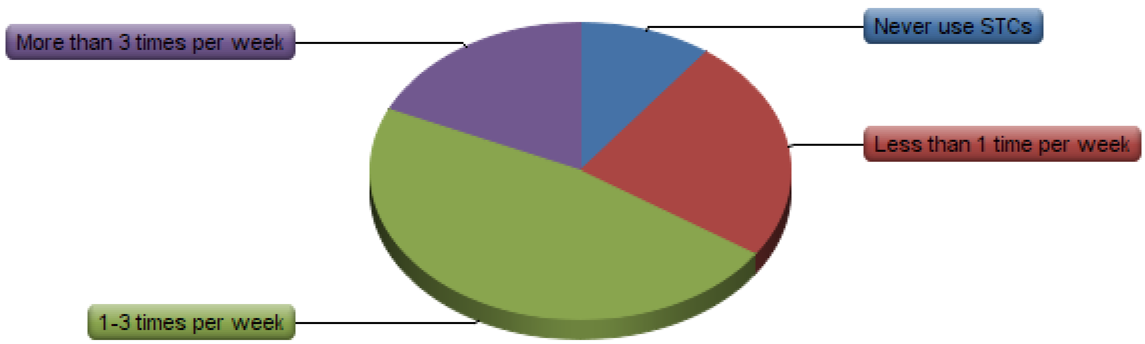
2. Which of the following most accurately describes your role on IU Bloomington's Campus?



#	Answer		Response	%
1	Undergraduate Student		370	74%
2	Graduate Student		130	26%
3	Faculty Member		0	0%
4	Staff Member		0	0%
	Total		500	100%

Statistic	Value
Min Value	1
Max Value	2
Mean	1.26
Variance	0.19
Standard Deviation	0.44
Total Responses	500

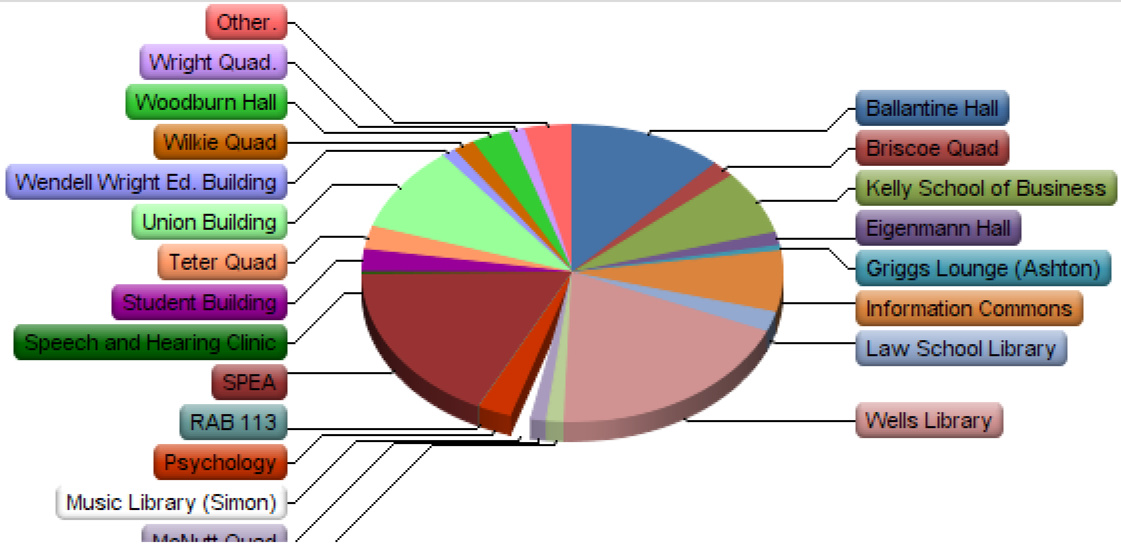
3. How often do you use STCs (Student Technology Centers)?



#	Answer		Response	%
1	✓ Never use STCs		51	10%
2	✓ Less than 1 time per week		121	24%
3	✓ 1-3 times per week		236	47%
4	✓ More than 3 times per week		91	18%
	Total		499	100%

Statistic	Value
Min Value	1
Max Value	4
Mean	2.74
Variance	0.77
Standard Deviation	0.87
Total Responses	499

4. Which buildings do you use the STCs? Please Check All That Apply:



#	Answer		Response	%
1	Ballantine Hall		158	35%
2	Briscoe Quad		24	5%
3	Kelly School of Business		93	21%
4	Eigenmann Hall		19	4%
5	Griggs Lounge (Ashton)		8	2%
6	Information Commons		88	20%
7	Law School Library		29	6%
8	Wells Library		255	57%
9	Lindley Hall		18	4%
10	McNutt Quad		16	4%
11	Music Library (Simon)		22	5%
12	Psychology		33	7%
13	RAB 113		0	0%
14	SPEA		234	52%
15	Speech and Hearing Clinic		3	1%
16	Student Building		32	7%
17	Teter Quad		34	8%
18	Union Building		125	28%
19	Wendell Wright Ed. Building		14	3%
20	Wilkie Quad		22	5%
21	Woodburn Hall		39	9%
22	Wright Quad.		16	4%

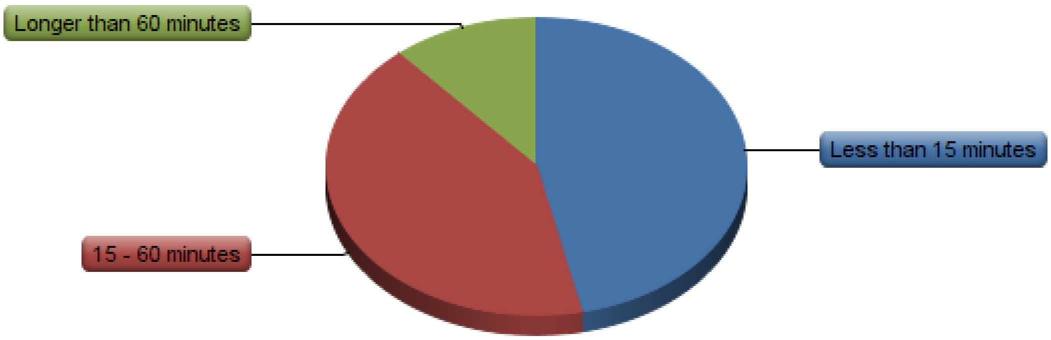
23	Other.		50	11%

Other.
Kelley School of Business
SPH
Optometry Library
Collins
Wiley Hall
SPEA Graduate Student Lounge
jordan hall
Journalism School
SPH, Fine Arts
Fine art building. IMU
Optometry Library
Chemistry
HPER
University East Apartments
Art Library
SPH Library, Tulip Tree Lab
Swain West
Swain
Hope Schhol of Fine Art, Neal Marshall Black Cultural Center and SPH
Cedar-Union Street
Chemistry
Swain
Geology Library
Jordan Hall
Forest
academic center
Geology Bldg
Jordan Hall
Fine arts
Foster
HPER
Geology
Swain
Public Health
Jordan Hall
sph
Swain
Chemistry
Collins LLC Smith Lab
Forest
Chemistry
Jordan Hall
Tulip Tree
Jordan Library
Chemistry
Chemistry Building
Shuel Academic Center

Collins
Jordan Hall Library

Statistic	Value
Min Value	1
Max Value	23
Total Responses	449

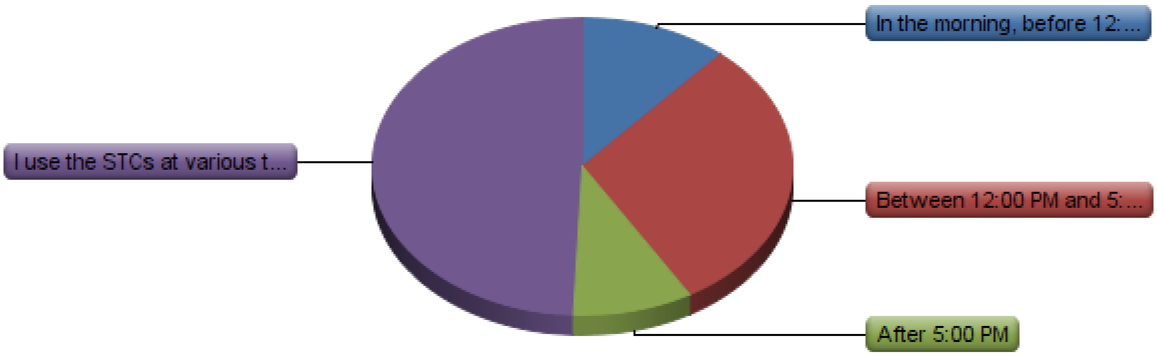
5. When you do use STCs, for how long do you use them?



#	Answer		Response	%
1	✓ Less than 15 minutes		209	47%
2	✓ 15 - 60 minutes		189	42%
3	✓ Longer than 60 minutes		51	11%
	Total		449	100%

Statistic	Value
Min Value	1
Max Value	3
Mean	1.65
Variance	0.46
Standard Deviation	0.68
Total Responses	449

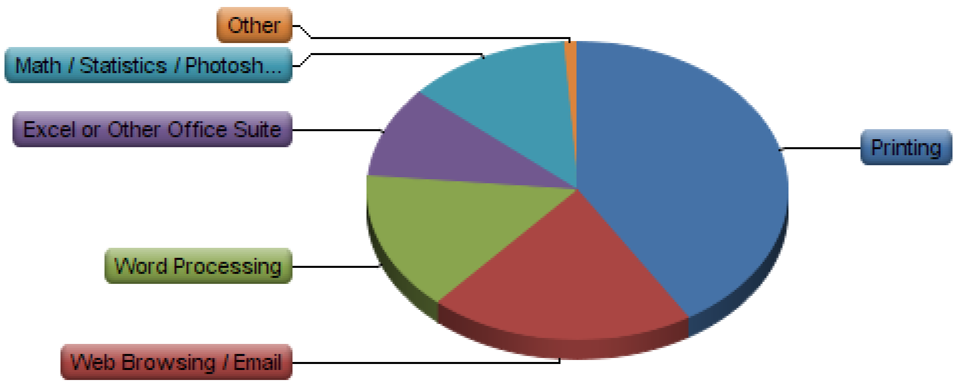
6. What time of day do you most often use the STCs?



#	Answer		Response	%
1	✓ In the morning, before 12:00 PM		51	11%
2	✓ Between 12:00 PM and 5:00 PM		135	30%
3	✓ After 5:00 PM		41	9%
4	✓ I use the STCs at various times		221	49%
	Total		448	100%

Statistic	Value
Min Value	1
Max Value	4
Mean	2.96
Variance	1.25
Standard Deviation	1.12
Total Responses	448

7. What are your uses of the STCs? Please Select all that Apply.



#	Answer		Response	%
1	Printing		442	98%
2	Web Browsing / Email		217	48%
3	Word Processing		161	36%
4	Excel or Other Office Suite		106	24%
5	Math / Statistics / Photoshop or other Specialized Software		134	30%
6	Other		12	3%

Other
PDF reading
informatics developmental tools
FTP, Notepad++
quiet place to study
smartphysics
group work
scanner
Almost everything, almost never use my own computer
Scanner
ArcGIS
Adobe PDF viewer

Statistic	Value

Min Value	1
Max Value	6
Total Responses	449

8. Do you need access to the STCs for a program that you cannot otherwise access?

#	Answer		Response	%
1	Yes. Please Identify the Program		111	25%
2	No		336	75%
	Total		447	100%

Yes. Please Identify the Program
Microsoft Office 2013
SPSS, Excel
ArcGIS
SAS, Excel, Acrobat
SAS, MatLab, Mathematica
ArcGIS
ArcGIS
Promodel, excel on a PC with all of the add ins
SAS
Arc GIS
Latest Browser
ArcGIS
win sep
Printing
photoshop
Excel 2013
Pajek, NodeXL
Final Cut, Reason
multiple programs
printing
SQL Developer
Adobe Indesign and Illustrator
remote sensing program
STATA
photocopier
stata
SPSS, Photoshop
adobe indesign
GIS
Adobe Acrobat

GIS
Adobe CS6 for scanning documents
ArcGIS
SPSS
SAS
SAS, STATA
ArcGIS
Excel 2013
SAS, SigmaPlot, Adobe
GIS
SAS-- It works poorly on IU Anyware
ArcGIS
ArcGIS and ESRI demographic data and SAS
Final Cut Video Editor
Stata
Scanning, Printing
SAS, Stata
SPSS
SAS
Chemistry
Stata
SAS
ArcGIS
Stata
SPSS
Microsoft Access/Excel 2013
novanet
Adobe Photoshop
Adobe
Access
printers
printer, adobe plug ins
Scanning equipment
Printing
Notepad ++
Jstor
Microsoft Office, for my computers class I need to have the most recent version which is not available on my Mac
GIS, STATA
Access
stata
Excel
Microsoft 2013

to print
iu anywhere
SAS
Printing
For using SAS without IUanyware
Microsoft Office (Access, Project, etc.)
NovaNet
ArcGIS
Printing
PowerPoint
Adobe for scanning
the scanner and its software
MATLAB
SAS 9.3
SPSS
ArcGIS
access
GIS, WinSLAMM
Ps
Variations, in the Music library
Statistics
QLab
SAS, STATA, SPSS, Microsoft Project
SAS
SPSS
Adobe and Scanning
iBooks Author
WinSCP
excel
digital performance, sibekius, finake 2012
Chem bio draw
Photoshop and Python
Chem Draw
SPSS, Adobe Pro with scanners
Word
stats
SPSS

Statistic	Value
Min Value	1
Max Value	2
Mean	1.75
Variance	0.19

Standard Deviation	0.43
Total Responses	447

9. Do you know about IU's Wireless Printer-Finder program that allows you to send documents from your laptop or mobile device to the IU print release stations directly?				
#	Answer		Response	%
1	Yes, and I use it as a method of printing.		56	11%
2	Yes, but I do not use it.		210	42%
3	I am not familiar with the program.		234	47%
	Total		500	100%

Statistic	Value
Min Value	1
Max Value	3
Mean	2.36
Variance	0.45
Standard Deviation	0.67
Total Responses	500

10. If you know about the wireless printing program, but do not use it, why not?				
#	Answer		Response	%
1	Incompatible with my computer		28	13%
2	Printing service is unreliable / technical issues		82	39%
3	I prefer the convenience of the STC computers		59	28%
4	I do not use IU-owned printers		5	2%
5	Other		36	17%
	Total		210	100%

Other
I cannot get it to work
I have never taken the time/don't know how to set up the program.
I would love to use it, but on Macs, it requires that the shortname on the user account is the same as my IU ID, which is a difficult and timeconsuming process unless it's a new computer.
i have no idea how to use it
I think it brings about more confusion than help, so I would rather just login to an STC
haven't put forth effort to set it up
too lazy to set up
compilcated installation process makes STC computers easier
Need someone to help me set it up!!
I don't bring my computer to campus
I don't want to carry my laptop to school to prin
Installed it, but couldn't figure out how to make it work
Dont own laptop.
Don't own a laptop
takes more time
I don't know where to download the wireless printing program.
Does not work with SPEA printers
I will just haven't yet
I can't get it to work
I never got it to work on my computer, though I doubt it was actually incompatible with my computer
Too lazy to figure it out
It is annoying to need a different account on a mac computer. It doesnt save time with this need to switch users
Cannot figure it out
I haven't set up the system
Just discovered it
I can never get it to work
I hate to say that the service itself is unreliable or has a technical issue, it could be that I don't know just how to use it efficiently. The times that I have tried, namely at Woodburn Hall, have been frustrating and unsuccessful.

access to office printer
I have never been able to get it to work.
I don't know how to use it
I can't get it to work on my computer even though it should
Not quite sure how to use it
It does not ever connect to the printers
it fucking sucks
I do not know how to set it up
I would love to use this service, but I don't know how to do it or where to go to access it.

Statistic	Value
Min Value	1
Max Value	5
Mean	2.71
Variance	1.56
Standard Deviation	1.25
Total Responses	210

11. As a user of the wireless printing program, please identify the number one concern you have with using the program.

#	Answer		Response	%
1	Printing service is unreliable / technical issues		20	36%
2	Printing service is too slow		6	11%
3	Printing service does not connect to the printer that is most convenient for me		8	14%
4	Printing service program is difficult to use		2	4%
5	I do not have a concern with the program		17	30%
6	Other		3	5%
	Total		56	100%

Other
Printing was very difficult to set up on my laptop
Having to reconnect each time I want to use it
I had a huge amount of technical issues to work through in order to set up the wireless printing program, including contacting IT for help.

Statistic	Value
Min Value	1
Max Value	6
Mean	2.98
Variance	3.33
Standard Deviation	1.82
Total Responses	56

12. Are you familiar with the Thin Client Computers?				
#	Answer		Response	%
1	Very Familiar		45	9%
2	Somewhat Familiar		143	29%
3	Not Familiar		308	62%
	Total		496	100%

Statistic	Value
Min Value	1
Max Value	3
Mean	2.53
Variance	0.43
Standard Deviation	0.66
Total Responses	496

13. Would you consider using a thin client machine instead of a full functionality computer in the STCs?

#	Answer		Response	%
1	Yes		96	51%
2	No		93	49%
	Total		189	100%

Statistic	Value
Min Value	1
Max Value	2
Mean	1.49
Variance	0.25
Standard Deviation	0.50
Total Responses	189

14. Why would you reject using a Thin Client Computer in the STCs? Please Identify your Number 1 Concern.

#	Answer		Response	%
1	I need access to analysis and visualization programs not available on the Thin Client Computers		19	20%
2	The Thin Client Computers are too slow to run the programs they have installed		54	57%
3	I do not utilize the STCs		3	3%
4	Other		19	20%
	Total		95	100%

Other
They are confusing!
The first two answers
they annoy me to no end
Does not print double sided papers
User interface is hard to navigate
I cannot save my work on the Thin Clients
It won't print on both sides properly
They are weird
They are confusing to use.
dont print double sided and need bigger programs
I like to print on both sides of the paper.
They messed up last time I used them and would not print my documents
I do not like the "Cloud" style of working. A locally run program works infinitly better in my opinion
More familiar with STC
I just hate these things you have to stand up and they never work right. Honestly one of the worst investments IU has ever made into technology.
they don't print
Like the STCs better
Usually use own computer

Statistic	Value
Min Value	1
Max Value	4
Mean	2.23
Variance	0.99
Standard Deviation	0.99

Total Responses	95

15. Do you own a laptop (or tablet used as a laptop)?

#	Answer		Response	%
1	Yes, and I bring my laptop/tablet to school most days.		351	70%
2	Yes, but I rarely/never bring my laptop/tablet to school.		139	28%
3	No, I own a personal computer kept at my residence.		7	1%
4	Do not own a personal computer.		1	0%
	Total		498	100%

Statistic	Value
Min Value	1
Max Value	4
Mean	1.31
Variance	0.26
Standard Deviation	0.51
Total Responses	498

16. If you bring a laptop to campus, would charging and / or docking stations that provide charging and full sized keyboard with mouse in the STCs be useful to you?

#	Answer		Response	%
1	Yes		356	72%
2	No		141	28%
	Total		497	100%

Statistic	Value
Min Value	1
Max Value	2
Mean	1.28
Variance	0.20
Standard Deviation	0.45
Total Responses	497

17. How many personal electronic devices (cell phone, laptop, tablet, e-reader, etc.) do you bring to campus each day? Please provide an integer greater than or equal to 0.

2	2	2	2
2	2	1	
2	2	2	2
1		2	2
2	2	2	2
	2	2	2
1	2	2	
3	2	1	1
2	2	2	2
2	1	2	2
2	2	3	2
1	1	2	2
2	2	2	2
	2	2	3
2	2	2	3
2	2	2	2
1	2	1	2
2	2	1	2
2	1	2	2
2	2	2	1
1	1	1	2
3	2	2	2
2	2	1	1
2	2	2	2
2	2	2	2
2	1	5	2
2	1	1	
2	1	2	1
2	3	3	2
2	3	2	3
2	1	2	2
3	2	2	2
2	1	2	2
	2	2	1
3	4	2	1
2	2	2	3
2	1	2	2
2	1	2	2
3	2	2	2
2	3	2	2
2		2	2

2	1	2	3
2	3	2	3
2	2	2	0
2	2	2	2
2	2	2	2
3	2	2	2
2	3	2	1
2	2	2	2
2	3	2	2
1	3	2	1
2	2	1	2
2	2	2	1
	2	1	2
1	2	2	3
2	2	2	2
1	3	2	3
2	2	2	1
3	2	2	2
	2	1	3
1	3	3	1
2	2	1	2
2	1	2	2
2	2	2	2
2	2	2	2
2	2	2	3
2	2	2	2
2		2	2
2	2	2	1
2	2	2	3
	2	3	3
3		3	2
1	1	2	1
2	2	2	3
2	2	2	2
3	2	3	2
2	2	2	1
2	1	3	2
1	1	2	2
2	1	2	2
1	1	3	2
3	2	2	2
2	2	2	2
2	2	2	2

2	2	2	1
2	2	2	2
2	2	3	2
2	2	2	2
2	2	2	2
2	2	3	4
3	2	2	2
2	1	1	2
2	3	2	2
1	2	3	1
2	1	2	3
1	2		2
2	2	2	1
1	3	2	2
2	2	3	2
2	3	1	2
2	1	2	2
2	2	2	2
2	2	1	2
2		3	2
2	2		2
2	1	2	2
2	1	2	2
2	2	2	3
3	3		2
	1	3	1
2	2	3	2
2	1	2	3
2	1	2	3
1	2	1	2
2	2	2	2
	3	3	4
1	3	2	2
2	2	3	2
3	3	3	2
2	3	1	2
2	2	2	2
1	2	2	3
2	3	2	2
3	2	1	2
2	2	2	

Statistic	Value
Total Responses	481

18. How many of your personal electronic devices identified in the previous question connect to the IU Secure Network or the AT&T Campus WiFi when you bring them on campus? Please provide an integer greater than or equal to 0.

2	2	3	2
2	2		2
2	2	1	2
1	2	0	2
2		2	
2	2	1	2
1	2	1	2
2	2	2	2
2	2	2	1
1	2	1	2
2	1	1	1
1	2	2	1
1	3	2	2
2	2	2	2
2	2	2	2
2	2	2	2
1	2	1	2
2	2	2	3
1	2	2	2
2	2	1	2
1	2	2	2
3	1	2	1
1	1	1	1
2	2	1	2
1	2	1	2
2	2	1	1
2	1	2	2
1	1	2	2
2	1	1	2
2	1	2	
2	2	2	1
2	1	2	1
2	2	2	3
3	1	1	1
3	2	2	0
2	4	2	2
2	2	2	1
1	1	2	1
3	1	4	2
2	2	2	2

1	1	1	3
2	1	2	2
2	1	2	2
2	1	2	2
2	0	1	2
2	3	2	3
2	2	2	
2	2	2	2
2	2	2	1
3	2	3	2
2	3	2	0
2	2	2	1
2	2	2	2
1	3	2	1
2	2	1	1
2	2	2	1
2	2	0	2
1	2	1	2
2	2	2	2
1	3	2	2
3	2	2	1
2	2	2	2
2	2	0	3
1	3	2	1
1	2	1	2
2	1	2	2
1	2	2	2
2	3	2	2
1	2	2	1
2	2	2	1
1	1	2	2
2	2	2	0
1	1	2	2
2	2	2	1
1		3	1
1	1	2	1
2	2	2	2
2	2	2	2
3	2	2	2
2	2	2	1
2	0	3	2
2	1	2	2
2	2	2	2

2	1	2	2
2	2	2	1
2	2	2	2
1	1	2	2
1	2	3	2
2	2	2	1
2	2	2	4
2	2	3	2
1	2	2	2
1	2	2	2
2	2	2	1
1	2	2	3
1	2	2	2
0	1	2	1
1	2	2	2
	2	1	1
2	3	2	2
0	2	1	2
0	2	2	2
2	1	2	3
2	1	1	2
2	2	2	2
2		1	2
2	1	1	0
1	1	2	3
2		1	1
2	2		1
1	3	1	2
2	1	1	3
	2	1	2
2	0	2	2
2	1	0	1
1	1	2	3
1	2	2	2
2	2	2	2
2	3	2	2
1	2	3	1
2	3	1	2
2	1	2	3
2	1	2	2
2	2	2	2
0	3	1	

Statistic	Value
Total Responses	489

19. Do you charge your personal electronic devices in an on-campus building? (academic buildings, library, Union, Dormitory building, SRSC, or other)				
#	Answer		Response	%
1	Yes		378	76%
2	No		117	24%
	Total		495	100%

Statistic	Value
Min Value	1
Max Value	2
Mean	1.24
Variance	0.18
Standard Deviation	0.43
Total Responses	495

20. Approximately how many hours per week do you charge your personal electronic devices in an on-campus building? (Example: laptop about 10 hours per week + phone about 5 hours per week + e-reader about 5 hours per week = 20 device charging hours per week.) Please provide an integer greater than or equal to 0

5	2	2	
4	2	2	15
18	40	3	5
1			1
10	10		5
5		1	15
5	3	10	20
4	10	30	
	20	5	
5	5	1	1
15	1	100	20
	1		2
1			15
	2	6	
8		3	4
15	10	30	145
	2	5	
10	4	5	5
6	0	1	6
12			
4	1	0	5
15	30	50	3
50		2	5
6			30
3			1
10	15		
4	1	0	1
10		4	20
2		5	
2	3	1	3
10	5		1
20	20	2	2
5	130	5	
1	5		
40	1	5	2
12	5		15
20	15	2	5
3		3	70
25			

	2		4
	2		40
3	10	1	
12	4	3	1
10			7
		5	10
6	8	140	80
1	15	10	20
1	1	25	5
4	15		23
5	5	5	
2		5	20
4	5	20	
20		30	
10	2		
10	20	4	
70	10		15
	40	30	
1	15		10
4	2		1
4	7		
		20	2
5	5		0
5	4	5	16
20		15	1
15	5	20	4
2	5		
	12	5	2
10			6
1		5	5
0	2	6	
5	130	3	
5	15	6	12
15	1	35	1
20	5	10	3
5	4	2	
	2	4	5
	2	2	4
3		4	
40	5	40	
2		8	5
	5	1	5
21		3	6

		125	1
	40	10	10
1	5	10	1
25	6		72
9	1	30	2
10			4
14	10	60	5
10	2	3	100
12	15	45	15
10	5		40
20	5		2
20	1		
	1	10	65
25	15	0	1
	2	35	
3	15	6	2
4	1	2	
10	20	10	10
1	1	40	135
1	1	90	5
15		14	2
	24	15	7
			40
	15	40	70
5	5	2	50
5			5
	5	20	16
40	30	2	
	1	10	1
2		14	1
	15	25	1
40		1	
		15	
20		1	1
10			40
100		5	20
5	20	1	
5	0	18	4
25	4		25
4	5	72	20
	16		3
42	10	1	50
20		20	

Statistic	Value
Total Responses	373

21. Do you live in On-Campus or Off-Campus Housing?

#	Answer		Response	%
1	On-Campus		118	24%
2	Off-Campus		379	76%
	Total		497	100%

Statistic	Value
Min Value	1
Max Value	2
Mean	1.76
Variance	0.18
Standard Deviation	0.43
Total Responses	497

22. What is your current Degree Path?
Text Response
doctorate
B.A. Criminal Justice, B.A. Psychology
JD Law
JD
J.D.
Business
Business
Kelly School of Business
Juris Doctorate
Finance
Exploratory Undergraduate student
Spanish, CMCL
Kelley- Marketing
Optometry
Masters
Masters
BA
Masters of Environmental Sciences
MPA/MA Latin American Studies
Mpa
MPA
MPA/MSES
JD/MPA
J.D.
MPA/MSES
MSES
MPA
MPA
MSES/MPA
Bachelor of science in business
?
Master of Public Affairs
MPA
Nursing
MPA
Masters in computer science
computer science
MPA in Energy Policy
JD
MS Environmental Science
MPA 2014

JD
MPA
MPA/MSES
Master of Public Affairs
PhD
Nursing
Social Work and Spanish
Human Biology
B.S.
BS informatics
JD
MSES/MPA
MPA/MSES
MPA
MPA
History
MPA/MSES
Undergrad. BA in Journalism
MSES
BSOF Bachelor of Science in Ballet with outside field in Business
Management
psychology
Entrepreneurship
MSIS
Marketing
BS SPEA Policy Analysis May 2014
PhD
Business Management
PhD
Sport Marketing & Management
Spea management
english
Bachelor's Degree in Public Financial Management
B.S. Recording Arts
elementary education
Biology
Informatics
Chemistry BA & Studio Art BA
Masters
doctorate
MSES
Psychology bachelor of arts

Biology
Professional School
Fine Arts- Studio Art
Operations and Technology Management
English
Business
env. mngt.
SPEA
neuroscience
JD
Business- Finance and Supply Chain Management
Exercise Science/Pre-Physical Therapy
Biology
Optometry
chemistry
Individualized Major Program
psychology
PhD
Undergrad
PhD
BS Public Health
Finance and International Business
BS
BA English Literature
Psychology BS
Secondary education
BSPA
General Studies
Psychology BA
dietetics
Master
Marketing
Bachelor
BS, Applied Health Science, Dietetics
MPA in Nonprofit Management
Telecommunications
Informatics
JD/MPA
Master's Degree
Human Biology BA
Human Biology

MPA
mses
Psychology
Biology
Masters in Environmental Science and Public Affairs
bachelor of arts
graduate
Master's
Master of Public Affairs
Bachelor of Arts and Sciences
MPA
MPA
Graduate
PhD
Dual MPA/MSES
Business
senior
Master of Public Affairs
Tourism, Hospitality, and Event Management
Nursing
MPA
MPA
Dietetics
Speech and Hearing Sciences
MSES
Finance
MPA
Music Performance BM
MSES and MPA
Masters of Public Affairs (MPA)
English Literature
MPA
J.D.
Masters in Environmental Science
MPA
mpa
Masters
Nonprofit Management
Master of Public Affairs
Medicine
BS Health Management and Policy
Health administration
Law & Pubic Policy

BSPH
SPEA Management
Bachelors
Arts Management
Health Admin
Public Management
Bpa
Arts Management through SPEA
Business Management
Management
Managment
MPA
SPEA-Management
BSPA; environmental affairs
SPEA MPA
Health Administration
Health Administration
Health Care Policy and Mangement
health administration
Management
Public Management
BPA
BSPA, Public Financial Management/Policy Analysis
Environmental management
SPEA - Policy Analysis BSPA
Bachelor of Science in Arts Management December 2014
Environmental Management
Bachelor's in legal studies and environmental management.
Health Administration
management
BSES
art management
Policy analysis
Graduate MPA Natural Resource Mgt Env'tl Policy
Public Affairs: Environmental Management
Environmental Management
Business Management
arts management
Health Administration
SPEA
SPEA Management

Healthcare Management and Policy
SPEA-Law and Public Policy
Bachelors of Public Affairs, Health Administration
Policy Analysis
MPA
Management
BSPA
Spea
Public Health Policy and Administration
Policy Analysis
Bachelor of Science in Healthcare Management and Policy
Management
Nonprofit management
Bachelor of Science
BSPA
Public Affairs
Nonprofit Management
Policy Analysis
Healthcare management and policy
Public management
Public finance and public management
BSPA
Nonprofit Management
management
Spea mgmt
Public Financial Management
Health Administration
Health Administration
BSPA
BS Environmental Science
Health Administration
Healthcare Management and Policy
SPEA Management
Public Mgmt
Media Management
Arts Management
Nonprofit Management
BSAM
Masters of Public Affairs
Healthcare Administration
bspa
Bachlors of Science in Arts Management

BSPA - Management
arts management
Legal Studies
Bachelors in Health Care Management and Policy
Policy Analysis
Healthcare Management and Policy
MPA
BSPA - Environmental Management
Health Administration
Bachelors of Science in Arts Management
Bachelor of Science - Public Affairs
Accelerated Master's MPA
Management
SPEA Management
Arts Management Honors
PhD
MPA
MPA/MSES dual degree through SPEA
Human Resource Management
Legal Studies
Management
SPEA
Arts Management
School of Public and Environmental Affairs--Environmental Management
nonprofit management
Bachelor of Science Environmental Science
Public and Nonprofit Management - Public Track
Public Financial Management
SPEA Policy Analysis BSPA
Arts Management
Management
Arts Management
Public Financial Management
health administration
BS in Public Affairs
Human Resources through SPEA
Health Administration
undergrad
SPEA Management
business
SPEA BSPA
Arts Management, SPEA
BSPA

MPA, MSES
Arts Management
Nonprofit Management
SPEA Bachelor of Science
Nonprofit Management
Bacherlors
Environmental Management
Health Administration
MPA
Health Administration
bsph
MSES
SPEA Non Profit Management
Environmental Management
Management
Management Major with a Business Certificate
Environmental Management BSPA
B.S. Public Affairs (Environmental Management)
exercise science
Management degree through SPEA
Environmental Management
Environmental Management
Undergraduate
Political Science Bachelor of Arts
BSPA in Policy Analysis
Ph D
Graduate School
Arts Management
Bachelor's
Informatics
Microbiology B.S.
medical degree
J.D.
Bachelors
JD
J.D.
J.D.
JD/MPA
Computer Science BS
Social Work
Graphic Design
JD

JD
J.D.
Speech Pathology
Masters of Public Affairs
Marketing
M.A. Speech-Language Pathology
Juris Doctor
J.D.
Masters in Public Administration
Environmental Management
spea management
Policy Analysis
SPEA Management
bachelors
Environmental Management
SPEA BS Environmental Management
BS Environmental Science
business
Public Financial Management
Arts Management
Policy Analysis
management
BSPA Environmental Management
Bachelor of Science in Health Management and Policy
Bachelors in Healthcare Management and Policy
Healthcare Managment and Policy
SPEA Management
Public Affairs: Law and Public Policy
BPA
BSPA in Management
BA English
Environmental Management
Nonprofit Management
Public finance
spea management
SPEA
Journalism
B.S. in Healthcare Management and Policy
MSES
SPEA Public Financial Management
Nonprofit Management
Health Administration
Health Administration

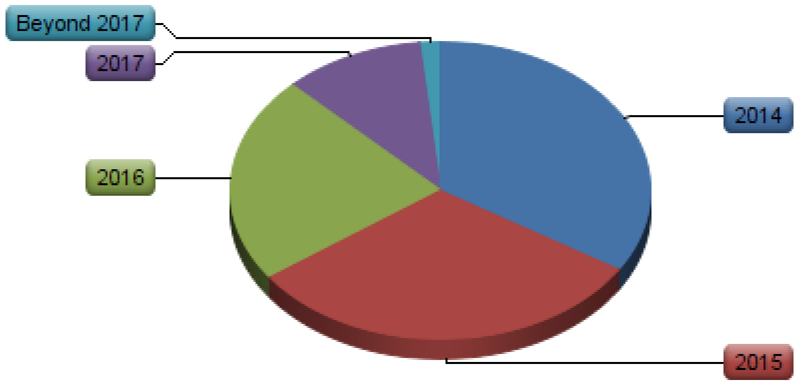
bachelors
Healthcare MAnagemant and Policy
Nonprofit Management
Undergraduate
JD/MLS
Law
BSAM
Business
Arts Management
Masters
Physics
Tourism
Chemistry BS
PhD
Anthropology
Marketing and Legal Studies
backwards ;)
Biology
Ph.D.
Informatics
MPA
Chemistry B.S.
Masters
Business
Political Science BA
sociology major
Biology / Exercise Science
apparel merchandising
MM and MSEd
Poli sci
Master of Public Affairs
Business
PhD
neuroscience bs
Undergraduate
Finance and Economic Consulting
MS
Human Biology
Secondary education
Environmental Science
Psychology BS
Biology

B.S. In Kinesiology for Physical Therapy
Tourism, Hospitality, and Event Management
Biochemistry
Biology
human biology
physics
DM composition
Biochemistry
Human Biology B.S.
Chemistry, B.A.
Chem
Biology
Biology and Spanish, premed
Chemistry BS
COMMUNITY HEALTH
Major in Psychology, minor in Sociology and Creative Writing
Biology
Biochemistry
Dietetics
2 Masters degrees
biology
Political Science
Biology
Recreational Therapy
Computer Science
BS Psychology
Exercise Science
nursing
Dietetics
BS
Chemistry BA Studio Art BA
Human Biology
Undergraduate
physics
ms computer science
B.S. Astronomy
chemistry
English and Communications Majors with a PACE Certificate
pre-med
Telecommunications
Doctorate
Animal Behavior B.S.

Germanistik
Exercise Science
Biology
Biology BS
that's a weird question. elaborate.
Nursing
BS in Biology
Public Health
Bachelors of Arts in Geography and BSPA
B.S. Biochemistry
Exploratory. Sciences
Exercise Science
Entrepreneurship and Corporate Innovation
Community Health
Psychology
Exercise Science
PhD. French Linguistics
Dietetics
Finance
Telecommunications and Communication & Culture
nursing
human biology
Biotechnology
biochemisty
BSES
Psychology B.S.
BPA-Nonprofit Management
Biology

Statistic	Value
Total Responses	491

23. What is your anticipated year of graduation from your current degree path?



#	Answer		Response	%
1	2014		169	34%
2	2015		155	31%
3	2016		112	22%
4	2017		54	11%
5	Beyond 2017		8	2%
	Total		498	100%

Statistic	Value
Min Value	1
Max Value	5
Mean	2.15
Variance	1.12
Standard Deviation	1.06
Total Responses	498

25. Thank you for completing our survey. Please provide any feedback or additional information in the block below.

Text Response
I liked how simple this survey was and would be more than happy to respond to future surveys. Mostly I was happy that you didn't have any spectrum questions that ranged from "Most Likely" to "Least Likely" because those require a ridiculous amount of brain power from me.
It was great!
Although it seems that the majority of students I know use Mac laptops, it strikes me that the computer centers (docking stations, wireless printing, etc.) are not particularly Mac-friendly, relatively speaking.
N/A
Spelled Kelley wrong on list of STC computer labs
I think charging stations would be an awesome addition to the libraries and various other student tech centers; also if someone could somehow get word out about the wireless laptop to IU printers printing, that'd be great; I have no idea how to use it and have been here for 7 semesters.
Thin clients are a good idea, but they need more resources in order to speed things up - otherwise they are unusable unless just used to print. The thin clients by the printers in the IC at Wells could be made to be a lot lighter to improve speed.
I have said many times that having a docking station in the academic buildings where students could charge their devices, such as my laptop or iPad that I use to take notes on, would really help!!
Great survey! I would love to see charging stations or more readily available outlets for laptops.
Rock on!
YAY
Very good survey.
My email address is incorrect. It should read [retracted]
n/a
Please provide more campus charger docking stations.
The idea of having charging stations on campus for phones and computers is brilliant - please do that!!
The availability of computers and printer stations is excellent.
The clients are nice to use when your in a hurry and other things like that, but having a regular computer is my best option!
Another reason that I don't use the thin clients is because they won't print double sided.
I like that IU is thinking of updating its STC centers based on student surveys. This way it ensures that we (IU) are not wasting money and utilizing our resources to the best of our ability. I also like that we are possibly adding charging stations to the STC areas. Everyone at one time or another has had their laptop die which results in wasted time on campus. Looking forward to seeing the updates!
I really dislike the thin client computers mainly because I can't print on both sides. Not only is it a waste of paper and hurting the environment, it takes up my printing quota for no reason. Especially in the atrium where there is only thin clients offered I don't have time to wait or go somewhere else to print off of a normal computer.
Thank you!
Great survey! Format and layout was great. Perfect length. Hope my responses help!
Please work on the printer finder. Technical difficulties with it have caused me much stress, as it is incredibly unreliable.
Thank you!
Having charging stations around campus would be great! Or having chargers that you can check out for some time would also be useful. I'm always forgetting my charger at home...
School provides a really convenient and nice services.

I think it would be helpful if students could be more informed about the printing options from their personal laptops. I just discovered this and I feel that if I knew about this I would have taken advantage of it before.
IU Secure needs to be expanded. It is also no longer possible for me to connect my cell phone to that network for some reason, and multiple people I know have had the same issue with their phones.
:)
I was confused by the 'Degree Path' question-- please do not disregard the quality of my other answers by that snarky remark. if this is the answer you intended to generate, then I am an Undergraduate Anthropology major, with a Biology minor, and an EALC Certificate. If this doesn't answer the question, then I should admit that it was a bit confusing.
I am also a Visiting Lecturer who uses the computer in my (shared) office, but I do have an office computer of my own on campus.
IU Printer finder is absolutely terrible... I have a mac and i have to log in to another user and go online to access my documents in the cloud to "maybe" be lucky enough to print. Also, every campus printer takes more than 5 minutes to log in. Everything is just so slow.
The printer in SPEA Graduate Lounge is down at least twice a week which is very inconvenient
Charging stations aren't needed but having a charger for popular laptops or brands that could be checked out for a certain amount of time would be a great idea. Also didn't know I could set up my laptop to send print jobs to release stations from my laptop. I wish there was more info advertising that I would have used that all my college career.
The biggest problem with printing from a personal computer is that I can never get my computer to connect with the printers in the SPEA library (where I do most of my printing) even though it connects fine to other printers around campus.
good, relevant questions
Campus computers should be set to sleep after 30 min of inactivity, instead of being on 24/7 all over campus.
Looking forward to the results and implications!
I know that I can print from my computer, but I'd rather just go to the Union lab and just print stuff there since it's so convenient, however when the lab is full it is kinda annoying not being able to print.
I have tried to use Thin Clients before, and it was so slow and frustrating that I switched to a regular computer. I would never recommend a friend to use one.
none

Statistic	Value
Total Responses	43

Appendix C: Faculty and Staff Responses to Survey

FacultyStaff Responses_2014-04-18
Last Modified: 04/18/2014
Response Set: AprilSurvey Distribution
Filter By: Report Subgroup

1. IRB Survey # 1404707661

INDIANA UNIVERSITY STUDY INFORMATION SHEET FOR
Spring 2014 Energy and Computer Usage Survey

You are invited to participate in a research study of energy and computational use on the Indiana University-Bloomington campus. You were selected as a possible subject because you are a current student, faculty, or staff member on the Indiana University-Bloomington Campus. We ask that you read this form and if you do not feel comfortable with the goals, privacy notice, or any other aspect of the survey please close your web-browser and do not participate.

The study is being conducted by Dr. Diane Henshel of Indiana University (IU) School of Public and Environmental Affairs. The project is a student-led capstone course working with the Office of Sustainability and IU Physical Plant. As such, the project is unfunded student research.

SURVEY PURPOSE
The purpose of this survey is to measure how students, faculty, and staff members use electricity and the computational resources on the IU-Bloomington campus.

PROCEDURES FOR THE STUDY:
If you agree to complete our survey, you will continue with this electronic form and answer a series of questions about your interactions with the electrical and computational resources at IUB. Your responses will be used to validate physical observations that have been made on campus as well as provide a view of how the general population uses the resources available. Ultimately, your responses will help us guide future determine how to efficiently reduce the financial burden of providing electrical and computational resources without lessening community access to necessary resources.

CONFIDENTIALITY
This survey instrument is not collecting any personal identification information that you do not provide explicitly. Efforts will be made to keep any personal information provided confidential. We cannot guarantee absolute confidentiality. Your personal information may be disclosed if required by law. Your identity will be held in confidence in reports in which the study may be published and databases in which results may be stored. No unique identifying information will be collected during the interview. Your name and contact information will not be recorded. The only information that will be kept temporarily is your email address, if you provide such information, in order to contact you in the event you win one of our participation prizes.

Organizations that may inspect and/or copy our survey answers for quality assurance and data analysis include groups such as the study investigator, her research associates, and the Indiana University Institutional Review Board or its designees.

PAYMENT
Students, if you chose to provide your contact information via an @indiana.edu email address, you will be entered to win one of four prizes; one $50 gift card to Scholars Inn or one of three $25 gift cards to Scholars Inn. Eligibility is not based on any of your answers nor is it based on your successful completion of each question presented to you in this survey. Students who skip questions will still be eligible to win a prize. Faculty and Staff members will not be financially incentivized for their participation.

CONTACTS FOR QUESTIONS OR PROBLEMS
For questions about the study, contact Dr. Diane Henshel at (812) 855-4556.

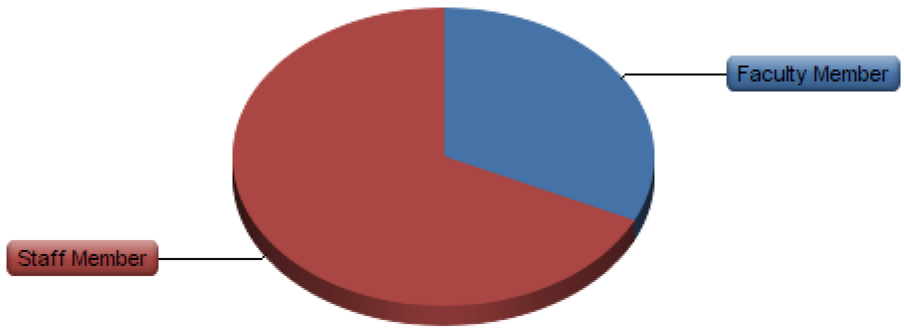
For questions about your rights as a research participant or to discuss problems, complaints or concerns about a research study, or to obtain information, or offer input, contact the IU Human Subjects Office at (317) 278-3458 or (812) 856-4242.

VOLUNTARY NATURE OF STUDY
Taking part in this survey is voluntary. You may choose not to take part, may leave the survey at any time, or may choose to leave any individual question blank for any reason. Leaving the survey or not completing each question will not result in any penalty or loss of benefits to which you are entitled. Your decision whether or not to participate in this survey will not affect your current or future relations with IU.

#	Answer		Response	%
1	I Agree to take this Survey		1,380	100%
2	I Do Not Agree to take this Survey		0	0%
	Total		1,380	100%

Statistic	Value
Min Value	1
Max Value	1
Mean	1.00
Variance	0.00
Standard Deviation	0.00
Total Responses	1,380

2. Which of the following most accurately describes your role on IU Bloomington's Campus?



#	Answer		Response	%
1	Undergraduate Student		0	0%
2	Graduate Student		0	0%
3	Faculty Member		443	32%
4	Staff Member		937	68%
	Total		1,380	100%

Statistic	Value
Min Value	3
Max Value	4
Mean	3.68
Variance	0.22
Standard Deviation	0.47
Total Responses	1,380

3. In what department or school do you serve as a faculty member or administrative staff?

IU Maurer School of Law
Geology
RPS
OVPUE
IU Press
RPS
Bursar
SPEA
School of Public Health
Maurer Law
Law School
RPS
Kelley School
kinesiology
spea
Physical Plant - Building Systems
Department of Theatre, Drama, and Contemporary Dance
Linguistics
public health
Comparative Literature
Optometry
AMST/ENGL
Libraries
History
COAS
Psychological and Brain Sciences
Kelley School of Business
Optometry
SGIS
Education
Institute for European Studies
Kelley School - Marketing Department
SPEA and Office of Vice Provost for Undergraduate Education
Kelley BEPP
Kelley School of Business
Kelley Business School
Office of Scholarly Publishing: Indiana University Press
Biology
Geological Sciences
COLL PACE
Deans Office, Kelley School of Business
U.D.
History
School of Informatics and Computing
Dean's Office, Kelley School of Business
PBS
COAS
Department of Folklore and Ethnomusicology
SPEA
PBS
Literacy, Culture, and Language Education
Libraries
ENGLISH
Theatre, Drama, and Contemporary Dance
School of Education
Business Horizons (physically located in Management Department, Kelley School of Business)
Libraries
IIDC
IIDC
Psychological and Brain Sciences
Business
Law School
student affairs
College of Arts and Sciences
Kelley
Biology
Office of the Vice Provost for Research
Kelley School of Business
Kelley
Budgetary Administration and Planning
Library
Educational Leadership and Policy Studies
School of Public Health-Bloomington, Dean's office
Veterans Support Services
biology
SoIC
Medicine
Blank

Vice Provost for Undergraduate Education
Kelley School MBA Program Office
Fine Arts
Indiana Business Research Center
Jacobs School of Music
Education
Kinsey Institute
Psychology
Physical Plant
Human Biology (COAS)
Indiana Memorial Union
university division
Libraries
IIDC
La Casa/Latino Cultural Center
mathematics
Radio-Television
athletics
Custom Publishing/IUB
Physical Plant
Kelley School of Business
Residential Programs and Services, Dining Services
College of Arts ands Sciences
Liberal Arts & Management Program
OVPUE/SoE
Kelley School of Business
Student Advocates Office; Division of Student Affairs
College of Arts & Sciences, Deans Office
Psychology
Parking Operations
Kelley School of Business
Blank
Residential Programs & Services- Facilities Dept.
Scool of Education - Graduate Studies Office
Telecommunications
IUHealth Center
Center for Innovative Teaching and Learning
OEM
Psychological & Brain Sciences
School of Informatics and Computing
Kelley MBA Program Office
Registrar

Health Center
Libraries
IURTV
Professor
Music
College
IU Press
CCCS
Office of the Registrar
Undergraduate Program, Kelley School of Business
Indiana Geological Survey
Department of Counseling and Educational Psychology in the School of Education
IU Campus Bus Service
College of Arts and Sciences
School of Public Health
Admin Staff
Education
Auxiliary Information Technology
RPS Dining Services
Institute for International Business, Kelley School of Business
School of Education
English
Health Center
School of Education
Kelley School of Business - Indiana Business Research Center
Residential Programs & Services
Psychological and brain sciences
SPEA
Athletics
Biology
No department
Center for Genomics and Bioinformatics
Optometry
Center for Geospatial Data Analysis, Indiana Geological Survey
Communication and Culture - College of Arts and Sciences
Psychological & Brain Sciences
Kelley School of Business
Optometry
Kelley School of Business - Learning Technologies and Support

Apparel Merchandising and Interior Design	Blank
Education	RPS
Division of Student Affairs (DSA) in the Student Life and Learning Office (SLL)	Libraries
SPEA Overseas Program Office	Physical Plant
IMU	Kelley
EALC	Molecular and Cellular Biochemistry
Indiana Institute on Disability and Community	Kelley Schoo, of Business- UCSO (P100)
SPEA	Psychological and Brain Sciences
Library	Biology
Education	Kelley Undergraduate Advising
SPEA	College of Arts and Sciences
RPS	PBS
Wells Library	University Division
Optometry	IIDC Early Childhood Center
COAS	RPAS
Communication and Culture	Chemistry
DEMA	The Office of Admissions
College of Arts & Sciences	Center for Evaluation & Education Policy
RPS	Kelley School of Business MBA Program
Jacobs School of Music	School of Public Health
Psychological and Brain Sciences	Residential Programs and Services
RPS	Operations and Decisions Technology
Jacobs School of Music	Indiana University Jacobs School of Music
Biology	Physical Plant
OSFA	Department of Psychological and Brain Sciences
Athletics	Maurer School of Law
Medical Sciences	Germanic Studies
Radio/TV	Biology
Folklore	none
Office of the Provost for Undergraduate Education	UITS
Radio/TV Services	Religious Studies (COAS)
IU Outdoor Adventures	AAADS
OVPUE	Physics
RPS Dining	Indiana Institute on Disability and Community (IIDC)
law	School of Informatics
School of Education	Business
Physics	SPEA--Development and Alumni Relations
Jacobs School of Music	Kelley School of Business - Development
medical sciences	BL-GEOL
applied health science	Library
IURTVS	Maurer School of Law
IMU	Center for Innovative Teaching and Learning

College of Arts and Sciences
College of Arts and Sciences
School of Public Health
Registrar's office
Recreation, Park, and Tourism Studies- SPH
College Information Technology Office
Music
OVPUE
Auxiliary Services
Building Supprt Services
Kelley Business School
DOGS
Office of the Vice Provost for REsearch
Physical Plant
Student Central
Document Delivery Services/Interlibrary Loan
Kelley Institute for International Business
Business
physical plant
Office of Enrollment Management
PHYP
Kelley School of Business
CEEP - School of Education
Kelley School of Business
CEUS
Libraries
Herman B Wells Library Acquisitions
School of Education
Registrar
Bloomington Physical Plant
School of Public Health
Office of Enrollment Management
Office of International Services
Latin American & Caribbean Studies
Kelley School of Business
Career Development Center/Arts & Sciences Career Services
Health Center
Indiana Memorial Union
Residential Programs and Services
Department of Theatre, Drama and Contemporary Dance
Jacobs School of Music

Sch of Education
Blank
Biology
Philosophy
IU Press - Department of Scholarly Publishing
Office of the Vice President for Engagement
JAcobs School of Music
rpts
Department of English
Hutton Honors College
Office of International Services- Office of International Admissions
Kelley School of Business - Operations & Decision Technologies
Jacobs School of Music, Band department
Telecommunications
College of Arts and Sciences POLS
Blank
School of Public Health, Applied Health Science department
Informatics and Computing
Center for Survey Research
Libraries
RPS
Geological Survey
Jacobs School of Music
Marketing and Communication Office
African American and African Diaspora Studies
political science
KSOB
rps
Informatics
Libraries
OVPR
Campus Recreational Sports
Germanic Studies
SPEA
radio-television services
Chemistry
Public Health
College of Arts & Sciences (ARSD)
chemistry
Second Language Studies
Chemistry

business
Philosophy
Indiana Memorial Union
Psychological and Brain Sciences
Kelley School of Business
Law Library
Kelley School of Business
Bloomington Office of the Registrar
Criminal Justice
Kelley Accounting
SPEA
Geological Sciences
Blank
College of Arts and Sciences
Student Academic Center
Bus - OADT
SPEA, OVPR
Biology
Recreation Park & Tourism Studies, School of Public Health
Health Center
IU Maurer School of Law Admissions Office
Biology
Journalism
Indiana Memorial Union Building
EALC
Athletics
IU Health Center/Healthy IU
Physics
Education
Residential Programs and Services
administrative staff
Office of Scholarly Publishing - IU Press
Medical Sciences
SPEA
Faculty Council Office
Vice Provost for Undergraduate Education
art museum
Campus Recreational Sports
Jacobs School of Music
Music
Libraries
Mathematics Department

Office of the Bursar
Education
SPEA
Office of the Bursar
spea
Student Affairs
Kelley SoB
Parking Operations
Indiana Memorial Union Office of Activities & Events
Office of Teacher Education
College of Arts and Science
athletics
School of Informatics and Computing
Center on Congress / Office of the Vice Provost for Research
Education
Kelley School of Business
Faculty: Medical Sciences; Administrator: Graduate School
IU Health Center Health Information Management
FYE
Second Language Studies
Blank
SPEA
Physics
Center for Exploration of Energy and Matter
Hutton Honors College
Biology
Mathers Museum of World Cultures
Athletics
Libraries
School of Optometry
IU Health Center
Kelley School of Business
Telecommunications
School of Education C&I
Informatics & Computing
Jacobs School of Music
Astronomy
Biology
Mathematics
graduate admissions coordinator
IDS

Appendix C
Faculty and Staff Responses to Survey

Athletics	RPTS - SPH
IIDC	SPEA
Curriculum and Instruction, School of Education	Geography
Jewish Studies	Law
n/a	Geography
College of Arts and Sciences	COAS
College of Arts and Sciences	Music
Office of the Registrar	Blank
education	Indiana Memorial Union (BA-IMAU)
SPEA	Office of the Bursar
Campus Administration	Biology and Human Biology Program
SPEA Alumni Relations	BL-CCCS
Division of Student Affairs	Library
Center for Survey Research	Blank
IU Student Media	chemistry
Circulation	IUHC
Kelley School of Business	Telecommunications
ARVM	Biology
Second Language Studies	Psychological and Brain Sciences
Indiana Memorial Union	Applied Health Science
Payroll	School of Public Health-Bloomington
criminal justice	Biology
Physical Plant Utilities	HR
Mathematics	Psychological and Brain Sciences
IUB Libraries	physics
Department of Folklore and Ethnomusicology	ILS, Informatics
biology	Kelley School of Business
IU Libraries	Athletics
School of Education	Biochemistry
CPCS	Criminal Justice
Journalism	SLS
Career Development Center	School of Nursing and School of Medicine
UTILITIES	Press
IU Health Center	Kelley
athletics	Development
College of Arts and Sciences	university academic affairs
Business	Biology
School of Journalism	School of Law
Residential Programs and Services	Maurer School of Law
Biology	SPEA
Libraries	IIDC
IUB Wells Library	Law School
Libraries	Maurer School of Law

Residential Programs and Services
Molecular and Cellular Biochemistry Dept.
Student Affairs (Health Center)
Chemistry
SoIC
Kelley School of Business
Department of Biology
Office of the Registrar
Undergraduate Education
College of Arts and Sciences
OVPR
Philosophy
psych
Libraries
Library
CEUS
GAP/ISGP Dept of Kelley School
RPS Libraries in the Academic Inititives and Services Department
School of Informatics and Computing
Dean's Office
Athletics
Theatre, Drama and Contemporary Dance
Kelley School of Business
DGRC-Biology
Biology
Libraries
SPEA
Wells Library
SPH
Indiana Institute on Disability and Community
School of Education
CEEM
Health Center. CAPS
Molecular and Cellular Biochemistry
History
IU STUDENT HEALTH CTR
Indiana University Press / Herman B Wells Library 350
Environmental Science
Campus Card Services
Educational Leadership and Policy Studies
Libraries

BL-COGS
Physics
College of Arts and Sciences
fine arts
BL-SPH
Biology
Kelley School of Business - Undergraduate Program
Libraries
Libraries
human resources
Music
Russian and East European Institute, SGIS, COAS
Admissions
Kelley School of Business MBA Program
Education
Athletics
Residential Programs and Services
Department of Speech and Hearing Science
Student Affairs
Arts and Sciences
Public and Environmental Affairs, Career Development Office
School of Informatics and Computing
Residential Programs and Services
Mathematics
Operations and Decision tech
physical plant
Office of the Vice Provost of Undergraduate Education
University Division
School of Public Health-Bloomington
Office of Student Financial Assistance
Dean's Office, College of Arts & Sciences
Eppley Institute for Parks and Public Lands
Center for Exploration of Energy and Matter (CEEM), formerly Cyclotron Facility
parking Operations
Wells Library
Office of Student Financial Assistance
Parking Services
health center
Athletics
Hutton Honors College
Informatics and Computing

Religious Studies
Office of Enrollment Management
Biology
Biology
Kelley School of Business
Athletics
Residential Programs & Services
Optometry
Law
Residential Programs and Services
Indiana Institute on Disability and Community
School of Education
chem
Graduate Career Services
ARSD
IUHC
optometry
Art Museum
Kinsey Institute
Jacobs School of Music
Organization of American Historians
Disability Services for Students
Kelley School of Business
Center for Innovative Teaching and Learning
KElley School- Marketing Department
School of Informatics and Computing
Affirmative Action
College of Arts and Science
IU Child Care
Cyber Cafe
Department of Folklore and Ethnomusicology
Kelley School of Business UCSO
Residential Programs and Services
OVPR
Astronomy, College of Arts & Sciences
Slavic/SLS
Student Central
OVPUE
CEEP
spanish and portuguese
Jacobs School of Music
Kelley Undergraduate Career Services
Residential Programs and Services

cmcl
Physical Plant
Athletics
Kelley School of Business
School of Medicine Jordan Hall
Career Development Center
Kelley School of Business
Physical Plant
Hutton Honors College
physical plant
CEEP (Center for Evaluation and Education Policy) for the School of Ed
Kinesiology
SLS-Intensive English Program
IU Health Center
Nursing
Chemistry
Mathematics
SPEA
Maurer Law School
chemistry
Music
RTVS
Economics
Blank
Anthropology
Medical Sciences
Residential Programs and Services
Kelley
Libraries
Physics
Accounting
College of Arts & Sciences
Education
Jacobs
Student Academic Center
Blank
Office of the Executive Dean, College of Arts and Sciences
Law
Psychological and Brain Sciences
Jacobs School of Music
IUB Libraries

Admissions
Office of the Registrar
School of Education
Enrollment Management
Physics (Center for Exploration of Energy and Matter)
telecommunications
SPEA Healthcare Management and Policy
Kelley School of Business
telecommunications
College of Arts and Sciences - History of Art
Development
School of Social Work
Office of Enrollment Management
Wells Library
Education
Kelley School of Business
Second Language Studies
HPSC
SPEA
Health Center
Center on American and Global Security
Second Language Studies Department Intensive English Program
Academic Personnel and Policies
Biology
Kelley
Athletics
spea
School of Education - Center for International Education, Development and Research
University Graduate School
College Office of Science Outreach
DOCUMENT SERVICES
Geological Sciences
Public Health
School of Nursing
Libraries
Spanish & Portuguese, IUB
DEMA
Univeristy Division
Telecommunications
College
IIDC

Social Work
Kelley School of Business
Medical Sciences
Career Development Center
Campus Bus Service
Astronomy
Kelley
School of Public Health, Applied Health Science department
Statistics
Speech and Hearing Sciences
COLL
Hutton Honors College
School of Education
AUDITORIUM
School of Education
Residential Programs and Services
College of Arts and Sciences
We are in the School of Arts & Sciences
Kelley, Business Communications
Maurer School of Law
Political Science
Linguistics
Art museum
Sociology
Psychology and Brain Sciences
Kinesiology
Blank
Physical Plant, Building Services
Mathematics
SPEA
Office of First Year Experience Programs
Law School
SPEA
Bldg. Svcs.
History
Business School--Accounting
College of Arts and Sciences
Biology
rps
Jacobs School of Music
Libraries
Jacobs School of Music

Physics	Kelley School of Business
Near Eastern Languages and Cultures	Veterans Support Services, Division of Studrent Affairs and University Student Systems and Services
Campus Recreational Sports School of Public Health	Law Library
History	SPEA
Anthropology	SPEA
French & Italian	Biology
Blank	Kelley School of Business
Blank	Telecommunications
IMU	Athletics
Business	Philosophy
RPS	Budgetary Administration & Planning
Blank	Kelley
Student Financial Assistance	Medical Sciences
Music	Jacobs School of Music
Amid	University Libraries
Athletics	Geological Sciences
CeLTIE	philosophy
School of Education	Physical Plant
Office of Enrollment Management	Auxiliary Business Services
Motor Pool	Gender Studies
Technical Services	Engineering
Athletic Department	Biology
Journal of American History	School of Fine Arts
Office of Enrollment Management	School of Education
Library	Apparel Merchandising and Interior Design
Recreation, Park, and Tourism Studies in the School of Public Health	Music
Indiana Memorial Union	CHEMISTRY
SoIC	Libraries
IU Libraries	Germanic Studies
Business	Biology
EDUC	Kelley
Recreational Sports	School of Public Health
Sociology	University Division
Career Development Center and Arts & Sciences Career Services	Department of Psychological and Brain Sciences
Physical Plant	School of Informatics and Computing
COAS	Center for Innovative Teaching and Learning
Athletics	College
IMU	Indiana Daily Student: Journalism
Jacobs School of Music	School of Public Health - Campus Recreational Sports
Geological Survey	LAW
WPTP	Psychological and Brain Sciences

Chemistry	Office of Student Financial Assistance
Education - Center for Evaluation and Education Policy	School of Informatics and Computing
Athletics	Recreational Sports
OVPUE	Office of the Vice Provost for Undergraduate Education
IUB Libraries	Office of Scholarly Publishing (IU Press)
PhD	Campus Bus Service
Registrar	Athletics
SPEA	facility services
Admissions Operations	Theatre, Drama, and Contemporary Dance
OVPUE	Library Technologies
Indiana Geological Survey and SPEA	Enrollment Management
Libraries	SPEA
Jacobs	Kelley School of Business
Libraries	neither I am a custodian
East Asian Languages and Cultures	Wells Library
Biology	Jacobs School of Music organ department
SPH Dean's Office	Biology
Athletic Department	School of Education
RPS	Admissions Operations
Kelley School of Business	Germanic studies
Kelley School of Business	Social work
Music	Residential Programs & Services
IIDC	Astronomy
History	Kelley School of Business, Department of Operations and Decision Technology
Office of the Vice Provost for Research	Kelley
Wells Library	SPEA
OVPUE	Optometry
law school	Kelley School
Division of Student Affairs	Library
Kelley School of Business	Cognitive Science
School of Education	individualized major program
Chemistry	College of Arts & Sciences
School of Fine Arts	MBA
Kelley School	Sociology
Office of Enrollment Management	Kelley School of Business Office of the Dean
IU Health Center	College of Arts and Science
Sociology	SPH
the Cognitive Science program, housed in Eigenmann	College of Arts and Sciences, History of Art
Physics	SPEA
School of Public Health	Accounting - Kelley
Student Central	Kelley School of Business

Student Life and Learning
SOE
Business Law & Ethics
mathematics
CoAS Chemistry
Enrollment Management
Residential Programs and Services
NELC/ CSME
School of Ed
SPEA
School of Public Health
School of Informatics and Computing
Office of Admissions, Bloomington
Kelley School of Business
anthropology/geography
Jacobs School of Music
Anthropology (College of Arts and Sciences)
College IT Office
Education
SLST
FOLK
Biology
RPS
Jacobs School of Music, Organ Department
Psychological and Brain Sciences
Health Center
Sociology/Statistics
Libraries
Folklore and Ethnomusicology
CITL
college of arts and sciences
Indiana Geological Survey
Indiana Geological Survey
Spanish and Portuguese
Physical Plant
Law
Office of the Registrar
College / Mathematics
Faculty support
Radio/Television Services
campus writing program
School of Music
The College of Arts and Sciences
Jacobs School of Music
The College
College of Arts and Sciences
Sociology
RTVS
Law
philosophy
Athletics
Biology
IU Libraries
Building Systems
Art History Department
Residential Programs and Services
Blank
LAR
Folklore & Ethnomusicology
IU Art Museum
Germanic Studies
Biology
Library
Physical Plant Utilities
Optometry
athletics
School of Education
African Studies Program
IU Document Services
OVPUE
Dept. of Theatre, Drama, and Contemproary Dance --- also Mathers Museum of World Cultures
Student Affairs
Department of Mathematics
physics
Maurer School of Law
Admissions
Arts and Sciences - Physics
Libraries
Law
Health Center
spea
Physical Plant
Wells Library- Technical Services
Center for Language Technology and Instructional Enrichment

Spanish and Portuguese
School of Public and Environmental Affairs
bursar
RPS
Inner Asian and Uralic National Resource Center
NELC
Blank
Office of Admissions
Medical Sciences
SPEA
SPHS
IUSOPT
economics
ILS SOIC
College of Arts and Sciences
Indiana Memorial Union
Mathers Museum
Chemistry
English
Libraries
School of Public Health
Law school
History
School of Journalism
Bloomington Budgetary Administration & Planning
Document Service Centers
Athletics
GLBT Student Support Services
Indiana Geological Survey
College of Arts and Sciences
Journalism
Office of the Registrar
Campus Recreational Sports
School of Informatics and Computing
iuhc
physical plant
Office of Scholarships
Jacobs School of Music
SPHS
Biology
Law School
school of education
SOIC-ILS

The School of Education (Center for Evaluation and Education Policy)
Blank
Sph
Classical Studies
Office of the Vice Provost for Research
Maurer Law
OVPR
Libraries
physics
SPEA
SPEA
Chemistry
Technical Services, Wells Library
IU Auditorium
CS
Document Service Centers
Dept. of Political Science
Applied Health Science
Kelley School of Business
SPH
Offive of the Vice Provost for Undergraduate Education
Bursar
Political Science
Medical Sciences
Libraries
Motor Pool
Recreation, Park & Tourism Studies, School of Public Health
Kelley School of Business
Physical Plant
Operations and decision technologies
Psychological and Brain Sciences
Athletics
School of Public Health
Informatics and computing
Undergraduate Kelley School of Business
Institute for International Business
Psychological & Brain Sciences
Medical Sciences
Libraries
School of Education
ceem

Education
Education
Geography
Department of Chemistry
Jacobs School of Music
Document Service Centers
Physical Plant
BUS
IU Libraries, School of Optometry
Provost's Office
School of Optometry
Kelley School of Business
Office of Scholarly Publishing - IU Press
Informatics
School of Public Health
CITO
Indiana Geological Survey
School of Public Health-Bloomington
Student Central on Union IUB
Hutton Honors College
CMCL
Health Center
Athletics
Admissions
chemistry
Education
School of Public Health
Residential Programs and Services
KInesiology
EO
Telecommunications
Vice Provost for Faculty and Academic Affairs
Hutton Honors College
Physical Plant
Kelley
Law
Residental Programs & Services - Food Service
OPTOMETRY
Office of Admissions
Blank
SPEA
Statistics
Philosophy

IU Health Center
Kelley School of Business
Campus Card Services
Maurer School of Law Admissions Office
IU Auditorium
Recreation, Park, and Tourism Studies
Blank
Education - Center for Postsecondary Research
School of Public Health
Jacobs School of Music
wells library
Jacobs School of Music
Veteran Support Services
athletics
Residential Programs and Services
Groups Scholars Program
Kelley School of Business
The College
IU Health Center
Psychological & Brain Sciences
Physical Plant
Office of the Registrar
Kelley School of Business
SPEA
Libraries
Geology
College of Arts & Sciences Office of Development
Campus Divsion
music
Office of Scholarly Publishing, IU Press
Registrar
CAS
Athletics Information Technology Services/Bloomington
Mathematics
College of Arts and Sciences
Psychological & Brain Sciences
Student Central
ANTH
Anthropology
Blank
OVPR
Department of Computer Science and Informatics in

the School of Informatics and Computing
Collins Living-Learning Center
Undergraduate Admissions
BAP
University Division
IU Communications
IU Health Center
CPCS, Kelley School
RPS
Radio/TV Services
Kelley School of Business- CPCS
R.P.S. Facilities
Public Health
Epidemiology and Biostatistics
Religious Studies
school of optometry
Kelley School of Business Graduate Career Services
RPS
Law
Law
Kelley School IT Systems
RTVS
Biology
Jacobs School of Music - Marketing and Publicity
College
BL-CCCS
Center for Survey Research
Speech and Hearing Sciences
Libraries
Optometry
Indiana University Physical Plant
I hold a Support Staff position in the Herman B Wells Library
Office of Student Ethics
EALC Chinese Flagship
Indiana Institute on Disability and Community
Classical Studies
Informatics
Service Learning Program, Center for Innovative Teaching and Learning
PBS
Utility Infomation Group - Physical Plant
Kelley School of Business

BEST
Education
English, COAS
Indiana Institute on Disability and Community
Kelley School of Business
Med Sci
Kelley School of Business
COAS
Physical Plant
physics dept.
First Year Experience
Epidemiology & Biostatistics
School of Public Health, Bloomington
EALC
Health Center
faculty
Biological Sciences
College of Arts and Science, Department of HIstory and Philosophy of Science
Office of the Vice Provost for Research
Kelley School of Business Undergraduate Career Services
law
SPEA
Kinesiology
Biology
Office of Student Financial Assistance
SPH-Bloomington
College of Arts and Sciences
Blank
Athletic
Kelley School of Business
Indiana University Health Center
Center on Education and Lifelong Learning/ Indiana Institute on Disability and Community
School of Education
Chemistry
Library
Ostrom Workshop
Indiana Memorial Union
History
Blank
libraries
Parking Operations

School of Informatics and Computing	School of Education
School of Optometry	Kelley Direct
Informatics and Computing	College Information Technology Office
Informatics and Computing	Physical Plant
Physical Plant	SPEA
Communication and Culture	Jacobs School of Music
Kelley School of Business	Optometry
School of Business - Institute of International Business	Parking Services
School of Journalism	SPEA
Mathematics	BL-IIDC
Blank	Anthropology
Campus Childcare Centers	IU Health Center
Biology	Office of Scholarly Publishing
DEMA	Kelley School of Business-Business Office
History	Athletics
Physics	SPEA
Blank	Residential Programs and Services
Kelley School of Business MBA	Budget office
Indiana University Conferences	Jacobs School of Music
parking operations	administration
all of them	I am hourly service maintenance staff
Military Science	Optometry
Maurer School of Law	physics
Blank	Health Center
public finance and policy analysis faculty	Academic Support Center
Physics	Hutton Honors College
Hutton Honors College	RPS Facilities
Workshop in Political Theory and Policy Analysis	Wells Library
School of Informatics and Computing	i am a piano tuner in the school of music. I am not faculty or administration
SPHS	SPEA
Office of Admissions	SPEA
Kelley School of Business	SPEA
School of Public Health	Arts and Sciences; Dean
Optometry	School of Fine Arts
Art Museum (staff); History of Art (adjunct faculty)	Student central
POLITICAL SCIENCE	Building Services
RPS	Education
Physical Plant	I am with a journal, the American Historical Review
College of Arts and Science	Statistics
Physical Plant	Education
IIDC	Building Services @ School of Music
Physics	Building Services

Public Health	VPFAA
School of Informatics and Computing	Ballet at the Jacobs School of Music
Building Services	Residential Programs and Services
optomerty	theatre drama and contemporary dance
ACP (OVPUE)	Career Development Office
information and library science	English
College of Arts and Sciences	IUB--
Kinesiology	Education
Athletics	Library technical services
Blank	History
physical plant	journalism
Department of Studio Art/College of Arts and Sciences	School of Education
Office of the Vice Provost for Research	School of Public Health - Bloomington
Office of Enrollment Management	CEEM part of OVPR, (i think !) at the cyclotron
Diversity, Equity, and Multicultural Affairs	Athletics
College of Arts and Sciences	School of Public Health
Physics	School of Education Records Office
SPEA	Kinesiology
Folklore and Ethnomusicology	Geological Survey
Spanish and Portuguese	School of Public Health
IUHC	Physics
Athletics	SPEA
Slavic Languages and Literatures	Libraries
Kelley School of Business--Communication, Professional, and Computer Skills	School of Fine Arts
Indiana Geological Survey	Center for the Study of Global Change, in SGIS
Applied Health Science	Educational Leadership and Policy Studies
	School of Public Health

Statistic	Value
Total Responses	1,353

4. In which building is your primary office located?

Law School
Geology
Union Street Market
Maxwell
Wells Library
CIB
poplars
SPEA
I am an adjunct; I have no assigned office.
Maurer Law
Law Building
Briscoe Residential Center
Hodge Hall
School of Public Health
spea
Service Building
Lee Norvelle Theate and Drama Center
Memorial Hall
public health
Ballantine
School of Optometry
Ballantine Hall
Wells
Ballantine
Woodburn Hall
Psychology
Hodge Hall
Optometry School
1217 E Atwater Ave
WWW Education Building
Ballantine Hall
CG
Maxwell Hall
Hodge hall
Hodge Hall (the undergraduate business building)
Business Communication House
Wells Library
Jordan
Geology
Ballantine
Godfrey Center
Forest
Ballantine
Wells Library
the bridge that connects the two Kelley buildings together
PSY
Ballantine Hall
510 N. Fess
SPEA
Psychology building
W W Wright
Wells Library
BALLANTINE HALL
Lee Norvelle Theatre and Drama Center
Eigenmann
Hodge Hall
Simon Center
IIDC
H
MSBII
Hodge Hall
Main law building
Student Health Center
Ballantine
Hodge Hall
Jordan Hall
Eingenmann
undergraduate
Godfrey
Bryan Hall
Wells Library
WW Wright Education Building
Sycamore Hall
Indiana Memorial Union
jh
IU rental house 821 E. 10th St.
Jordan
blank
Maxwell Hall
Godfrey Center
McCalla
Chase Bank Building on College Avenue
Music library

Wright Education Building
Morrison Hall
Psychology building 3rd floor
Service Building
Sycamore Hall
Indiana Memorial Union
maxwell hall
Lilly Library
IIDC building B
715 E 7th Street
Rawles Hall
Radio-Television Building
assembly hall
Smith Research
Service Building
Hodge Hall
Alice M. Nelson Building
Ballantine Hall
Wylie Hall
408 North Union
Godfrey Graduate Center
Eigenmann
Owen Hall
Phsychology
310 S Fess Ave
Kelley Graduate Building
Innovation Center
Foster Gresham
Wright Education Building
Radio-TV
Eigenmann Hall
Wells Library
408 N. Union
Psychology
Lindley Hall
Godfrey Center
408 N Union St
Health center
Herman B Wells Library
Radio/TV Center
Education
Music Annex (Addition)
Ballantine Hall
Wells Library- Bloomington
Campus View Apartments
408 N Union
Hodge Hall (old part - we are moving soon)
IGS
School of Education
120 West Grimes Lane
Owen Hall
Showers
Smith Research
Wright
Parking Operations
Hoosier Cafe & Store @ Wright
316 N Jordan Ave, Suite 200
Eigenmann
Ballantine
Health Center
Eigenmann
Chase Bank in downtown Bloomington
Nelson Administration Building, 801 N. Jordan
psychological and brain sciences
MSB II
Assembly Hall
Jordan Hall
SPEA
Jordan Hall
Optometry
Geology (IUB Bloomington)
Classroom Office Building - 800 E. 3rd St.
MSBII (702 N Walnut Grove)
Hodge Hall (formerly BU building, faculty offices)
School of Optometry
BL450 (CG)
Memorial Hall
Wright
Indiana Memorial Union
SPEA
IMU
Goodbody
Administration
SPEA
Wells
Education

SPEA	MSBII
Foster-Shea	Maxwell Hall
Wells Library	Suite I
Optometry	Nelson Administration/801 N Jordan
Ballantine Hall	Chemistry
Classroom-Office Building	300 N. Jordan Ave.
Memorial Hall West	Eigenmann
Student Building	The Kelley School of Business Godfrey Center
801 North Jordan Rd	Public Health Building
Musical Arts Center	Alice B. Nelson - 801 N. Jordan
Psychology	Kelley School of Business
Range Road Warehouse	Music Practice Building
The (new) East Studio Building	Physical Plant
Myers Hall	Psychology Building, Part A
408 North Union Street	Maurer Building
Memorial Stadium	Ballantine Hall
Jordan Hall	Myers Hall
Radio/TV	Herman B Wells Library
Smith Research Center	Morrison Hall
Maxwell Hall 006	Sycamore Hall
Radio/TV	Memorial Hall East
Eigenmann	Swain west
Wells Library	Administration Building A
SPEA	Innovation Center
law	CG
Eigenmann	SPEA
Swain West	Godfrey Graduate Building (1275 E. Tenth St.)
Simon Music Building	Geological Sciences BL417
jordan hall	Wells Library
sycamore hall	Maurer School of Law
R-TV Center	Wells Library
IMU	Owen Hall
blank	Owen
Union Street Center	blank
Wells Library	408 N Union
Service Building BL630	School of Public Health and Ostrom Workshop
Godfrey	Kirkwood Hall
Simon Hall MSB1	Merrill Hall
SPEA	MAXWELL HALL
Psychology	Eigenmann Center
Jordan Hall	SPEA
Kelley School of Business	Graduate Center
Simon Hall	MSB II

Carmichael Center
Service Building
Student Central
B-WELLS
316 N. Jordan Avenue
Godfrey Center
service building
Student Services, 408 North Union St
Service Bldg 1800 Range Road
Hodge Hall
Eigenmann Hall
BU
Eigenmann
Wells Library
Wells Library
Wright
408 N Union
Service Building
School of Public Health
408 N. Union
Poplars
1125 E. Atwater Ave.
BL CG3000
Career Development Center/Arts & Sciences Career Services
blank
Indiana Memorial Union
Alice M. Nelson - 801 N Jordan
Lee Norvelle Thatre and Drama Center (Neil Marshall)
Simon
SOE 201 N. rose ave
Nelson
Jordan Hall
Sycamore
Wells Library
Von Lee
Simon Music Library Building.
sph
Ballantine Hall
Hutton Honors College
Poplars
Undergraduate Side
Simon Music Center, 200 S Jordan
RTV
Woodburn Hall
blank
Woodlawn House (a rental property next to the new Honors Building--309 Woodlawn Ave.)
919 E 10th St
Eigenmann Hall
Wells Library
Tulip Tree apts
Geology
Merrill Hall
Main SPEA building 1315 E Tenth Street
Memorial Hall
woodburn
Kelley undergrad
Gresham
919 E. 10 th St Bloomington
Wells
Woodburn Hall
Wildermuth Intramural Center
Ballantine Hall
SPEA
Radio-Television Services Building
Simon Hall
School of Public Health
Owen Hall
Chemistry
Memorial Hall
Simon Hall
blank
Sycamore Hall
Indiana Memorial Union
Psychology
516 N. Fess Avenue (rental house)
Law School
Kelley School of Business
408 N Union St
Sycamore Hall
Hodge Hall
MSB II
Geological Sciences Building
Jordan Hall

Ballantine	Eigenmann
408 N. Union	Godfrey (CG 3100)
Hodge Hall	Myers Hall
Eigenmann	IU Health Center
JOrdan hall	326 N Jordan Ave
Showers Building - Owned by Monroe County	Memorial Hall
Eigenmann	SPEA
IU Maurer School of Law	SPEA
Jordan Hall	Swain West
Ernie Pyle Hall	Center for Exploration of Energy and Matter
Indiana Memorial Union Building	Hutton Honors College
Goodbody Hall	Jordan Hall
Assembly Hall	Mathers Museum Annex
IU Health Center	Football Stadium
Simon Hall MSB1	SPEA
W.W. Wright Education Building	800 E. Atwater
Campus View	IU Health Center
Tulip Tree	SPEA
Herman B. Wells Library, 3rd Floor	RTV
Jordan Hall	Wright Education
SPEA	Informatics East
Ballantine Hall	East Studio Building
Franklin Hall	Swain West
art museum	Myers
Student Recreational Sports Center	Swain East
Simon Music Library and Recital Center	geology
Simon Music Library Center	Ernie Pyle Hall
Ruth Lilly Auxiliary Library Facility (ALF)	Mellencamp Pavilion
Rawles Hall	IIDC
Poplars Bldg	Wright Education Building
Eigenmann Hall	Goodbody Hall
SPEA	Wells Library
Poplars	Owen Hall
spea	Kirkwood Hall
IMU	408 N Union
324 N Jordan Ave	education
Henderson parking garage	SPEA
Indiana Memorial Union	Maxwell Hall
Education	1315 E. 10th Street
Kirkwood Hall	Eigenmann
memorial stadium	Eigenmann
Lindley Hall	Ernie Pyle hall
SPEA	Herman B. Wells

BU	Radio & TV (overlooking arboretum, 3rd floor)
Morrison Hall	Jordan Hall
Memorial Hall	Psychology
IMU	School of Public Health
Physical Plant	PH (old HPER building)
sycamore hall	Myers Hall
Central Heat Plant	SPEA
Rawles Hall	Psychology Building
Herman B Wells Library	ISAT
504 N. Fess Ave	Wells Library
Jordon	Hodge Hall
Wells Library	Mem Stdm NEZ
W W Wright Bldg	Simon Hall
1319 E 10th Street (Carter House)	Sycamore Hall
Journalism annex	Memorial Hall
625 N. Jordan Ave.	Classroom Office Building
Central Heating Plant	Wells Library
IU Health Center	Godfrey
assembly and university gym	SPEA
Sycamore Hall	Poplar
Business	Jordan Hall
Ernie Pyle Hall	Law
Briscoe	Maurer School of Law
Jordan Hall	SPEA
Lilly Library	K
Wells Library	Law Building
Auxilliary Library Facility	630 E. 3rd St.
SPH Building	801 North Jordan
SPEA	Simon Hall MSB1
Student Building	IU Health Center
The Law Building	Chemistry
Student Building	Info East
Memorial Hall	Hodge Hall
Music Practice	Myers Hall
Ballantine Hall	408 N. Union
Indiana Memorial Union	Maxwell Hall
Poplars	Eigenmann
Sycamore Hall	Carmichael Center
Hoosier Courts	Sycamore
Wells Library	psych
Wells Library	SPEA
Myers Hall	Wells Library
IUHC	Memorial Hall

Godfrey Graduate & Executive Center
Teter
Informatics East
School of Public Health
Cook Hall
Lee Norvelle
Godfrey Center
Jordan Hall
Jordan Hall
Wells Library
SPEA
Well Library
PH
Center on Education and Lifelong Learning
W. W. Wright
ISAT
Health Center
Simon Hall
Ballantine
IU STUDENT HEALTH CTR
Herman B Wells Library 350
PV
Eigenmann Hall
Eigenmann
Wells Library
Eigenmann
Swain West
Owen Hall
morgan hall
WIC
Jordan Hall
Hodge Hall
Herman B Wells
Wells Library
SPEA
Simon
Ballantine
Office of Admissions 300 N Jordan Ave
Graduate and Executive Education Center
Eigenmann Hall
Memorial Stadium
Alice Nelson Administration Building
Simon Music Library/rec
IUHC
SImnon Hall
Main SPEA building
Lindley Hall
Campus View Apts.
Rawles
HH
spea
Maxwell Hall
Maxwell Hall
Public Health
408 N Union St
Owen Hall
Monroe County Government Center (old IU Research or Showers Building)
ISAT Hall
Henderson parking garage
Wells Library
Student Services Building, 408 N Union St
Henderson Parking garage
IUHC
Memorial Stadium
Hutton Honors College
INFO East
Sycamore
408 North Union
Jordan Hall
Jordan Hall
Godfrey Center
Assembly Hall
Nelson Administration Building, 801 N. Jordan Ave.
800 Atwater
Law Bldg
McNutt Quad
Building H
Wright Education Building
chem
Kelley Graduate Side
Owen Hall
Health Center
optometry (Atwater ave)
Art Museum
Morrison Hall

Music Addition	chemistry
112 N Bryan Avenue (IU Bldg #324V)	East Studio Building
Wells Library	Radio & TV
Chase Bank Building (downtown)	Wylie Hall
Wells Library	Smith Research
Godfrey Center	Student Bldg.
Lindley Hall	Jordan Hall
Poplars	Read Center
Polish Studies House	HH
Campus Children's Center	Wells Library
Wells Library	Swain west
504 N Fess Avenue	Kelley School of Business
SPEA	Sycamore
Forest Residence Center	Eigenmann
Carmichael Center	Practice Building
Swain West	408 N. Union St.
BH	Poplars
Student Central	Owen Hall
Maxwell Hall	Law School
Eigenmann	Psychological and Brain Sciences
ballantine hall	Simon Music Library building (M)
Simon Music Center	Wells Library
SPEA (P100)	300 N Jordan Admissions
Wright Quad	408 N Union
800 east 3rd	Education
Service Building	300 N Jordan Ave
Assembly Hall	Center for Exploration of Energy and Matter
Godfrey Graduate and Executive Education Center	radio tv center
Jordan Hall	SPEA
625 N. Jordan Avenue	SPEA
516 N. Fess Ave.	radio-tv
Service Building	SoFA
Hutton Honors College	main school building
chemistry	1127 Atwater
Eigenmann	Student Central\Registrar
HPER	Wells Library
Memorial Hall	W.W. Wright Education Building
IU Health Center	undergraduate side (HH)
Sycamore	Memorial Hall
Chemistry	Goodbody Hall
Rawles Hall	MSB-II
SPEA	Health Center
630 E. Third	Memorial Hall

Memorial Hall	Ballantine
Bryan Hall	Psychology
Myers Hall	School of Public Health
Kelley Undergrad (Hodge Hall)	IU health center
Assembly Hall	Poplars Building
spea	Rawles
Eigenmann	SPEA
kirkwood hall	326 N. Jordan Avenue
1600 E. 3rd St (residential house)	Maurer School of Law
SMITH RESEARCH	SPEA - 1415 E 10TH ST
MSB-II	Business, Psychology, SPEA and MSB II
Showers	Ballantine
Sycamore Hall	Hodge Hall (formerly BU)
Lilly Library	Geology
Ballantine Hall	Jordan Hall
Eigenmann Hall	gresham
Maxwell Hall	Merrill Hall
Radio-TV	Wells Library
blank	East Studio Building
IIDC Building I	Swain W
School of Social Work 1127 E. Atwater	Goodbody Hall
CG	SRSC
Myers Hall	Ballantine
625 North Jordan Ave, Career Development Center	422 N. Indiana Ave.
120 West Grimes	Ballantine Hall
Swain West	blank
UGRAD Hodge Hall	spea
SPH-B	IMU
410 N Park Ave	Business undergrad
Speech and Hearing Building/Clinic	IU Warehouse
RH	Kelley School of Business
Hutton Honors College	408 N Union Street
Wright Education Building	Simon Music
AUDITORIUM	Smith research center
School of Education	Assembly Hall
801 North Jordan	Ballantine Hall
Sycamore	W Wright Education
MSBII	300 N Jordan Ave
Carter House, 1319 E Tenth St	Motor Pool
Law Building	Wells Library
Woodburn Hall	Assembly Hall
Memorial Hall	The Journal of American History has a stand-alone office on Atwater.
Art museum	

408 N. Union Street	East Studio Building
Herman B Wells Library	CHEMISTRY
School of Public Health	Herman B Wells Library
Indiana Memorial Union	Ballantine Hall
Informatics East	Jordan Hall
Wells Library	Undergrad
Godfrey Center	Public Health (formerly HPER)
Eigenmann	Foster
School of Public Health	PY 383
Ballantine Hall	Informatics East (10th and Woodlawn)
Career Development Center	Wells LIbrary
Service Building	Owen Hall
201 N. Indiana Ave.	Ernie Pyle Hall
North End Zone	SRSC
IMU	Law School
Simon Music Center	Psychological and Brain Sciences
Geology	Chemistry
513 N Park	Eigenmann
Communication House	Memorial Stadium
IMU	Hutton Honors College
Law School	SPEA
MSB-II	SPEA
SPEA	408 N Union
Jordan Hall	SPEA
Corporate and Graduate Building	300 N Jordan
Radio-TV	Maxwell
Memorial Stadium	IGS
Sycamore Hall	Wells Library
Bryan Hall	Simon
CG	Wells Library
Jordan Hall	Eigenmann
Music Addition	Jordan Hall
Wells Library	SPH
geology	Assembly Hall
sy 109	Eigenmann
Service Building	Hodge Hall
Bryan Hall	CG
Memorial Hall	East Studio Building
Service Building	BLD. E
JH	Ballantine
Henry Radford Hope School of Fine Arts	Carmichael Hall
WW Wright School of Education	Wells Library
Memorial Hall	Maxwell Hall

law school building
IMU
undergraduate
WW Wright
Chemistry
Fine Arts
BU
Student Central
IU Health Center
Schuessler Institute for Social Research
Eigenmann
Swain West
Sycamore
Student Central
Student Central Building
Informatics East
SRSC
Franklin Hall
Wells Library
120 W. Grimes Lane, Bloomington, Indiana, 47403
Assembly Hall
Indiana Memorial Union
Lee Norvelle Theatre and Drama Center
Wells Library
408 North Union
INFORMATICS West
HH
Psychology
Wells Library
East Studio
Jordan Hall
Eigenmann Hall
Admissions Office
Ballantine Hall
1127 E Atwater Ave
Cedar Hall, Union Street Center
Swain West
Business Building, Undergraduate
Godfrey Center
SPEA
Atwater - School of Optometry
Undergrad
Wells Library
Eigenmann
ballantine hall
blank
CG
Ballantine Hall
Kelley School "Bridge" between Godfrey Center and Hodge Hall
Student Building
SPH
Fine Arts
MSB2
Hodge Hall
1275 East Tenth, Godfrey
IMU
SOE
Hodge Hall
Rawles Hall
Simon Hall MSB I
Student Services
Eigenmann
Goodbody
School of Ed
SPEA Bloomington
Showers
Lindley Hall
300 N. Jordan Ave
Godfrey Center
SB
Music Addition
Student Building
Rawles Hall
Education
Memorial Hall
506 N Fess
Jordan Hall
Eigenmann
Music Addition
Psychology
Health Center
Ballantine
Wells Library
504 N Fess
Wells Library

ballantine	Swain West
Geological Survey	Maurer School of Law
Geology	300 N. Jordan, Office of Admissions
Ballantine Hall	Swain West
BL445 Central Heating Plant	Wells Library
Law	Law
408 N. Union	Health Center
Rawles Hall	spea
SPEA	Service Building
Radio/Television Services	Wells Library
wells library	Ballantine Hall
Simon	Ballantine Hall
Owen Hall	SPEA Building 1315 East Tenth
Merrill	Poplars
BH	801 N. Jordan
Owen Hall	Ballantine Hall
Schessler Institute for Social Research	GOODBODY HALL
RTV	blank
Law	300 N. Jordan Avenue
sycamore	Jordan Hall
Assembly Hall	SPEA
MSB 2	SG Speech and Hearing Clinic
Wells Library	744 E 3rd St
Service Building	Wylie
Fine Arts Building	Wells Library
801 N Jordan	Owen Hall
imu	Indiana Memorial Union
MSBII	Mathers Museum Annex
504 N Fess Ave	Chemistry
IU Art Museum- second floor	BH
Ballantine	Wells Library
Jordan Hall	Bradford Woods
Wells Library	Law school
Central Heating Plant	Ballantine Hall
Optometry	Ernie Pyle Hall
assembly hall	Bryan Hall
WW Wright building	Smith Research Building
Woodburn Hall 221	Memorial Stadium
2931 E 10th Street - Warehouse Bldg on Range Road	705 E 7th St
Maxwell	Geology
275 N. Jordam #A300C	Owen Hall
703 East Seventh Street	Ernie Pyle Hall
Rawles Hall	408 N Union

WIC	School of Public Health (formerly HPER)
919 East 10th Street (INFO East)	Info East
iuhc	Hodge Hall
2222 East 10th Street	316 N. Jordan Avenue
Student Services, 408 N. Union	Psychology building
Merrill Hall	Jordan hall
SPHS	Wells Library
Jordan Hall	Wright Education Building
Lewis Building	isat hall
eigenmann	WW Wright
Wells	Wright Education Building
Eigenmann	Student Building
blank	Chemistry Building
Tennis Center	Simon Music Center
Ballantine Hall	Smith research Center
Carmichael Center	Service bldg
Maurer Law	BUS
513 N Park Ave	Optometry School, 800 E. Atwater Avenue
Wells Library	Bryan Hall
swain West	blank
Elinor Ostrom Workshop	Hodge Hall
SPEA	Wells Library
Chemistry	Info East
Wells Library	School of Public Health
IU Auditorium	Kirkwood Hall
Innovation Center	Geological Survey
Smith Research Center	Public Health (PH, formerly HPER)
Woodburn Hall	408 N Union St.
School of Public Health-Bloomington	Hutton Honors College
Godfrey Center	Classroom and office building
1185 W. 2nd St	Health Center
Maxwell Hall	Memorial Stadium
Poplars	300 N Jordan
Woodburn Hall	chemistry
Jordan Hall	blank
Wells Library	School of Public Health
801 N Range Road	Union Street Center
SPH	School of Public Health
Hodge Hall- Undergraduate Building	Foster
Service Building	Radio and TV
Hodge hall	Bryan Hall
Psychology	Hutton Honors College
Mellencamp	1800 N. Range Rd

Bu	Goodbody
Law	1101 E. 10th -- the PBS building
Forest	408 N. Union
OPTOMETRY BUILDING	Student Building
Office of Admission	Student Building
blank	blank
1315 E Tenth St.	Carmichael Center
Statistics House 309 N Park Ave	Lindley Hall
Sycamore Hall	Collins-Edmondson
Iu Health Center	Admissions, 300 N Jordan
Godfrey Center	Bryan Hall
Eigenmann Hall	Maxwell Hall
Maurer School of Law	Von Lee
IU Auditorium	IU Hwalth Center 600 N. Jordan Ave
Tennis Center	1319 E. 10th St.
Wells Library	801 N. Jordan
Eigenmann Hall	Radio and Television Center
School of Public Health	Hodge Hall (Undergraduate Business School)
Simon Center	801 N. Jordan Facilities
main library	Public Health
Simon Music Building	School of Public Health building
IMU	Sycamore Hall
SRSC	800east atw. optometry
Alice Nelson Building (801 N Jordan Ave)	1275 E. 10th Street
Maxwell Hall	801 N. Jordan
Hodge Hall/SPEA	Law building
Ballantine	The Law Building
IU Health Center	324 N Jordan Ave
Psychology	RTVS
Service Building 1800 N Range Rd	Myers Hall
Old PDK building - 408 N Union St	Music Practice Building
Hodge Hall	Owen Hall
SPEA	E-7
Wells Library	Eigenmann
Geology	SPHS
Owen Hall	Lilly Library
2222 E 10th	OPTOMETRY (800 E Atwater)
music	Physical Plant
Wells Library	Herman B Wells Library
408 N. Union	801 N. Jordan Avenue, Alice Nelson Admininstration Building
Sycamore	814 E. 3rd Street
Assembly Hall	M
Rawles Hall	

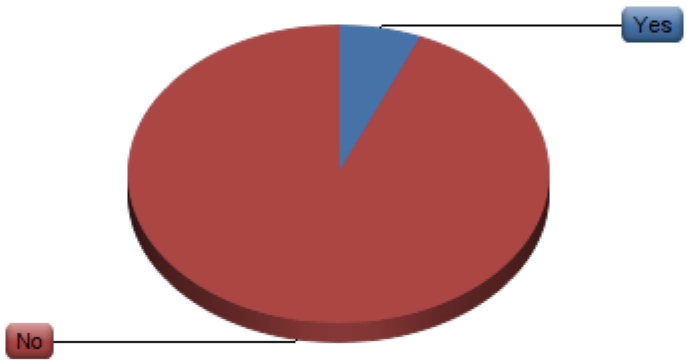
Ballantine
Info west
Wells Library, East Tower
MSBII
Central Heating Plant - 3rd Floor
Kelley School of Business Graduate Building
Franklin Hall
Eigenmann
Ballantine Hall
Indiana Institute on Disability and Community Building I
Hodge Hall
Myers Hall
blank
Kirkwood Hall
Service Building
swain hall west
326 N. Jordan
SPH
School of Public Health (old HPER Building)
Goodbody
Health Center
Simon Hall
Jordan Hall
Goodbody Hall
Glenn A. Black Laboratory of Archaeology
Kelley Undergraduate
Lewis Building
SPEA
Public Health (formerly known as HPER)
Myers Hall
408 N. Union Street
PH
Owen Hall
Eigenmann
Assembly and Bart Kaufman Field
Kelley School of Business Graduate side, ground floor.
Business Office
Building B of the IIDC
Wright Education Building
Simon
Wells Library
513 N. Park Ave.
Indiana Memorial Union
Ballantine
Eigenmann
Wells Library
Henderson Parking Garage
Informatics East
744 E 3rd St
Informatics West
Informatics East
Service Building
Classroom Office Building
Godfrey Center
316 N Jordan
Journalism Annex
Swain East
Health Center
CW
Jordan Hall
Maxewll Hall
Ballantine
ISAT
blank
Godfrey Center (CG)
Alice Nelson Building
henderson
1514 east third street
Smith Research
Law School
blank
spea
Swain Hall West
Hutton Honors College
CIPEC
815 East Tenth Street
Robert Milisen Speech and Hearing Clinic
300 N Jordan Ave
Hodge Hall
School of Public Health Building
Optometry School
Art Museum
WOODBURN HALL
McNutt

Service Building	In an old house at 914 E Atwater
Owen Hall	410 N Park Ave
Service Building	WWWright
1905 N Range Road	Simon Music #181
Swain West	Kelley School of Business
Wendell Wright School of Education	Public Health
Godfrey Center	Info East (Connector)
Kirkwood Hall	Optometry
Service	optomerty
SPEA	Maxwell
East Studio Building	225 west informatics
Atwater Eye Care Center	Owen Hall
Henderson Parking Garage	SPH
SPEA	North End Zone facility
B	IU Health Center
Student Building	physical plant
IU Health Center	Fine Arts building
Wells Library	Poynter Center for the Study of Ethics and American Institutions
Kelley School of Business-Business Office CG 3023	408 N union St
Memorial Stadium	Memorial Hall West
SPEA	Memorial Hall
Alice Nelson Building	ISAT Hall
Bryan Hall	SPEA
JS	501 N. Park
Eigenmann	BH
120 West Grimes Lane	600 North Jordan
Optometry, 800 E. Atwater Ave.	Assembly Hall
swain west	Ballantine Hall
Health Center	Carter House
Briscoe Quad	Geology
HHC	501 N Morton
801 north Jordan ave	Bryan Hall
Wells Library	Musical Arts Center (MAC)
i do not have an office. the piano shop is located in the musci annex	Alice Nelson Building (801 North Jordan Ave)
SPEA	lee norvelle theatre building
SPEA 4th floor	SPEA regular building
SPEA	Ballantine Hall
Owen	TT
Fine Arts	Education
408 n union	Herman B Wells Library
Smith Research	Ballantine
Wright Education	ernie pyle

Eigenmann Hall
Showers
cyclotron (now the ISAT hall)
Memorial Stadium
Public Health
Wright Education Building
Public Health (formerly HPER)
Geology
School of Public Health
Simon
SPEA
Auxiliary Library Facility
Hope SoFA
201 N Indiana Ave (International Programs Building)
Wright
SPH

Statistic	Value
Total Responses	1,362

5. Do you have a secondary office?



#	Answer		Response	%
1	Yes		88	6%
2	No		1,289	94%
	Total		1,377	100%

Statistic	Value
Min Value	1
Max Value	2
Mean	1.94
Variance	0.06
Standard Deviation	0.24
Total Responses	1,377

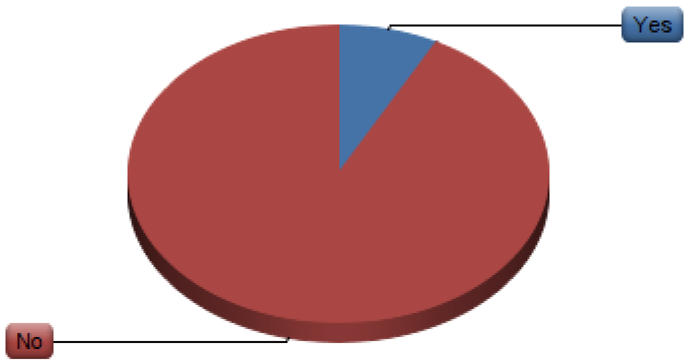
6. In which building is your secondary office located?
Text Response
Geology
Union Street
814 E Third Street
Chemistry
Polish Studies Center
HH
SPEA
Carmichael Center, 530 E. Kirkwood Ave.
Eigenmann Hall
801 N Jordan, 012
Student Building
Maxwell Hall 010
Kelley Graduate School of Business
MSBII
School of Education
Informatics
510 N. Fess
Oops - I don't have secondary office
Ostrom Workshop
IMU
Kirkwood Hall
Ireland Field Hockey Team Building
n/a
Wells Library
University Gym
Auxillliary Library Facility
Student Building
Jordan Hall
Swain West
IUPUI
Assembly Hall
ISAT
Home
IMU
Teter Hall
I don't have a secondary office
HPER
Education
Weatherly
Woodburn
Law school
Bess Meshulem Simon Music Center
ISAT HALL

Wildermuth
Student Bldg.
Kelley undergrad
Schuessler Institute
Poplars
Bryan Hall
Auxillary Library Facility (ALF)
201 N Indiana Ave
Teter
Geology
SPEA
home
Home
Informatics West
Music Addition
Rawles Hall
Mathers Museum (2nd floor)
Swain West
SRSC
Woodburn Hall
Psychology building
sorry answered previous question wrong
Student Recreational Sports Center
Harlos House
410 N Park Ave
Informatics West
Psychology Building
Owen hall
Bart Kaufman Field
Building G
Eigenmann Hall
Swain West
Indiana Memorial Union
IU Police Department
Musical Arts Center
School of Optometry
Carmichael
Poynter Center
Transportation Research Center
019 wells library
Fine arts building
504 N. Fess
McNutt
Home Office
Hutton Honors College

Poplars

Statistic	Value
Total Responses	89

7. Do you have a tertiary office?



#	Answer		Response	%
1	Yes		7	8%
2	No		84	92%
	Total		91	100%

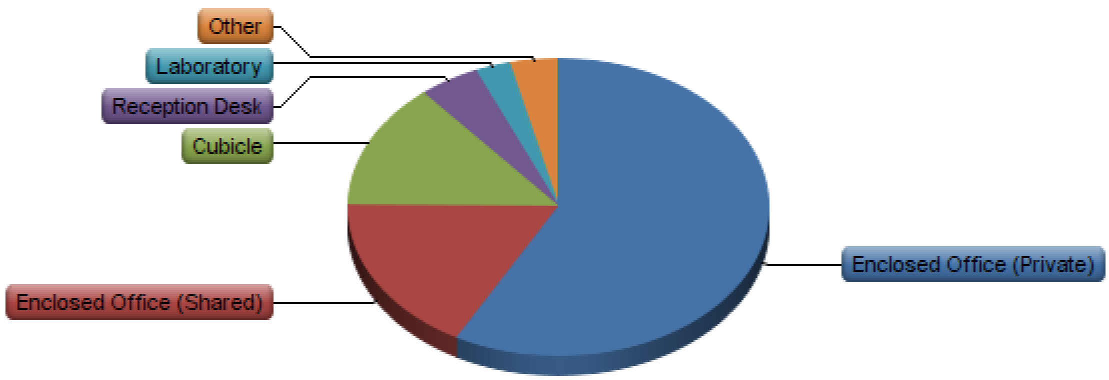
Statistic	Value
Min Value	1
Max Value	2
Mean	1.92
Variance	0.07
Standard Deviation	0.27
Total Responses	91

8. In which building is your tertiary office located?

Text Response
Jordan Hall
ALF
Eigenmann Hall
Maxwell
home
Pinnicle School
Teter Quad

Statistic	Value
Total Responses	7

9. Which of the following best describes your primary office space?



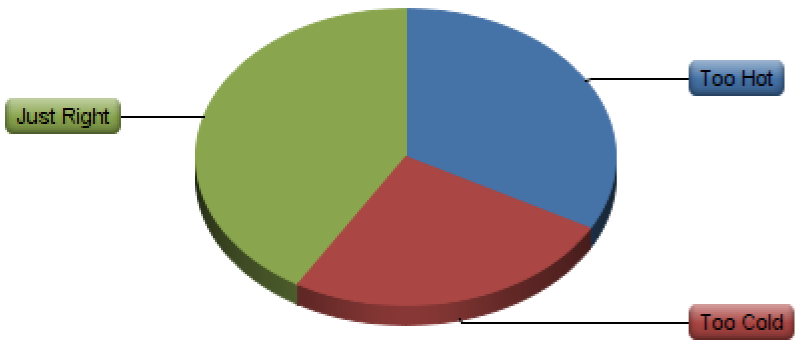
#	Answer		Response	%
1	Enclosed Office (Private)		798	58%
2	Enclosed Office (Shared)		237	17%
3	Cubicle		189	14%
4	Reception Desk		64	5%
5	Laboratory		37	3%
6	Other		52	4%
	Total		1,377	100%

Other
Manager Office on side of market with windows
I only use an assigned lecture hall and the department office.
Enclosed Audio/Video Control Room
open office space
open office
radio studio
Corridor - moving to office in August
Costume shop
Private office plus two shared AV labs
open concept
open space with 10 others
Cubicle within a shared enclosed office

Open floor plan office
open
double faculty study carrol
2-sided cubicle
open office space (like UITS desks in the CIB)
Food Court
An open area in the corner of the staff area of the basement
semi-enclosed office
my office has a door, but the walls don't go to the ceiling, so it is not completely a "private" office.
Open plan
open lounge area with terminals
Open Shared Space
open-concept workstation
Open Concept
Big Room-Gated area
Open with partial partition
My office is open to the public however I do not share the space with anyone else. One women office.
Out in the middle of everyone
open floorplan w/desks
Storeroom
Open space similar to a cubicle
sliding accordion door
both enclosed and shared
open office space
Classroom
House
Common Area - Shared Space
I drive a bus
work shop
breakroom

Statistic	Value
Min Value	1
Max Value	6
Mean	1.88
Variance	1.74
Standard Deviation	1.32
Total Responses	1,377

10. How would you describe the typical temperature of your primary office space in the Summer Months?



#	Answer		Response	%
1	Too Hot		447	33%
2	Too Cold		346	26%
3	Just Right		561	41%
	Total		1,354	100%

Statistic	Value
Min Value	1
Max Value	3
Mean	2.08
Variance	0.74
Standard Deviation	0.86
Total Responses	1,354

11. Do you use any of the following to adjust the temperature of your primary office space in the Summer Months? (Check all that Apply)

#	Answer		Response	%
1	Electronic Space Heater		122	9%
2	Electronic Personal Fan		410	30%
3	Non-Electronic Temperature Control such as blankets or Opening the Windows		246	18%
4	Other		185	14%
5	None		613	45%

Other
Air conditioner
I keep the AC system off - too loud!
Window AC unit
jackets/sweaters
thermostat
Window air conditioner
window ac unit
thermostat
thermostat
thermostat
internal adjustable thermostat
My windows don't open. I wear a sweater.
I have not yet occupied this space during summer - I moved in January.
leave fan running on furnace to circulate air better
sweater
Temp varies, so both heater and fan are used depending on the day
window air conditioner (we all have these on the upper floors of Ballantine)
I have not been in this office during the summer yet (we moved in October)
AC unit
Open Windows
Air conditioning in the window
humidifier

turn off AC and open window
Dressing in layers
Electric blanket once or twice
Not able to adjust temperature from within office space
small electric fan
Wall thermostat
ice packs
air conditioning in room
I use the room thermostat, which works fine.
Floor fan
hooded sweatshirt
opening doors, extra jacket
sweaters/clothing layers
This will be my first summer here
window a/c unit, but it is very loud so I frequently turn it off and/or down for meetings
I have covered the some air vents to avoid the IU air conditioning polar vortex. Save energy, avoid faculty frost bite, turn down the AC during summer.
Windows? Hahahaha
leave to warm up
Attached AC sometimes
thermostat
Temperature is inconsistent
window air conditioner
go home
shut curtins
window air conditioner
Sweater
Open exterior door
Air conditioning and personal thermostat
Turn the air conditioner on or off.
sweater
Jackets warm clothing
might buy swamp cooler
A/C
Building's air conditioning which I can control for my office
Thermostat
Office has its own thermostat

air conditioner provided by university
on the rare occasion that the AC goes out I use a personal electric fan
the thermostat
Fan
Winter hat and gloves
Adjust thermostat
My start date: 9/3/13
I use a paper fan.
window AC
not here during the summer months
I use fans year round because it's always too hot in this office.
University provided window ac unit
fans throught office
Pneumatic thermostat which is currently malfunctioning
Sweater
Individual A/C and Heater
I have yet to be here for a summer so I don't know yet
Sweater
Window Air Conditioner
air conditioner
Working from home when necessary
Lighter clothes
Window AC
have not occupied space in the summer
standing fan
Open windows if there's a breeze
Nothing - no fan or window available
window air conditioner in addition to central air
window
Window Air Conditioner
thermostat
window AC unit
Window Air Conditioner
close vent
Extra clothing
Sweater
open/close air vents

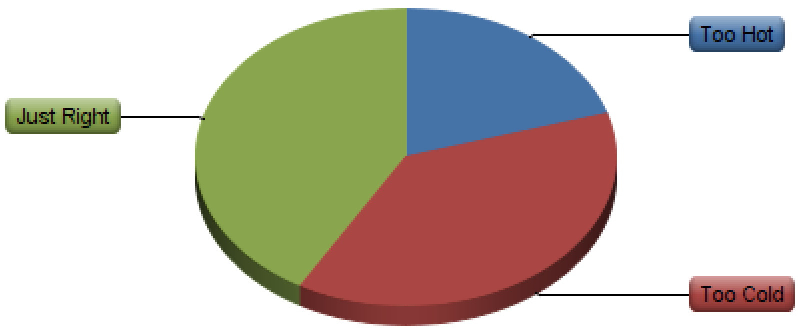
My office has a thermostat--I keep it where I like it. That said, the shared parts of the building as a whole is *too hot during the winter, and too cold during the summer.
window air conditioner
I am not here in June/July
I have not yet worked over the summer months
aircon window unit
AC window unit
AC
electric space heater
Open window
there is a thermostat on our floor so, we can adjust the temp.
window air unit
Window airconditioner
Thermostats
Wall Unit in my office.
In room thermostat
the office AC
Prop the door open to the let air flow in from hallway.
air conditioner
personal window unit air conditioner
sweatshirt
The room has a dedicated heating/cooling unit
Sometimes try to fiddle with the thermostat but that is usually not effective and it discouraged
thermostat adjustment
adjust thermostat
dedicated AC
Window A/C Unit
A/C Window unity IF in town.
window air conditioner
Keep a sweatshirt in my office
AC
window air conditioner
sometime fan
Sweater
if too hot I use a fan, if too cold I put on a sweater
Thermostat
wear a sweater

Window air conditioner
electric blanket
wear sweater of jacket
AC
Air Conditioner
I have my own air conditioner and I open the window when the weather is nice and I don't need to use the air.
I have not been on campus over the summer yet, as I just recently arrived
heat/air wall unit
adjusting window blinds
space heaters are banned in our building and our windows are sealed
specifically, a cardigan :)
Window Air Unit Electric
Wear extra layers and always have a sweater available.
Our windows don't open, but I would much prefer the natural cooling wind to the electric personal fan I have to use instead
Oil Filled Radiator Heater
I have not worked in this building during summer
AC Window Unit
Adjustable thermostat
I wear a jacket in the lab in summer.
go out door when it nice
Layers of clothing
window air conditioner
Wearing sweaters
I just moved into my current office and haven't experienced the air conditioning as of yet.
Personal a/c (window unit)
The building is both too hot and too cold at times. The central heating comes on and off according to calendar. There isn't an option to indicate this in the previous question.
mechanical switch on airconditioner/heater
Window mounted AC
Heating Pad
Open/Close Windows
Air Conditioner
Window air conditioner
sweater - in summer it is freezing
Previous question=warm to very warm-not too hot
Open doors

Box Fax
Do not know yet if such additional devices are necessary, as we have only been in our current location for a week
i can turn on/off air vent in my space
thermostat
Noisy window air conditioner
window air-conditioner
window air conditioner unit and opening the windows
Window AC
i haven't worked in this space in the summer...
ordinary motor operated fans
Sweaters
Layers of heavy clothing
There is a heater/AC unit that I control in my office. The outside unit is shared with one other office.
Jacket

Statistic	Value
Min Value	1
Max Value	5
Total Responses	1,367

12. How would you describe the typical temperature of your primary office space in the Winter Months?



#	Answer		Response	%
1	Too Hot		278	20%
2	Too Cold		522	38%
3	Just Right		572	42%
	Total		1,372	100%

Statistic	Value
Min Value	1
Max Value	3
Mean	2.21
Variance	0.57
Standard Deviation	0.76
Total Responses	1,372

13. Do you use any of the following to adjust the temperature of your primary office space in the Winter Months? (Check all that Apply)

#	Answer		Response	%
1	Electronic Space Heater		323	24%
2	Electronic Personal Fan		127	9%
3	Non-Electronic Temperature Control such as Blankets or Opening the Windows		234	17%
4	Other		192	14%
5	None		660	48%

Other
Not allowed to have a space heater, or I would.
Thermostat
sweater
I wear a coat and gloves
I have an adjustable thermostat - yippeee!
thermostat
thermostat
thermostat
adjustable thermostat for my office
I turn off the blower on my office's HVAC unit sometimes.
jacket
Window air conditioner (because I only have one window and can't open it)
I cover the vents
thermostat in office
humidifier
turn off heat
Dressing in layers
cannot use space hearter due to insufficient electricity; wear a coat and snow pants
keep the door open
Electric blanket once or twice because HVAC is sometimes unreliable
Wall thermostat
sweaters

lots of extra layers
Room thermostat
bullky clothng
hooded sweatshirt
Blanket, Coat, Sweater
opening doors, extra jacket
sweaters/clothing layers
Sweater
wear layers of clothing
space heater isn't used very often
I wear multiple layers. The pattern is frigid till about 3 o'clock. Then - for whatever reason - the heat finally seems to come on. Moral of story. More to equal levels of heat in the winter. Less AC in the summer.
leave to warm up
i also use incandescent light bulbs instead of the flourescent tubes overhead because the bulbs put off more heat and warm my room temp a few degrees.
thermostat
Temperature is inconsistent
this past winter seemed worse - maybe contsruction related
turn off radiator
layers of clothing stored in office
Sweater(S)
I turn off the heating unit
Heating and personal thermostat
Turn the radiators on or off.
sweater
extra layers of clothing
wear layered clothing
sweater
Wear more clothes. Raise temp as last resort.
Building's heating which I control for my office
Thermostat, coat
Individual thermostat
Thermostat
thermostat
warm clothes
attempt to turn off radiator
I sit next to the elevator shaft & it is quite cold at times.

Winter hat and gloves
Dress in layers
Wear layers of clothing
adjust thermostat
Extra clothing, coat
it depends on the weather
Usually try to layer clothing or wear a scarf around my neck
jacket
sweater or jacket
WE COVER THE VENTS W BLANKETS
sweaters, shawls, gloves
electronic foot warmer
Individual heater and A/C
wear heavier clothes
Extra Clothes due to single pane windows with ice on the inside
heavy sweater
Close vent and put box over it.
air conditioner
Heavier clothes
Window AC
thermostat
standing fan
Many layers of clothing/gloves/etc.
open door
window air conditioner
Sweater/Jacket
sweater
thermostat
Turn off heat
Window Air Conditioner
Extra clothes
Sweater
office thermostat
sweater/fleece
Electric space heater
Thermostat that works sometimes
gloves with the fingers out & jackets
we have a thermostat on our floor so, we can adjust the temp.

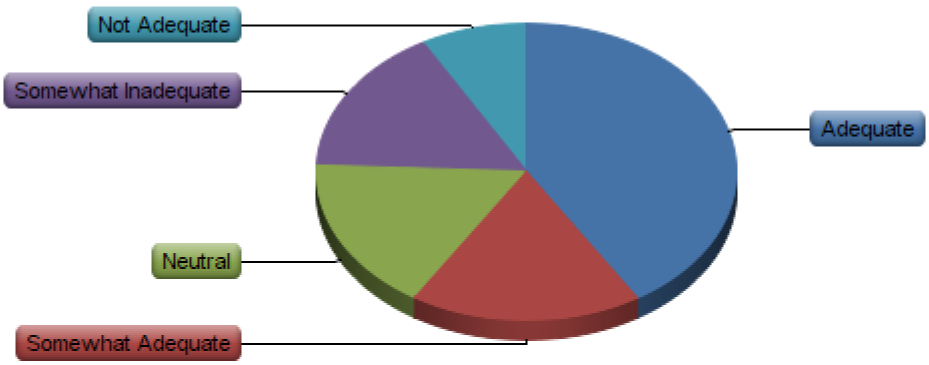
open window
if too hot, fan used
Plastic over windows
Window airconditioner
Thermostats
Wall unit
in-room thermostat
Put on more layers of clothes
Temp is 78 degrees - much too hot!
Layer
I mostly leave the heat off, except for the very coldest days
It is always extremely warm in our office. We prop the door open with a trash can to get air inside
cover register
Removing layers of clothes
autoclave, sometimes
the wind seeps through the window
sweatshirt
Adjust thermostat
The temperature in EG in the spring/fall is so hot it's unbearable.
Sweater
I turn the thermostat in my office off. It would be too hot otherwise
The room have a dedicated heating/cooling unit
turn off the central heat
extra warm clothes needed at times.
thermostat
dedicated AC
Coat
Depends on the day (for previous question).
AC
airconditioner
Leave door open
I wear warmer clothes
extra layers of clothing
wear gloves
sometime heater
sweater
Thermostat
electric blanket

I have the heat permanently turned off
sweaters
If I had a window, I would open it
sweater or coat
wearing sweaters
I open the window when it too hot and use a space heater when it is too cold. We cannot regulate the heat in the building.
heat/air wall unit
adjusting window blinds especially with morning sun
coat
Space heaters are banned i our building and our windows are sealed
i dress more warmly
We had no heat all winter. We could not use space heaters because it would blow the fuse.
sweater in winter
Water Radiator Heat
Wear extra layers and always have an extra sweater available
Open window
layering
Oil Filled Radiator Heater
AC Window Unit
Adjustable thermostat
blanket on my legs
the wire are old
Layers of clothing I can remove as necessary
steam radiator
dress warmly
Wearing lots of sweaters
Mechanical switch on airconditioner/heater
temp. fluctuates
Steam heat radiator
Heat Pad
Heating system
I have a heating pad
Extra Sweater
sweater
i have a control in my office
Previous question-cool to very cool-rarely too cold-wear sweaters!
Open doors

rob knapp
office-specific blower with thermostat
Same responbse as for Summer months
i can turn on/off heat vent in my space
wear my overcoat inside
Sweat shirt
someone else uses the heater because she is cold but I am not!!!
electric space heater
shut doors to hallway to conserve heat
Turn on heat in office/old building
Layered clothing
sweaters & jackets
breakroom
adjust thermostat
Sweaters
Heavy layers of clothing
layered clothing

Statistic	Value
Min Value	1
Max Value	5
Total Responses	1,364

14. Do you feel that the air quality in your primary office space is adequate?



#	Answer		Response	%
1	Adequate		567	41%
2	Somewhat Adequate		244	18%
3	Neutral		231	17%
4	Somewhat Inadequate		222	16%
5	Not Adequate		113	8%
	Total		1,377	100%

Statistic	Value
Min Value	1
Max Value	5
Mean	2.32
Variance	1.86
Standard Deviation	1.36
Total Responses	1,377

15. Do you use any of the following to adjust the air quality in your primary office space? Check all that apply.

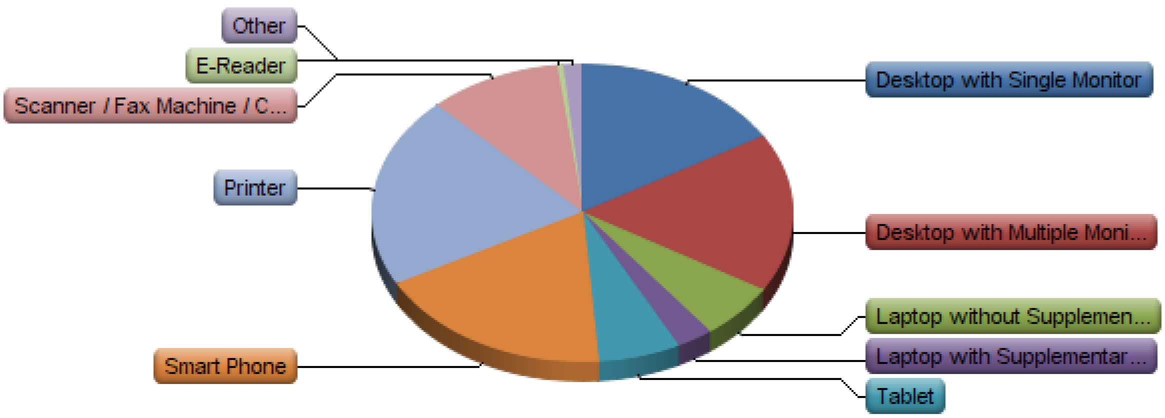
#	Answer		Response	%
1	Personal Air Filter		57	4%
2	Dehumidifier		14	1%
3	Humidifier		56	4%
4	None		1,191	87%
5	Other		64	5%

Other
plants
open window
running outside to ask people not to smoke near the intake
plants
electric fan
plants
opening doors
Febreeze
Open a window
personal mask
Open window
open window
fans for air circulation
Office air filter
personal fan
will purchase an air filter
Open Doors to outside
opening window
We have many, many plants
Filters over air vents
Non electric desk top humidifier
large air filter in common area
Open window
don't work in office as much as I would
Would like air filter, but no
Open Window
I run my fan to circulate the air.
personal electric fan
would use personal air filter if I
I wish we could open the windows for fresh air.
industrial filer has been added
Window airconditioner
Air Cleaner / Fan

Open window
Work in another space
Lots of plants
window
Open windows in spring.
I open the window
fan, when necessary
plants
air filter under air outlet
Plant
fan, vaporizer
There is no air flow, and it feels stagnant and unhealthy, but it is an issue in the entire area I'm in, and just one unit of air filters or humidifiers or fans would not be adequate to solve the issue.
would use one of the above but our department will not allow the purchase
I wish!!
personal fan
clean the air duck
I would like to have a filter put on the vent on the ceiling.
window
can open window in our testing room next to mine if needed.   Usually it is for somebody having perfume or aftershave.
Office Air Filter
Occassionally open the window.
Open doors
rob knapp
Jackets and coats on and off
Open the window
Question the saftey of the air
We have had an air analysis--we have mold and fungus
open window
Fan

Statistic	Value
Min Value	1
Max Value	5
Total Responses	1,363

16. Which if any of the following computing device(s) do you typically utilize in your primary office space? Please check all that apply.



#	Answer		Response	%
1	Desktop with Single Monitor		619	45%
2	Desktop with Multiple Monitors		651	47%
3	Laptop without Supplementary Monitor		227	16%
4	Laptop with Supplementary Monitor		106	8%
5	Tablet		237	17%
6	Smart Phone		687	50%
7	Printer		783	57%
8	Scanner / Fax Machine / Copy Machine		384	28%
9	E-Reader		17	1%
10	Other		58	4%

Other
desktop in lecture hall

4 desktop PCs for video capture and editing as well
Second desktop and scanner
telephone
calculator, cup warmer
projector
small desktop scanner
and monitor for automation system
desktop speakers
Various AV playback decks (turntable, cassette deck, VHS, etc.)
Scanner/Fujitsu
VOIP IP Phone
APC
Shredder, Fax, Credit Card Terminal
Server
Coin Counter/ Check Endorser
CD/DVD burner
Two desktop units with one monitor
Laptop with docking station and extra monitor
2nd desktop with single monitor
Four other computers each with 1 monitor
perpherals are centrally located
Plus monitor
2 desktops and 2 monitors
Flip Phone
Label Printer, Ticket Printer
dymo label printer,electric hole puncher
There are approximately 13 work stations, two printers and numerous smart phones in use in my office
Hand Scanner for Inventory System
Phone
30 min in computer lab before work
third and fourth desktop with monitor
Server
Desktop with dual monitors and two servers
multi-function printer (copier)
label printer
Photo printer
scanner no fax
calculator
two additonal desktops with one monitor each
Lync Phone
computer server
VME crate
2 additonal desktops and monitors
clean the air duck
Desk Phone

Tech office, we see many types of additional electronic devices.
caluculator, phone
cell phone
Office Phone
lyncphone
shared computer
phone hooked to computer
Battery operated calculator
IU Lync phone

Statistic	Value
Min Value	1
Max Value	10
Total Responses	1,380

17. Other than your primary office computer, do you charge any personal electronic devices in your primary office space?

#	Answer		Response	%
1	Yes		602	44%
2	No		776	56%
	Total		1,378	100%

Statistic	Value
Min Value	1
Max Value	2
Mean	1.56
Variance	0.25
Standard Deviation	0.50
Total Responses	1,378

18. Do you keep your personal electronic device plugged in continuously or do you only charge the device when needed?

#	Answer		Response	%
1	Plugged in Continuously		55	9%
2	Only Plugged in when Devices Need to be Charged		546	91%
	Total		601	100%

Statistic	Value
Min Value	1
Max Value	2
Mean	1.91
Variance	0.08
Standard Deviation	0.29
Total Responses	601

19. Does your primary office space have a printer that is specifically for your individual usage (or use by only you and your office mates in an enclosed shared office space)?

#	Answer		Response	%
1	Yes		834	61%
2	No		541	39%
	Total		1,375	100%

Statistic	Value
Min Value	1
Max Value	2
Mean	1.39
Variance	0.24
Standard Deviation	0.49
Total Responses	1,375

20. Do you use other areas with computing capabilities outside of your individual workspace such as a dedicated printer release station for your department or a faculty/staff computer lab?

#	Answer		Response	%
1	Yes		825	60%
2	No		552	40%
	Total		1,377	100%

Statistic	Value
Min Value	1
Max Value	2
Mean	1.40
Variance	0.24
Standard Deviation	0.49
Total Responses	1,377

21. Thin Client Computers are limited functionality machines that are currently utilized at some print release stations around IU's campus. These machines have Internet, word processing, Adobe PDF, and printing capabilities but will not run analysis,visualization, or other memory intensive programs. Additionally, these options use less energy than a traditional desktop workstation. How would feel about replacing your traditional desktop workstation with the following more energy efficient computing-based technologies?

Question	Strongly Support	Somewhat Support	Neutral	Somewhat Oppose	Strongly Oppose	Would Like More Information	Do not Currently Use a Traditional Desktop Workstation	Total Responses	Mean
Thin Client Computer	61	103	183	131	597	199	79	1,353	4.49
Tablet Computer with additional Keyboard and Monitor	82	139	173	188	553	138	80	1,353	4.27
Laptop Computer instead of Desktop Computer	188	192	219	199	385	78	100	1,361	3.76

Statistic	Thin Client Computer	Tablet Computer with additional Keyboard and Monitor	Laptop Computer instead of Desktop Computer
Min Value	1	1	1
Max Value	7	7	7
Mean	4.49	4.27	3.76
Variance	2.16	2.36	3.09
Standard Deviation	1.47	1.54	1.76
Total Responses	1,353	1,353	1,361

22. What additional plug-in personal electronic devices have you brought into your workspace? Please check all that apply.

#	Answer		Response	%
1	Refrigerator (any size)		272	32%
2	Coffee Maker		192	23%
3	Toaster / Toaster Oven		45	5%
4	Microwave		183	21%
5	Teapot		150	18%
6	Desk Light		305	36%
7	Pencil Sharpener		97	11%
8	Clock		60	7%
9	Radio		63	7%
10	Music Playing Device (iPod Docking Station, CD Player, etc.)		85	10%
11	Other		174	20%

Other
desktop in lecture hall
4 desktop PCs for video capture and editing as well
Second desktop and scanner
telephone
calculator, cup warmer
projector
small desktop scanner
and monitor for automation system
desktop speakers
Various AV playback decks (turntable, cassette deck, VHS, etc.)
Scanner/Fujitsu
VOIP IP Phone
APC
Shredder, Fax, Credit Card Terminal
Server
Coin Counter/ Check Endorser
CD/DVD burner

Two desktop units with one monitor
Laptop with docking station and extra monitor
2nd desktop with single monitor
Four other computers each with 1 monitor
perpherals are centrally located
Plus monitor
2 desktops and 2 monitors
Flip Phone
Label Printer, Ticket Printer
dymo label printer,electric hole puncher
There are approximately 13 work stations, two printers and numerous smart phones in use in my office
Hand Scanner for Inventory System
Phone
30 min in computer lab before work
third and fourth desktop with monitor
Server
Desktop with dual monitors and two servers
multi-function printer (copier)
label printer
Photo printer
scanner no fax
calculator
two additonal desktops with one monitor each
Lync Phone
computer server
VME crate
2 additonal desktops and monitors
clean the air duck
Desk Phone
Tech office, we see many types of additional electronic devices.
caluculator, phone
cell phone
Office Phone
lyncphone
shared computer
phone hooked to computer
Battery operated calculator
IU Lync phone

Statistic	Value
Min Value	1
Max Value	11
Total Responses	853

23. Does your building have any policies indicating what devices you are allowed to bring into your workspace?				
#	Answer		Response	%
1	Yes		170	12%
2	No		429	31%
3	Do Not Know		777	56%
	Total		1,376	100%

Statistic	Value
Min Value	1
Max Value	3
Mean	2.44
Variance	0.49
Standard Deviation	0.70
Total Responses	1,376

24. Please Identify which of the following areas are covered by the building policy. Please Check All that Apply.

#	Answer		Response	%
1	Personal Computers		29	17%
2	Personal Printer / Fax / Scanner		30	18%
3	Personal Microwaves		72	43%
4	Personal Coffee / Tea Makers		65	39%
5	Personal Temperature Control Devices (ex: space heaters and fans)		92	55%
6	Supplementary Lighting (ex: desk lamps)		28	17%
7	Do Not Know		32	19%
8	Other		17	10%

Other
cooking equipment
This question is very unclear
candles, incense, potpourri heaters, radios, televisions
don't know all of them
Anything listed in the A-Z Guide
refrigerators
No hotplates
refrigerators
hotplates
Refrigerators temp and usage parameters
Personal refrigerators
hot plates
Wireless devices
Fridges

Statistic	Value
Min Value	1
Max Value	8
Total Responses	166

Appendix C
Faculty and Staff Responses to Survey

25. Please Identify which of the following programs you use on a regular basis. Please Check All that Apply.

#	Answer		Response	%
1	Office Word / Office PowerPoint / Office Project (or equivalents)		1,332	97%
2	Office Excel (or equivalent)		1,231	90%
3	Office Visio (or equivalent)		79	6%
4	SAS / SPSS / State / R / MatLab / GIS(or equivalent statistics analysis program)		203	15%
5	@ Risk (or equivalent)		13	1%
6	Kuali (or equivalent)		812	59%
7	AIM / MMS (or equivalent)		146	11%
8	Cboard (or equivalent)		26	2%
9	PeopleSoft		486	36%
10	TIME		634	46%
11	Graphics Visualization Programs		240	18%
12	Music Compositional Programs		38	3%
13	Adobe Design Products		754	55%
14	Other Specialty Design or Analysis Program: Please Identify		276	20%

Other Specialty Design or Analysis Program: Please Identify

GIS, PETRA, SQL Server
Filemaker Pro
Adobe Premiere CS6 Video Editing
AutoCAD
latex, programming languages
Dreamweaver/web editing
crystallographic programs
Photoshop, Audacity,Moviemaker
Sci2
NVivo
NVIVO
Microsoft Access
database programs
Crystal report writer
starnet
latex, emacs, dvi viewer, mathematica, ssh client
Visual (lighting design), AutoCAD
raw video
AutoCAD
Symplicity
audito editing: Adobe Audtion, MediaTouch, music programming, MusicMaster
DoubleMap bus tracking, SharePoint
oncourse
AMOS
MSD Chemstation
SQL
Fortran compiler, eCognition, ERDAS Imagine, Ctech MVS, Hydrus,
Neurolucida Explorer, Neuroexplorer, SigmaPlot, MatLab, specialized software for data collection in my lab
Micros Opera PMS
databases
Statview
Access
ScheduAll
Steinberg Wavelab, SilverFast Ai, WinSCP, various preservation and medata programs, Oxygen XML editor
Access Database
Atlas.ti, N*Vivo

ExamSoft
AutoCAD and Visual
vim, Eclipse, Chrome, Virtualbox
Adobe Acrobat
MestreNova, Chemdraw
A/V software (involving large files)
ProjectDox used Autodesk Design
Programming Integrated Development Environments
Acdcess, WordPerfect, Powerpoint
sas enterprise miner, aqua data studio
card management systems
projectdox
ILLiad, WorkFlows
Autocad
Audacity,Flash,VLCMediaPlayer,WindowsMediaPlayer,QuickTime,Windows Live Movie Maker, AquaData, Mozilla, Chrome, Internet Explorer, Microsoft Access, Paint, Notepad, TextPad, Outlook, Transporter MJC, Lync,WindowsExplorer,CommandWindow/UNIX,SQR4windows
Nvivo, Camtasia, Python, Gephi, Tableau, IUIE
AquaData Studio, SSH, iOpus, remote desktop to multiple machines, SQR for Windows, MS Access, multiple browsers, TextPad
sunapsis
Autocadd, Vectorworks, Lightwright5
SUNAPSIS
iMovie, Access (Word)
sql studio
VirtualBox, Adobe products, web browsers, Lync, Evernote, Spotify, Skype....
ArcGIS
WCMS, Photoshop, Dreamweaver
Oxygen, WorkFlows by SIRSI, OCLC Connexion
DreamWeaver
SketchUp
AIS database, Allegiance database
custom software for my field
internet browser
ChemDraw, Prism
Outlook
Sublime Text, Chrome, Terminal
Kronos, QuickBooks, Salon Biz, RecTrac
Ticketing Software

HMS & other AIT programs specifically designed for RPS Housing Assignments
HMS, Firefox for internet programs
Development and DBA software
QuickBooks
Visual Studio
Server administration tools and system testing
Visual Studio, Mentor Graphics, EagleCAD
AnyClient/Endnote/NVivo
Mathematica, root
FileMaker Pro databases
Unity
IRAF
Mathematica, TeXShop
Office Access
CASES Computer Assisted Telephone Interviewing Software
Filemaker Pro, Keynote
Dreamweaver
Geneious
Video and audio editing software
Final Cut Pro X
ArcGIS
You misspelled Stata
IE, Safari, Acrobat
specialized data analysis software running in MATLAB environment: SPM8, FSL, EEGLAB
powerpoint, mathematica
Sirsi WorkFlows
Digital Signage
Instrument specific software for data collection and processing
InDesign, MS Publisher
Filemaker Pro
IUIE
Workflows/Oddyssey HMS
SIS, Astra
AutoCAD
Mass Spec Data Analysis
embarking on digital project, so about to do more GIS
SIS, BLGTN HOSP, DOCS TO DOCS, GOOGLE, WORKFLOW, MEDICAT/CHART MGR, ECW
GIS

Workflows, OCLC
DB Querying Programs, Visual Studio
FlowJo flow cytometry software
IUIE
Compucell3D, COPASI, SBW, PowerPoint, Mendeley Desktop, Firefox, notepad++, python
MS Access Databases
Sirsi Workflows
Paradox database
CS Gold, Symplicity
Mplus
databases and data analysis software
Accommodate
Firefox (web browser), Box, VOIP
Numerous specialized programs and software for my research; my research is done primarily via my desktop computer and by accessing other IU computing resources (e.g., the SDA) outside my building
Career Management Software (Symplicity)
AutoCad
Access Database
IQ
Latex, mathematica
software
several music-related programs, Variations, Audacity, EndNote, etc.
OnBase, Carina, SIS
Inventor and ROOT
various datalogger software
PeopleAdmin
FIJI
In-house systems: Foxpro; Sequel & outside software Jump Forward
Access
language analysis programs
scrivener
The Enthograph (qualitative analysis)
Ecw
gnuplot, AUTO, fortran, xfig, LaTeX
TEST BANK SOFTWARE
offsite data interfaces, eg. WRDS/SNL
Root, McStas, MCNP
NA

SQL Plus Worksheet
Auto desk programs and adobe suite
Sports Injury Managememt System
RTA, FUELMASTER
Archtics
Lync, Rec Trac(Recreational Specific software), Event Management System (EMS)
Delphi
Microsoft Access
ArcGIS
graphing programs
programming softward, database software
Oxygen XML Editor
I'm an academic advisor, and we have many specialized student and advising records systems.
Video editing software: Final Cut Pro
Paradox
R; Stata; Matlab; C++; ArcGis; LaTeX; numerous other spreadsheet programs
OnBase process flow software
Music notation software
GIS
SIMS
ChemDraw, CisPro
Tableau (IU's new BI tool); SAS Enterprise Miner (Data Mining)
Microsoft Publisher
FileMaker Pro database
Library system
TOPCAT, IRAF, discipline-specific
Invivo, Ethnograph
Chemstation
LaTeX
IT Management tools
On Course
Visual Studio, Eclipse, Matlab, MySQL Workbench
GIS/Remote Sensing
Microsoft System Center Tools
Various programming environments - IDEs and compilers
Esri Products
Unix shell programs that I have authored, text based data analysis
Symplicity

Maple, TeX
Pyware (marching band drill design)
WordPerfect, Paradox, Papers
Internal Billing Software
scrivner
WinFig, Windows photo manager, WinEdt
MathType, TurningPoint
Too many to list
sirsi
Adobe Production Suite
SQL Server
access
Browsers, email, Lync, LDAP browsers, VMWare Fusion, terminal, Remote Desktop Admin, Calendar, Disk image creation utilities, text editors, Aperture, iMovie/Final Cut/Premier, Aqua Data Studio, etc.
Outlook, Access, Notepad, IUExporter (custom program)
Ecw
Electronic medical record software specific to our clinic
Eclipse, Visual Studio
WorkFlows and Conenxion
Workflows
Software development (javac, eclipse, vi, clang, make, etc); Latex
Office Access
Publisher
Tableau
RTA Fleet Management System
Oxygen
Access, online career system, online Teacher Ed system
Access
outlook
Omnigraffle
CATS Pajamas, FileMaker Pro
Unix
IT Office we use several IT related programs
I use specialized server & network monitoring software and apps provided for IT Professionals (ITPs, formerly LSPs) group; Echo360 and other high end video-making/videoconferencing apps; Lync (if you do not count that with MS Office above); GIS is mentioned above, but I need to indicate that I use some free GIS products though my primary GIS programs is ArcGIS Desktop 10.2; and I use programs like Audacity for audio. Basically, I am a high-end user as an ITP. The school has tried thin clients in various areas, and there are all sorts of issues with some of the virtualized software. Our graduate students hate to

use SPSS from IU Anyware, and I'm not sure why.
Editing software
ECW electronic medical record
mastercam
InDesign
WCMS
compulink, peachtree
ACES 2
GraphPad Prism; SigmaPlot; NeuroExplorer; Spike2
Office Access, Navicat
TeX
CRM, email, WCMS, Tableau
AnyClient
Visual Studio (.net Programming)
Filemaker Pro
CMBoss, FilemakerPro
Visual Studio, Eclipse
linux
Lisrel, IRT, HLM, Auxcal, M-Plus
SIS
Coot, PyMol,
Endnote
FileMaker
Symplicity
Adobe Dreamweaver
We use all types of programes for testing and diagnosing purposes
Matlab
Delphi;   Opera; Meeting Matrix
SQL Studio, a variety of web browsers, Outlook
web based
Final Cut Pro, Audacity, CyberDuck, Oxygen
Maple
root, x11, ppt, keynote, solidworks, ...
Argus collections management software
SharePoint Designer, InfoPath
Microsoft Access
T2 Flex
Configuration Manager

Conference Programmer - our business database
ssh client
unix, text editors, LaTeX
NVivo
KnowledgeLake
Vison Expert 9, versaworks
Active HDL, Cadence OrCAD
Final Cut Pro
multiple specialized health information systems
other MS office products
"inventor" 3D CAD design software

Statistic	Value
Min Value	1
Max Value	14
Total Responses	1,367

26. Thank you for completing our survey. Please provide any feedback or additional information in the block below.
Text Response
Need cooler temps in the buildings during the summer months.
Only opposed to thin clients in my workspace due to the fact that I perform HD Video Editing and require the additional power of a desktop PC. Most user in my school would be fine with thin clients.
Memorial Hall could be made much more energy efficient if they installed thermostats so that we could control the heating instead of having to open the window or switch on the air conditioner ...
It is important to me, as buildings are renovated and updated, that it still be possible to open windows. I worry about the air quality in closed-system buildings.
During the summer, the temperature is both too cold and too hot, depending on the time of day. There was no option for that in the survey. I usually have to bring a sweater for half of the day and sweat through the rest. / / Also, I'm pretty much always cold, so I'm probably an outlier. I wear gloves when my co-workers are too warm, which makes the no-personal heater policy in my building somewhat frustrating, since it means I'm always freezing.
Heat and a/c needs in Ballantine first floor are met more efficiently when outside doors, hallway doors, and classroom windows are kept closed. No one monitors this practical need, therefore, it can be very cold in winter and very hot/muggy in summer when going in the hallway to use the restroom or get some exercise.
Question on office temp - can vary greatly depending on time of day. Mornings in winter typically quite cold; by afternoon it can be fine. Summer generally fine unless there is a rationing of the cool air.
It is always 70 in my office- too warm.
Ballantine Hall would be oh so much more efficient if youse guys bit the bullet and put in building-wide air conditioning. This business of having people have window air conditioners must positively EAT energy and it adversely affects air quality because it reflects air circulation. I note you also did not ask about classrooms in Ballantine, which may be too cold or too hot at any time of the year. Nothing like having people open windows in the middle of winter to cool off a too-hot classroom to let energy fly out of the window!
My office temperature is basically unbearable unless the outisde temperature is between 60 and 75 degrees. So I spend as little time there as possible. I'd be a lot more productive if I had a reasonably comfortable place to work.
Nicely designed survey! I got a little concerned when you started to comingle questions on air quality and air temperature. Because the SPEA windows do not open, air quality is sometimes a problem and to make matters worse, I have fragrance sensitivies that cause health problems. I hope that cost savings are never used to justify any decrease in the building's air quality.
You should ask these questions about research space. Very different answers.
Many of the classroom spaces in the School of Education have thermostats that are set way too high in the winter or summer for heating or cooling. I think it's an incredible waste of energy for large classrooms to be heated or cooled overnight and over weekends without any regulation or control. Similarly, I don't think that people are very conscious about adjusted the thermostats in their offices to a moderate temperature, esp. over vacations. / In general, I would support the use of alternative energy sources at IU, such as solar and wind. After the initial investment, the university would save millions of dollars.

On some occasions, the air handling system discharges black soot from the ceiling vent onto my desk. This damages papers that I have on the desk and creates health concerns. I hope this will be resolved with the building renovation.
I'm a SPEA graduate who remembers capstone -- good luck!!!
Oops in the question about temperature in the summer I should have said too hot.
I wish we did not allow scented candles. Strong smells give me a headache and make me feel ill. It is only because I was able to convince coworkers I cannot tolerate the smell that they don't burn them. Other offices close by do - luckily the offenders got other jobs and moved out of this area. Surprising the burning of candles is allowed - I would think it to be a fire hazard.
Encourage the removal of mini fridges and the use of refrigerators in common rooms. These are the elephants in the room.
In the SOE we share thermostats and that is why I am always uncomfortable. The other person is always cold and I am hot.
I find that two monitors makes my worktime much more efficient and greatly reduces the need to print out materials. When I work on a personal laptop or one borrowed from the office, I get quite frustrated by the lack of desktop space.
The survey did not ask about the lighting situation in my office space and that is a key issue for myself and everyone in my building. We do not have control over our lighting. There are no light switches. All lighting is light- and motion-activated overhead florescent lights. However, they clearly do not work. Frequently individuals in my office will sit in the dark all day, unable to get their lights to come one, while simultaneously, the lights are on all day in an empty office. The lights in my office would go on and off all day depending on whether the sun was behind a cloud or whether I had moved around enough. I resorted to unscrewing the florescent bulbs in my overhead lights and now use an incandescent desk lamp and floor lamp as well as the built in florescent light in the desk itself. / / Related to the heat in the building. The heat distributes in such a way that most of it ends up in the first office next to the heater. If the door to that office is closed, the heat does not continue on down the rest of the hallway. The person in that office was out of the office for a week, when the door was opened, hot air billowed outs and chocolates on the desk had melted to a puddle. The rest of us had continued to to turn up the temperature on the thermostat not knowing that all the heat was trapped in that office.
to run the statistical analyses necessary for my job, I have to have a very powerful desktop with multiple monitors. I have a "back-up" desktop in my office that I sometimes use for basic email, word processing, Excel, etc. while my main computer is running outputs. As far as temperature control, I feel like in general all IU buildings are over-air-conditioned in the summer months.
There is so much waste in Ballantine. I will come into my office sometimes and the heat will be blasting away in the winter. In the summer it is grossly hot, and I hate using the AC unit, which is noisy and probably allergen-generating. I am appalled by all the waste on campus like this. I teach in classrooms both inside and outside of Ballantine that are either over-heated (winter) or over air-conditioned (summer). I often call Physical Plant to complain. What ever happened to maintaining 68 degrees year round?
My computer workstation is my research laboratory.
About air quality: the building often has a strong gas smell.
I think it's actually colder in the summer in MSBII than it is in the winter. I think this is more of a problem than it being a little too cold in the winter.

Please consider and address computer needs due to abilities - my need for a larger keyboard and screen are due to age related changes. Laptops and small screens are too challenging on my eyes and hands now. Also, regarding room temperature - this building is wrought with old and very decripit pipes and ventilation systems. Many of us request or bring in tools to open our windows due to extreme mold and humidity issues (water dripping from pipes above ceiling tiles, mold in air/heating vents, etc. We request cleaning out each year which building maitenance is wonderful about doing, but to replace is cost prohibitive. Opening window may not be sustainable but it is extremely necessary for allergies, illness, etc. Thank you!
There is a major project in Optometry to address airflow and heating/cooling. Part of the 5th floor will have vent work. My office is not in the part that may be fixed. When I sought to remedy the lack of heat, I was told that on a warm day, the temperature might reach 50 deg F during the Winter in my office. I am in temporary quarters until the weather is warmer, but the disruption to work this year has been excessive.
Individual faculty office are the greatest waste of resources in my building. Most are occupied no more than three to five hours per week. To heat, cool, light, furnish, and equip them is incredibly wasteful.
The university could save alot of money by allowing staff to work from home if possible and coming into work one or two days a week.
Do not like the idea of table system at all. The audiovisual processing work I do requires a heap of RAM and a very robust processor, so until tablet have considerably more computing power, a tablet won't do the trick.
The office is comfortable in the summer and winter because I wear a jacket or sweater at all times. The temperature tends to change to very warm after 3:00 during the summer months.
Alot of electricity is used in the IMU. Alot of it is wasteful. Leaving lights on when not needed.
Keep up the good work helping to save energy on campus. The whole wide world thanks you.
We have not had working air conditioning for the past 2 summers. I believe the high temperatures and poor air quality in our office space constitutes an unsafe working condition. Average temperatures in our office for 3 months last year were 85+ degrees, even with 30 personal fans running, the back door propped open 7:30-10am, and everyone drinking ice water, using ice packs, and turning off all electronics at night.
I am very concerned about the question regarding replacing my desktop computer with a shared work station or laptop. I work with a lot of sensitive student data. These data are confidential.
our building is still using the old style of steam heaters but has a new AC system - in the winter the building freezes - we are very limited on any type of plug in heaters because the wiring is not set up to handle it. Run the printer and the heater and the breaker trips. In the summer the side that gets the most sun is too hot and the other areas are too cold because those areas are upper level management and will request to have the temps set on a cooler temp.
I have personal items (like a coffee grinder, desk lamp) that I almost NEVER use, nor are these items plugged in. I usually plug them in while in use, and unplug them otherwise.
Although the temperature in my office is fine, and adjustable via the thermostat, the common spaces in Sycamore Hall could use some auditing, particularly the stairwells, which are often too hot. And the windows are very old, and likely inefficient. And I thought you might ask about leaving computers on all night, or turning them off to save electricity. I only shut mine off on weekends, for ease and time efficiency, but not energy efficiency.
worry more about the amount of water that leaks out of all the leaky faucets and you will save more

money
Its amazing to me when I look at the buildings like Ballantine, Kirkwood hall etc,,,,with literally HUNDREDS of window ac units operating year round because of the steam heat in the winter not controlled (at least in Kirkwood) that any consideration would be given to the energy useage by employee/equipment. Might be wise to take a look at replacing the window AC's with a Central AC unit in these buildings before nit picking other energy useage by employees. Just my opinion
Installing multiple light switch keys will save lots of energy in my office. At the moment, there is only one key that lights up entire office which is not necessary all the time. / Thanks for saving energy. /
I believe it would help if people had a way to switch off/on any extension cords for other electric products they use. Many electrical outlets are impossible without crawling under a desk; therefore extension cords are left plugged in whether or not they are being used. I believe this would be an energy savings to the campus. In our office, if it were kept just a tad bit cooler in the summer and the air were turned on 2 hours before 8 am, fans would not be necessary. Heaters would not be necessary in the winter if the building were heated 2 hours before we started work. Our cutbacks have been too much; and I know of other departments which have their heat and air set wherever they want it. It's not fair that some suffer a lot, and others, not at all.
We are in a newly remodeled building, that was remodeled with no light switches, only motion sensors. We are unable to override these sensors to turn lights off and on. As a result, we see a lot of wasted electricity because lights in unused rooms come on and stay on for hours when someone walks by in the hallway. Additionally, several of our employees have reported driving past the building at night and seeing the lights on, when no one is here (long after janitorial has come through). It would be much more efficient to just give us light switches that we could turn off and on, rather than having these motion sensors kicking on all the time when the lights aren't needed.
We are blessed with one of the most user-friendly computer campuses we could possibly have. I greatly appreciate the resources we are allowed to use, with top-of-the-line speed and computing power and reliability.
The air quality in Eigenmann on the upper floors is not good. Our windows do not open and when the heat is on too high, the air on our floor stagnates. This was particularly problematic for me in the late winter when I was pregnant and there was no air circulation. I found my nausea was much worse in the office. / / I had that our overhead lights are on timers. Most of the time I do not need to use the light because of our large windows, but when I do need the light it turns off while I am working. Often it is on when I don't need it. I think most people with their own offices are responsible about how they use light switches, and I find this light obnoxious. Part of the reason for this seems to be due to the light switches not being well-located, but it is still undesirable.
I wish more people would perform simple functions daily like turning off their monitors and using low power screen savers. I successfully convinced my colleagues in our shared office space to keep one set of lights permanently turned off. Our space is particularly comfortable but I know other parts of the building are often too warm or too cold. Thank you for this opportunity.
Better insulated windows would help regulate the office temperature.
We the where my cube is located has access to its own thermastat. We can, and do, alter our temperature as desired. I have my own window and a fan. I guess I'm pretty lucky!
I'd be perfectly happy with a laptop or tablet with keyboard instead of a desktop work-station, but I do need a place to work in my office.

The thermostat for our entire office suite is located in an office that sits on the corner of the building, above the garage, with two walls of windows. When it is hot outside, it means the air conditioning is too cold in all of the other offices, and in the winter, the heat is too warm in all of the other offices. Everyone else has to use space heaters and fans to regulate temperature.
I am relatively new to this department, so I have not spent the summer months in my office yet. I selected "too cold" because that's been my experience in most IU buildings during the summer.
One way of saving energy would be to enable individual users of offices to switch off the air-conditioning: mine is blowing constantly, whereas I would like to have it switched off unless it is absolutely necessary to use it.
we can't open any windows in eigenmann which is really, really, really awful. like, makes me want to cry awful. so just fyi, some answers were not applicable to me because of that.
I work in software development and also use a lot of media (audio and video) processing and analysis tools. Thin clients are a poor choice for me.
It has been a very cold winter inside of my office. The building was renovated, but the windows do not feel energy efficient. I have towels on the ledge and keep my blinds drawn on very cold days to keep the office warmer. My space heater thermostat in the winter most times read between 62 and 66 degrees first thing in the morning before I turned it on to heat up the office.
Would appreciate possibility of opening windows. Also would appreciate non-florescent lights.
Part of the problem with heating/cooling is that two different office complexes are on the same temperature control. The office with windows gets too cold in the winter, but the office without windows gets too hot. It would be more efficient if the older windows were replaced and/or the offices were on different controls. FYI, the windows are set to be replaced in May 2014.
Air quality periodically gets bad due to chemical fumes and when building's humidifier gets contaminated. This is the area where major improvement is needed.
Temperature questions should have an option to check that denotes variable. I said just right, but some days the office is too hot and some days it is too cold--especially when there is a sudden dramatic temperature shift outside. I have spare clothes in my office to layer appropriately. The desired temperature also varies by activity. It is harder to stay warm when typing at my computer than when animated teaching students in my office.
It would be nice to have building where the windows could be opened for warm days. Our office is cold in the winter and then either too hot or again cold in the summer. We need thermostates that actually work.
Building temperatures are inconsistent. They can be very warm in one area and very cold in the adjoining area. All light switches should have automatic on/off capability. In our office there are lights that cannot be turned off and/or are left on all night and weekends.
Nice survey!
In our laboratory a lot of people use portable fans all year round and several use a space heater near their feet, Mostly I think they think it is too warm.
In general, public spaces not just the university are expending too much energy for air conditioning during the summer.

our office space is shared by 3 staff. Only personal electronic devices are smartphones. Small refrigerator, microwave, coffeemaker, teapot shared by all. No access to any type of kitchen. 2 network printers. 1 printer shared by 5 PC units. 1printer used by supervisor (me) only. Copier used by all-but usage has been decreased. We are trying to conserve printing & copying. Have not ordered paper for 2 years. Print on both sides. Trying to make most processes paperless. No longer have a fax machine. Removed 1/2 of fluorescent ceiling light bulbs. Only use over head lights on cloudy days. Use natural sunlight as much as possible. We turn all computer monitors off at night and put computers on the restart mode.
The printer in my private office is networked to the rest of the department, thus is not "only" for my use. Your question did not provide this option. My private cell phone is kept charged due to the unreliability of the Lync phone system and the need to be able to dial 911. I have a thermostat in my office, which I can control, but I cannot control air movement. At times the air temperature is fine but feels stagnant and stale, the windows do not open and I have no room for a tabletop fan.
Office windows do not seal completely. During cold weather there is a large draft coming in around the windows causing the office temperature to be too cold. On windy days dirt blows in on the window seals.
I'm a developer, so for a laptop to work, it would have to be at least a quad core with 8gb of ram, minimum. We are in an old house, so I'm sure the windows / walls are not insulated as well as they could be.
I previously worked in Cyberinfrastructure Building at 10th and the bypass and I hate that building and it's setup. There is no way to individually control your temperatures and the open space is not conducive to work. The only thing nice about the CIB is the natural lighting and windows but people have fights over the blinds. Now in that I'm in one of the oldest buildings on campus that is in severe need of renovation I like this building with the ability to open a window, turn on the radiator or the air conditioning. Some other parts of the building do have heat and cool issues. It can be too hot sometimes because some radiators can't be turned off. It can also be too hot in the summer because some spaces don't have air-conditioning. The office I share with one other person is very nice and we don't have issues negotiating the room temperature settings. Sharing the room with a number of other people would make that negotiation much harder.
Your two basic questions about temperature in summer and winter did not have an option for how I feel about the temperature. You should have had an option of All Of The Above since it is at different times Too Hot, Too Cold and Just Right.
It's hard to answer the questions about office temperature because it varies so much. In the winter, some days it's really cold and I use a small space heater to supplement. On other days it's like a furnace and I have to have the windows wide open, which seems like a real waste.
You are asking the wrong questions. The worst temperature balances occur during the switchover from hot to cold or cold to hot. September is terrible when the university starts switching on their global heating systems (steam tunnels) and then Indiana summer hits. Outside temperatures high, but heat still running full throttle inside the building. Is the current system of chilled water and steam really the most efficient way to heat/cool? _Always_ having ~50 degree water as chilled water and then "warming it up" or mixing in heat for building temperature management just seems inefficient to me, but may be the only way to temperature control large numbers of instutional buildings. / / Swain West is filled with single-pane windows. Over the top efforts at saving energy are imbalanced when so much is lost due to the university's unwillingness to do pursue renovations of older buildings. Same holds true of lighting - so many of our inefficient, older flourescent lighting units are switched off to save energy that it results in a dark, depressing environment. Replacing with higher efficienciy units or LED units would allow a

brighter envirnonment that in the end probably uses less total energy. Again, universitiy's avoidance of such renovations in favor of brand-new buildings where everything is up-to-date while a decent fraction of the community has to put up with older buildings.
I'm rather conservative about resources, and try hard to reduce my own use of electricity, etc. It's hard to get that message across to others who are not aware of their (over) use. I hope this survey helps change attitudes & usage, thanks for taking it on!
the heat in the first floor offices in the Geology building is terrible. It is sometimes so hot that it's difficult to work. It's impossible to regulate the temperature with the thermostat - I open the windows constantly.
I feel that the building could save energy by lowering the temperature of the hot water by one or two degrees.
Please note: There are other types of "staff" besides "Administrative" staff. It may be better if you do not specifically say "Administrative" in the early question about our role on campus. Thanks & good luck!
Ask Athletic department to not keep drink coolers running 24-7 between home football games.
The amount of microwaves and fridges in my building is, to me, excessive and should be limited.
The air quality at the IMU is horrible. For the past four years I have come into work every day only to have allergies flare up within an hour of arriving. Outside of work my allergies are controlled and do not cause me many problem. Here at the IMU it is almost a daily thing and has gotten to the point that I rarely wear makeup anymore because my eyes water so bad. I have asked if an air purifier would be possible on multiple occasions but to my knowledge, nothing has come of that.
Question about office temperature are misleading. Summer temperature is fine, except during rolling "cycling" of air conditioning, because too many buildings are on the same chilled water plant. They cut the AC during the hottest days of the year. Office is hot and muggy within minutes. Sometimes they turn it off and forget to turn it back on. Some areas of office are cooler than others summer and winter. / There is an old joke about "averages." If a man is standing with one foot on a hot stove and another on a block of ice, on average he's comfortable. / The temperature in the office is usually fine, but when it's bad, it is very, very bad.
Enter your state here
Just a general observation: Most campus buildings in the summer are much too cold. There should not be a need for people to wear sweaters to stay warm when it's 90 degrees outside. I would much prefer to have thermostats set at a temperature that is generally acknowledged to be comfortable for most people.
The survey did not ask about my secondary work location, where I have similar temperature concerns both in the summer and winter months. Also, in the winter months, the humidity is exceptionally low (16-24%RH) and causes problems with the nature of my laboratory work. It is difficult to get Physical Plant to take our temperature and humidity concerns seriously, and in a timely manner.

I have a thermostat in my office, so I can set the temperature where I want it. I stopped working at IU in the summer when there were rolling blackouts and it was so hot I was dripping with sweat just sitting still.
It would be nice to be able to regulate the air flow within our building during the winter and summer months to where we are not freezing or sufficating. The summer months are the worse because we just can't get enough fresh air through our building to make it comfortable.
I will not let them take my computer away. Nor my printer. Nor my teapot.
The heating / cooling system in the IUHC has been a problem for my entire 15 year career here. I STRONGLY endorse your move toward greener technologies.
While this is a commendable idea, you need to also consider that replacing computers with tablets etc may not be appropriate. I use data analysis software that will simply not work on a tablet (not enough disk space, or memory). You will need to ask users about their specific needs in greater detail in order to try to implement energy saving appropriately.
thank you for doing the survey and the research. I am willing to help IU reduce its energy costs. /
my widows don't open.
I would like to use a space heater in the winter, but have been told that doing so will pop the breaker. It would also be nice to have a hot pot, but I currently use a community microwave since I don't want to cause any power failures.
Classroom lights in Sycamore Hall are typically left on all weekend....never turned off by the last person leaving the classroom on Friday. They are turned off by the janitors after cleaning the rooms on Sunday night. I often will turn off lights if I have time. This could be a savings of electricity (and the earth's resources) if this problem were addressed. I'm sure this is not the only building where this happens.
We would love it if the third floor of Wells Library could be a little cooler. Even a degree would be great. It's always too hot here.
I think there should be more emphasis on sharing printers at one central area. Too many people have their own which seems to be a waste of resources.
Heating/Cooling unit in this office barely blows air, which may be a good thing, because the filters aren't changed and mold grows in these old units.
If the windows in the building blocked more air from coming in, the temperatures in the office would probably regulate more.
The questions about the temperature were difficult to adequately answer with the options given. Sometimes the worst time in my office is in the fall and spring when the outside temp does not match with if the heat or air conditioning on yet. It can be unbearably hot on warm spring days and extremely cold on cold fall days. Overall the temp of my office is not pleasant or controllable.
Temperature during summer or winter - varies but couldn't indicate both on your survey. Sometimes too hot, sometimes too cold - completely unpredictable and not controllable in my current office
I did not turn on my room's heater once all winter. My room stays warm between the sunlight (I'm east facing) and the heather of the other rooms on my floor. / / I use a lot of Adobe products, so I don't think I could use that thin computer or the tablet with keyboard option.
The office sometimes gets stuffy so air circulation is nonoptimal. In the summer opening the window helps but that is not an option in the winter.

The worst heating issues have to do with the inflexible heating period and no option to regulate heat. The office needs additional heat in the fall (have brought in my own space heater and worn woollen hats) and it is way too hot in the Spring, The old Window AC is terribly loud and if possible, I avoid using it which of course makes it diffcult to use the office in the summer. For me, the lack of a central department space with a larger fridge, oven, kettle and coffee-maker etc is strange and it wastes energy as people are forced to have these in the offices. I am considering getting a fridge. Eating out for lunch is not possible or affordable for everyone.
In some instances there is waste in the common areas--for example here at Kelley I have often walked in on the 2nd level in the morning to see the light on in the entry hallway on the 1st floor when the sunlight is pouring in. The same thing at the end of the day with the window lights on the west side. I routinely turn lights off in the "bridge" between the two buildings as there is plenty of natural light on most days between 8 and 5. I suspect the use of automatic light sensors would save IU tons of money.
My office is often too hot to be comfortable! The last two weeks it has been between 78 and 80 degrees every day. While I have a window, it is nailed shut and I am not able to get any fresh air. I do not complain a lot, but I find I'm getting headaches and am much more tired and irritable than normal. I understand the need to reduce energy, but please understand that keeping the buildings at such a hot temperature is a disruption to students, staff, and faculty. I am not as productive when I am this hot! Anything you can do to make sure that we don't roast this summer would be most appreciated.
I feel the servers on campus do not have the capability to handle the workload. They frequently have problems and shut down.
I believe we could open our windows 100 days a year and not have to worry about HVAC (although people with allergies would not be too happy).
Put corridor lights on timers, to dim them at night. I did them manually whenever I work at night.
if we could have individual room controls for the heat and air, perhaps controlled by one person, this room would be much more comfortable. We come in on Monday morns and it is like an oven, thus we open windows to cool down. For me this is an all year round thing, it is very rarely comfortable. There are ten people in this room, the hot nautured people sit in the hottest parts of room and the coldest one sit in the coldest part of room.
There was not a question about the temperature and air quality during Fall and Spring seasons. These times of year are the most problematic with the temperature in the offices. In the summer, A/C works, but in Fall & Spring it usually does not due to outside temperature. Windows were replaced with windows that do not open. This is a problem because we can't cool off or get fresh air.
I'd prefer cool CFL lighting than the traditional office florescent lighting.
The laboratory that is also my primary office space is a temperature controlled facility; the temperature cannot be allowed to fluctuate highly, and needs to be maintained at a stable, cool (70F) temperature year round for instrument stability.
I have an office computer that I never use except when I need to make a call from my office phone -- having to switch on a computer to make a phone call strikes me as a bit strange.
My main concern is the "health" of the SPEA building - many people seem to have respiratory / allergic issues in this environment.
It seems you are contemplating switching to centrally provided software. I use Linux and free software exclusively (eg, LaTeX), and would be extremely unhappy if I were unable to continue using that.
printer located here is shared with others in other offices; "personal" device that is charged here is a laptop used for meetings. This is a newly remodelled building, so not much going in way of electronic

devices except what has been purchased for our space (s).
When I have mentioned air quality concerns relating to specific situations, Environmental Health and Safety has responded fast and professionally. I greatly appreciate that.
If I were a "regular" computer user, I would be happy to work on a "thin" workstation; however, my computational needs are exceedlingly heavy. I use statistical software for simulation and analysis several times per week.
The air quality is bad in our building. It is very dry in the winter, causing irritation in nose and eyes etc. Also, there is often something in the air during other seasons that causes general respiratory irritation. When i leave the building, these issues go away - so I know it is not allergies.
I am able to adjust the temperature in my office with a thermostat. This is extremely helpful, as a I tend to keep it fairly cool in the winter and warmer than most in the summer. However, due to artwork in our offices, we are limited in heat and humidity options.
I have a late-2012 Mac Mini which has fairly low power requirements (http://www.everymac.com/systems/apple/mac_mini/specs/mac-mini-core-i5-2.5-late-2012-specs.html). Although I do drive two monitors with it.
I am considering adding a humidification device for next winter. This one was pretty dry!
Numerous typos in this survey, which doesn't give a positive impression to the user!
I'd love to adjust my office thermostat to reduce energy usage but I couldn't figure out how! / I'd love to use a thin client workstation in my office but my experience has been that they are too sluggish (not responsive in interactive use)!
This is to vague. Our building was in built in three diferrent phases so does not breath well . The air intakes etc are hard to adjust. Upstairs is 85 degrees downstairs 62.   Lights could be adjusted to the energy efficient florescent. I think on site evaluation would be the only to know what positive changes could be made.
My office is very stuffy and hot in the afternoon because it faces the south and it is not possible to open the window.
Humanists tend to have few computer needs compared to other disciplines. Please just leave us alone with our basic computers and printers. BUT...Ballantine Hall is awful for heating and cooling--that's the place to invest more money. And i don't just mean faculty offices, but classrooms, which are frequently either ovens or freezers. Such a waste....
The heating and cooling issue is major in my building. Offices are on common fuses that can't accommodate more than one electrical device beyond desktop computers. That means that when the temperature in offices is 45 degrees, which it was regularly this winter, only one person at a time can run a space heater without blowing a fuse. Not appropriate working conditions.
I work in the IT department so our computer usage is much different from the normal user. Also, we have a heating/AC unit exclusive to our office so we control the temperature.
At some times during the day, the thermostat doesn't appear to work and the work area gets too hot. Additionally, it smells like the cadaver lab ventilation doesn't appear to be working as well, a pungent odor can be smelled.
In order to conserve more energy, employees should turn off their monitors, printers, speakers, and lights after business hours. Additionally, classrooms need to shut down their overhead projectors and turn off the lights at the end of the classroom day.

Policy on use of space heaters would be very useful. I have the door open and the fan blowing and the other person has a space heater running full.
Memorial Hall has register heat. During the winter, space heaters are used until the water lines are bled of air. Then the registers get too hot that the window AC units are used to cool down the office. / / The shared office space contains 4 multi-monitor desktops, 4 printers and a fax machine used by 3 full-time staff members and 2 part-time hourlies.
The temperature in our building varies from floor to floor and sometimes office to office. With variable temperatures in the spring, before the heat can be turned off, there are days that are too hot and windows are opened. The reverse happens in the fall.
Please keep it cold enough (~70 degrees) this summer!
Other commonly used computer applications not mentioned: Outlook, Web browser (Firefox).
Your inquiry about weather too hot in summer or too cold in winter is too limiting. Offices can be too hot in winter (old heating system) or too cold in summer. These were not options available for selection.
Although my office is fine for temperature, I work in the Law Library and the Library is definitely not fine - usually too cold in the winter but way too cold in the summer - the Bloomington campus could save a fortune by raising the temperature a few degrees in the summer - sometimes it feels like 68 in the library in the summer - I'm sure it could be raised to at least 72. My daughter is an IU student and she tells me that the dorms are often insanely warm in the winter.
PBS is freezing in the summer!
I indicated that my office temperature was "just right," which is true enough on the average, but it is somewhat variable and there are occasional uncomfortable days (especially too hot).
While I would love to have a more efficient workstation, I have to have two programs running at the same time. One of which is a program that has to have internet. / In regards to my area temperature: I am located next to the door of the secondary loading dock. The door locks from the outside, so anyone using it has to prop it open. During the summer, that makes it very warm; during the winter, very cold.
I am excited to hear about cleaner office air and consistant temps
It's not often "comfortable" in the Kelley Undergraduate Career Services Office space (P100-P101). I'm stuck in an enclosed space (as most of my office is) without any window to open. We get literally 6+ fans from the Kelley Facility Operations and Services department to accompany the small fans many staffers office's have. Temperatures can reach the mid-80s at the front desk and get worse in some offices. During the winter, most of us generally require heaters to survive the day and drink tea/coffee to supplement. Our lunchroom space and interview rooms spaces tend to be the worst extremes - it's been nearly unbearable to go in the lunchroom to fill my water bottles, get lunch, and other quick trips as it is so much colder than the other parts of the office. We've been told that whatever had to get fixed to improve air conditioning, at least, has been fixed. We await hot weather to see if this is true. Additionally we seem to have little to no air flow and poor circulation so air feels stagnate and quite muggy in summer months.
as for thin computers: I'd have to have an experience of them before answering that question.
We are in an old limestone double where we currently have no insulation and incomplete storm windows. Summer and winter all the heat rises to the second floor where my office is. I understand that we will be getting insulation and new storm windows in the future and that should help. On windy days in the winter, the downstairs is freezing as all the heat goes up the stairs and the second floor is too hot. Real Estate, which manages our building is fully aware of these problems. At one time, we were promised a programmable thermostat for both sides of the house, but that never happened. I know it is challenge to

make this building more energy efficient.
Another area for energy conservation to be considered should be the computer labs or shared office spaces with several computers. Those computers are rarely shut down, and remain on, albeit in sleep mode, during all non-use hours.
The survey questions about temperature in my office are not really useful to you if you don't know who I am and that my office temperature is different from most of the building. For some reason this winter, the temperature in my office keeps going to 77°, even though every time I ask Ed Bitner to have it lowered to 74°, he does that. But after several days, it always goes back up to 77°. And in the summer it is always 70°, which is too cold.
I work mostly in Indy. I am only on campus 2-3 times per month. I bring my laptop with me to my cubicle when I am on campus, but I rarely spend time at my desk as I am mainly down in Bloomington for meetings.
My office is often too cold in the summer months. In the winter it can be either too cold or too hot.
Should also do a survey regarding lab space as well as office space for faculty
It's CBord not CBoard......
We have one issue in Woodburn that I've attempted to resolve without success. Our department's computer tech asks us all to keep our computers on 24/7/365, so that he can come into our offices after hours and do any necessary updates. I hate to see computers on all day every day, but the department defers to the computer tech. I also generally walk through the first-floor classrooms every day that I'm on campus, in the mid- to late afternoon, and turn off lights and computers. I usually find about half the computers and lights on. I think many faculty members are reluctant to turn them off for fear that they're inconveniencing the next person to use the classroom. But of course it's a pretty minor inconvenience. We need stronger norms about saving energy.
I am a supervisor in Building Services. I have 7 buildings under my supervision. When the air is cut down in the evenings, my staff gets very miserable trying to keep everyone's offices cleaned. Needless to say, the offices that are cool are cleaned better than the ones that are not.
The air conditioning in the law school building is sometimes inadequate in the middle of the summer. This can be rather disruptive to completing some work tasks over the summer. I am all in favor of conserving energy, but if conserving energy comes at the cost of a comfortable work environment it is counterproductive.
The questions did not allow me to answer fully. For example, regarding comfort level during summer or winter months, the temperatures are not consistent. They fluctuate so much that sometimes the space is very comfortable and at other times it's so uncomfortable that I work elsewhere (library or home). There's a way to save energy! Make the offices so uncomfortable that people leave the building!
The number of personal electronics people have in JH is obscene. People say they care about energy consumption but they don't practice what they preach. People can't walk twenty feet to a printer, copier, fax. Everyone has to have their own. This building is full of refrigerators, coffee pots, microwaves, space heaters, etc. It really is pathetic.
leaving some air on at night would make are job a lot better

You did not ask about the classroom which is where the real issue is. Many times its like teaching in a sauna.
Heating/Cooling---When we moved in to this space I overheard one of the construction people say to another that our thermostat was not connected to anything, it was just for show. It is always cold in here until the temperature outside reaches the single digits. Then it will run you out with heat.
In the summer months, it would be really helpful if we could turn the overhead lights off and just work from the lights on the computer screens. That would save a bunch on unitilies
Air flow / movement has been a problem on the 3rd floor of the East tower of the Herman B Wells Library since I began working in it in August 1983. The recent renovation of the 3rd floor has not improved the situation. Many, may persons in my department have fans and / or heaters (post-renovation, the floor contains more than one department).
I thik it's rotten that we need to leave our computers on all night for overnight installs through the server. Wasteful. Otherwise, I think we're fairly careful about our electrical usage.
Our building only has window AC units for offices and these are turned off at night and when away which can damage our computers. Many of the windows also let a lot of air in on windy days in the winter.
I do computational expensive data analysis on my desktop workstation, which is why I would be strongly opposed to switching to a laptop or tablet
I only filled out this survey to get to this comments box. If you are serious about reducing energy usage, why are you not installing motion sensitive light switches in all of the hallways of the buildings on campus? I have worked in three other countries (Japan, France, and Canada) and all of them use these. They are tremendous energy savers and not inconvenient nor a safety issue for anyone. You would see amazing savings from this effort and recoup your sensor and installation costs very quickly. Thanks for considering this option.
I'm all for reducing our carbon footprint.
Air quality in Sycamore Hall is causing health problems among staff that have to work in the building on a daily basis. / Mold has been identified as one of the culprits. This needs to be addressed.
I don't have an individual printer in my cubicle. There is one large, multi-function copy machine that is shared with the department/office grouping (8 people). I wanted to clarify because I don't know that I understood the question correctly. I work with large spreadsheets and also graphic images, and really need the larger double monitor system in order to be efficient. Also the refrigerator, coffee machine, microwave and refrigerator are shared by all who share the copy machine; they are not my personal appliances.
Our space can be hot or cold in the summer or winter -- depends on what the weather is like outside usually. The answer options for those questions in your survey did not fit our area.
In the consideration of building temperature/humidity, it should be remembered that music has VERY expensive instruments that should be kept in a constant environment. A 10-degree oscillation of temperature is too much. For performance and to avoid injury, individual thermostatic control is crucial. A musician asked to play virtuosic repertoire in a room of the wrong temperature can injure themselves, creating exposure for Risk Management.
It is very difficult to regulate the temperature in our department's office space. My office may be freezing during the winter, but the reception area (just outside my door) will be stifiling at the same time.

Due to buiding design, my office is almost always too hot, despite having the thermostat off. And because a window airconditioner was installed, one can no longer open/close the window. Rediculous to have the airconditioner on during the winter months, but that is the current situation.
Thank you for conducting this survey - the Heating/Cooling in the Kelley UCSO is a major issue for employees.
No centralized policy should be adopted or promulgated in terms of devices. This will sink morale and create inefficiency that will outweigh any benefits. Repeat staff morale is low in this period of belt tightening. This will further alieanate staff from wider sustainability intitiatives and seem like a faculty/administrative imposition on staff who are paying more for parking, healthcare and other expenses and getting minimal raises. Bad for morale bad P.R. and not a place for maximum impact for a greender campus.
You asked about how comfortable the office was during summer and winter. As long as it isn't an abnormally warm winter day or unseasonably cool summer day, then it is nice in our office on a daily basis. But this does not include the spring and fall, when it becomes unbearable at times in our work areas. We have internal thermometers that have read as high as the mid 80s while the seasons change. And no of amount fans, open windows, open doors or anything else will help cool the extemes during these seasons.
When you turn on or restart your computer, the network is very slow to get moving. The computer continues to run slow in order to run all the programs through the network even after boot-up for the first 5-15 minutes. Because of this, I hesitate to shut down my computer except when I will be away from it for a significant period. I might sometimes leave it on anyway because of remote desktop needs, but this is probably the biggest energy loss in my case. I know several other faculty members who have said the same thing about their computer, and that they leave it on as well to avoid the loss of time.
In the summer, our building air conditioner is too cold for the top floor: they open windows while the bottom floor remains overheated with AC on full blast, windows unopened. Last July, it got as warm as 83 degrees in my under these conditions. / / In the winter, our building's heating system overheats the top floor: about everyone opens a window on the top floor, while the bottom floor does not open any windows, has heat on high and often is still cold until mid-day. /
air quality issue is no humidity control
I oppose thin client for many staff/faculty workstations because of the additional software capabilities we need. Philosophically I do not oppose them but we need to keep productivity at a high priority -- finding a balance between utility and effeciency. thanks.
Eigenmann has serious issues that need to be addressed (at least on our floor, 11 West): / - The windows were recently replaced with ones that do not open (not allowing residents to take advantage of outside heating/cooling in appropriate seasons and leading to poor air quality) / -The temperature can be adjusted but not adequately (leaving offices either too hot or too cold) / - The lights were replaced with ones that automatically turn on when people enter the room, but there is no way to turn them off if the natural light is adequate or upon leaving the room)
We do not have access to our own thermostats in our own rooms--we are locked out. When the weather is hot, and the sun is on our side of the building (South), there's no way to be comfortable. Sometimes as high as 80 degrees. / Musical instruments are subjected to dangerously low humidity levels in the winter, including now.
I have long felt that people take energy for granted here. When I taught English in Japan (primary school), teachers were reluctant to plug in electric blankets at their desks in the staff room because it would direct resources (electricity/the $$ used to provide electricity) only to them.

Much power could be saved on the 3rd floor of Wells Library if people would set their PCs to automatically sleep after 5 or 10 minutes of none-use. Several people do not do this and the screens stay lit all night (and weekend) long, wasting a huge amount of energy! Also, quite a few people have screen savers, which waste energy as well. This department used to have a ban on screen savers, but it has been largely forgotten, and many people mistakenly think they save energy when the opposite is actually true. Some education is sorely needed; and it would save a significant amount of energy!
Heating and cooling in our building has been inadequate for the past several years, in large part due to the nature of the heating and cooling system and the condition of our building. The single-pane windows are old and let in huge amounts of air all over the building, which makes adequate heating and cooling a challenge. Much work has been done on our heating/cooling system over the past year or so, and we're hopeful that this will help, but again, it will be hard to overcome old windows which literally have gaps in them, allowing outside air to flow into the building.
I REALLY wish we could open our windows, even a bit. I hate being sealed in, both physically and psychologically. A lot of us use fans just to get some air movement, when we would have otherwise simply opend a window. I think the decision to seal up all our windows will, in the long run, prove to be energy inefficient, especially in the spring and fall. I am strongly environmental, and I'm willing to tolerate a range of temperatures, but the air needs to be fresh and moving. The lack of fresh air makes sitting in my office all day very unpleasant.
Thanks and Good Luck. Reducing energy use is good.
Our office is either too hot or too cold. In the summer they run it until it is freezing then turn it off until you get very hot. Not consistent. In the winter it gets very hot then seems to stop running then it gets cold. In theses times when it gets hot in the summer and cold in the winter it seems that the air gets stale and stuffy and is not circulating. It can get almost damp/sticky and you smell musty/dusty smells.
My technology is extremely important to me!
Eigenmann is serious boiling lava hot during the transitional seasons. It's steam heated and the steam only gets turned off when the ambient air temperature outside the building reaches a certain point. The other day? It was EIGHTY FOUR DEGREES in my office because the air was on heat as the temperature outside was still too low. It's ludicrous. If we could open the windows we might be able to have a little ventilation to save us from that but none of the windows in Eigenmann open anymore.
i've requested a soft serve ice cream machine on several occasions but my request is always denied.
I strongly support policies to reduce our energy use. I would like us to raise the thermometer in the summer and lower it in the winter; I am willing to be less comfortable to do this.
The heating/cooling in my building - and in others based on talking with colleagues and students - appears to be VERY inefficient. I have heard many colleagues and students complain about temperatures in classrooms; either way too cold - had to wear jackets in class in the winter or sweaters in the summer, or way too hot. It seems that this does not created a very good learning situation. I am especially concerned about students.
My case is different since I run two dedicated servers for an online instructional project that serves an avg undergrad population of 5k students. I run and maintain these MySQL dedicated servers plus my desktop doubles as experimental server to run administrative programs I code.
nice & short :) / A pet peeve: seems like there are very often too many lights on in Rawles. In Germany the halls are more or less completely dark after hours (a bit extreme, but I get the point). Surely some savings is possible there...do we have staff protocols for shutdown procedures? Thanks, Kevin Pilgrim pilgrim@indiana.edu

The windows in our building are not well fitted and have huge gaps that we stuff with paper towels and small blankets. Replacing the windows would go a long way towards more effective climate control in the building. Also I've requested plastic sheets or plexiglass to be installed on my windows in the winter to reduce heat loss and be more energy efficient. I was only able to get this done grudingly one year and have given up since -- I was told that because of the way cost center budgets operate, the carpentry shop would have to absorb the expense for this winterization and they have no incentive to do so!
The heating, cooling and ventilation systems in my office are terrible. There is a large enclosed fan on the ceiling that makes a huge racket (winter and summer) and sometimes smells bad. There is no way to adjust the temperature and, while the temperature is often comfortable, when it is not there is nothing I can do. I have had people come in to fix the fan but nothing they do ever helps. I actually use my office much less than I otherwise would because it is such a bad place to work.
On a typical day in summer or winter, my office temperature is fine. But there are several weeks, summer and winter, where I have to leave because the temperature is so extreme.
My office temperature is currently at 75 degrees
I was not sure what you wanted in the last questions. I use KFS to enter KFS documents and review purchase orders. I use Time to approve timesheets. I use other software related to RPS, most are Cbord products. Mostly used to review dining data or dining reports.
Our facility does have two common microwaves, a common fridge and a common coffee maker but they are out in the hallway (my shared office is not common space and we can't have food and drink in lab areas). So, just be aware that in science buildings you also need to be asking what sorts of "personal" things are out in the hallway . . . . / / Also, I would be interested in more energy-efficient computers but I use a Mac with a Windows partition so I put strongly opposed since it didn't look like any of the options would serve my needs
We could use a larger office to accommodate 3 staff members.
altho i said the temp is generally ok, at times the office is WAY too hot and at the start of this winter WAY too cold (we were told the pipes werent ready yet) / thx
although we are supposed to be transitioning to EHR there is incredible paper waste, more than before EHR
The Mathers Annex has heaters/coolers in each office and they seem inefficient. They are difficult to regulate and the design seems flawed for actually controlling the temperatrure of the space. Most electronic device rules in place have more to do with food and insect control than electrical uses.
I have worked in Owen for only one year. Various attempts have been made to remedy the temperature but workers come in and prop open the back door affecting the temperature and the amount of NOISE in my workspace. Also, since we all breathe the same air in the workspace, there is no real way to guard against whatever "bug" my coworkers have.
I am in a older building and in the center of the building with two copy machines in my area. It does get quite warm in here because of those reasons. Not much can be done about it. :)
I'm a developer. My opposition to changing to a thin client is based primarily on factors related to software development. As client responsiveness and ability to compile code via distributed services increases, I'll be more likely to reconsider that preference.
Telephone handset connected to Desktop with VOIP. Once or twice a semester I bring in a personal laptop or use a Library laptop to prepare work presentations or conference programs and these are plugged in for an afternoon or a day or so while I work on them..
People that have just started working at SPEA cannot answer the 'summer months'-questions and there is

no 'have not yet used' option.
your choice of the word "electronic" refering to heaters is interesting. Are they "electric" or "electronic". Electronic seems to refer to computing and technological devices while electric would refer to things like heaters and coffee makers. You had me confused on that question for a moment.
For five years I have asked Physical plant to increase the temperature in my lab, as it is too cold especially in the summer. This is a total waste of energy. To compensate, we are forced to use electric space heaters, which further wastes electricity. The alternative is to be too cold to be productive or wear winter coats inside during summer, which we have actually done. Please, please allow us to control the termostat, at least in a range between 68 and 75 F. Otherwise we will continue to use electric space heaters.
I use a fan to try to divert air that blows in my face from overhead vents. I asked that boards be hung below the vents to redirect the air but was told that wasn't possible. I sometimes use a vaporizer in the winter to counteract the air blowing on me, also. The vaporizer helps when it's too cold in here, too. About desktop alternatives: I need two large monitors and lots of memory for the type of work I do, so I don't think the more energy efficient options would be feasible. However, I'm open to anything that will still provide me with the big screens and enough memory.
We moved into this space in September. A team was here earlier this semester to attempt to balance the air temperature. It has moderated somewhat; however, in my personal office it starts off hot then moves to cold as the day progresses--in the winter/cold months. When it warms up the temperature is more moderate in here: it seems that the walls are not well insulated, so that may be a problem that can't be completely solved.   / I have several plants in my space, so that may help the humidity level somewhat. / The fridge and microwave are actually outside of my office--in the main area where the copy machine and an additional computer station are located.
As I mentioned in the previous comment, our school has tried thin clients in various areas, and there are all sorts of issues with some of the virtualized software. Our graduate students hate to use SPSS from IU Anyware, and I’m not sure why. I know that UITS is coming out with a better "build" for the thin clients, but I get a lot of pushback as an ITP that they do not have the ease of use and ability to connect to shared drives automatically. (We can set their https://cloudstorage.iu.ed options to shares, but we want to make certain that the transmission to the server is encrypted. We have not worked that out yet.)
Most computers are not shut down when we leave at the end of the day and weekend. Would shutting down the computers reduce the amount of energy used rather than leaving the computers in sleep mode?
Our building has significant heating/cooling and air flow issues. Simply giving us windows that open would increase the health of our offices immensely. Other issues are solved with personal heaters and fans, but the rate at which we have to use them to correct the issues alarms me. My office has limited air flow and two poorly insulated windows, so I have a cold office in winter and a hot one in the summer. At home I don't use much heating or cooling, but the office is much less bearable because of the lack of air flow. A fan can keep the air circulating in my office, but not throughout the building such that our air is healthy. I wonder about the insulation as well, since I can feel hot or cold air pouring in through my electrical outlet on an outer wall. At least the outlet provides a bit of air flow in from outdoors!
The temperatures in my particular office are ridiculous. This winter when i came in, it was 64-66 degrees. These days it is 76-77 degrees.
Thank you for a wonderful office! Sincerely, robby benson

Regarding desktop computer options: at the last computer upgrade cycle, I requested a laptop with a large monitor, so that I would have a single laptop on which I worked at home, while traveling, and at the office. I was told that CITO rules required me to have a separate desktop computer in my office. / The survey does not ask about lighting. I have noticed that the lights in my building are routinely left on in classrooms overnight. This seems a significant waste of resources.
I would love to have a microwave. I would love to have my own work space :(
The worst time for air quality in my office is the transition time between seasons. The biggest drawback is that the new windows do not open.
My world would be a million times better if I could open my office windows. But I understand that would be next to impossible to make happen.
My office is on the pool deck at the Counsilman/Billingsley Aquatic Center. The environment is very difficult to manage, thus the temperature being too hot and the air too humid. It is the nature of the beast at indoor aquatic facilities.
My office is at the end of the hall. It seems as though I get less of the heat and/or air conditioning than the central areas. In summer my office doesn't get so cold and in winter my office is cold. / I already have a tablet computer with extra monitor and key board.
Concerning air quality in the 4th floor labs in Psychology, very often the air is extremely humid, and I have seen FOG coming out of the ceiling vents in summer because the air from the vents is so cold meeting the humid air in th elab.
Was this really about making the work environment less people friendly to claim cost savings?
I am in a renovated space in Wells library and the temperature is controlled remotely. It is locked down between 74 and 78. anything above 74 is too hot for a work environment. more often than not the temperature is 78 in the summer. in addition, the temperature wasn't adjusted for the winter so it remained too warm in most of the area. My office was cold in the winter because of old, single pane windows.
I like my computer set up and would not like to see it change. I am comfortable with my space heater in the winter and with the windows open on a beautiful day. I think that if the heating/cooling system worked better in this building, along with the filtration system, that a lot more students, faculty and staff in geology would be happier. The air conditioning is just terrible in tghis building and it is very, very dusty.
we need more kids in the summer to fell building class should not be less then 6 people in a room not be a class at all for 6 people in a room can we have wind power and solar power to be put on building to help us in this electic we need please turn off your lights if you not in them we all need too do it for all in the building it like the last people in a room will not trun out the lights why we need too all be in this together and just one person in the building we need too fight too get too smart of this way / raise money for the solar power raise money for wind power too it too far for are trash to go 150 miles away not too burn the trash at all may be more ways too put trash in the right place and more people to do that with not just one person in the building / hired the stone belt people too do one things and put the trash too the right place on campus
I have concerns about lighting being dimmed or turned off in hallways because I have an eye condition that makes it impossible to see in dim light. I risk running into things or people. Motion sensing lighting would be fine, but I do not think turning off lights in hallways is workable. Switching from my iMac to a thin PC would greatly hamper my ability to use the computer and frankly, the iMac takes less power than traditional PCs anyway so I think it would be of limited energy savings. I used VoiceOver to complete this survey. Thank you for making it compatible with screen readers.

The worst part of the office is the temperature during the Spring and Fall during the turnaround times.
Although I prefer not to identify my building, I can say that it is an old but not historic (1960's era) type structure.
On the question about charging personal items, I do occasionally, but not routinely, so I said "no." On the question about personal electricity consuming items, I have had a refrigerator, radio, air cleaner, and coffee maker in the past, but no longer, so I did not include theses. Perhaps an option of "in the past" would be valuable?
Have worked in 3 buildings on campus. 2 older, 1 new. All seem to have climate issues and lighting issues. I wish this survey had covered office lighting as well- speaks to energy, temperature, and workplace comfort too.
It would be very difficult to do my job properly without a dual monitor desktop computer. But the air conditioning on the 1st floor of 801 N Jordan could be turned way down. Most people wear coats or have personal space heaters running all summer. Thanks for doing this!
My workspace is freezing, I would be forever grateful if you found a solution to make it warmer!
our offices have individual thermostats. I keep my office warmer in the summer and cooler in the winter than common areas.
Just replaced 18-older CRT (picture tube) televisions in office areas of the RTVS facility with energy star LED TV monitors... Always looking for ways to save energy... Thank you
I would recommend motion detection lighting. The lights are on in this building nearly 24 hours a day because of the practice rooms.
I am usually very happy in my small work space. I am comfortable enough, my equipment is fine for all I need.
I do not turn on the overhead lights provided in my office. Most often I don't use electrical lighting, but instead use natural, ambient light from the window. On cloudy days, I use my floor lamp.
I do not care for the new phone system that has been put in place!!! I feel that computers would be lacking as well
Our office a a shared eclosed area with 8 cubicles. It varies wildly between too hot and too cold during the summer and winter air flow is a serious problem, especially in winter.
People would be aghast if they knew what was in the heating/cooling ducts of / the old part of Swain West.
Even though I have a "private" office, the cubical outside my office has a cubical that has a copier/three burner coffee machine/water cooler/microwave/refrigerator.
I just want to make a note regarding the coldness of my office/facility - we have to keep it cold as a form of control. We house artifacts that have to be under specific temperature and humidity conditions or else they have a tendency to decay and/or grow mold.
the air quality is poor and someone mentioned there might be a mold problem in the building -- this should be investigated.
Our needs our higher than most as we support all the computing devices for the building/school, so our useage is wide and varried.
Eigenmann's forced temperature setting lags 2-3 days behind the weather. The temperature is less of a problem then the lack of air ventilation/circulation.

Give me a light switch. I know how to use it properly. Automatic lighting is only benefical in some areas such as hallways. It is not beneficial in work spaces and bathrooms. If one must use automatic lighting, they should work properly. Some rooms they have never worked correctly even though replaced numberous times. Perhaps this is a program failure and should not be used in southern facing, exterior rooms. Dumb lights go off and on for no reason throughout the day and stay on all night! Any savings in using automatic lights was wasted LONG ago.
the zone heat guys do a great jod! very proud of their hard work Rob Knapp @ Chuck Lyons!
The temperature in my office is often 85-90 when I arrive in the morning. I keep the windows open all winter long and the temperaure still will only drop to abpout 80.
I have worked for IU 29 years and i think environmental wise we are in Good shape.
In regard to my office being too hot or too cold, it is actually both year round and it is very frustrating.   I can be comfortable in the winter and then the chiller will turn on and the same thing can happen in the summer.   Alternatively, every day at some point I almost break a sweat as the heat turns on and blows down.   Various experiments with the vents have improved the situation but generally, there has to be wasted power in this situation.
There are reputed to be persistent mold issues in our offices which cause breathing difficulties
Owen hall gave out space heaters for the winter and they seem very, very inefficient for energy usage, plus they are loud. My office mate will run hers for 8 hours straight almost every day in the winter. It's annoying and I wish there was a different, quieter option.
I meant to say that in the summer my office is too cool and that I use a heater to warm it up.
http://english.stackexchange.com/questions/5699/electronic-vs-electric
I know that having a window that opens is not good for the HVAC balance of the building, but the indoor temperature in the office spaces is always so wrong. Most of the staff are older and the ladies get overheated easily.
Memorial Hall has steam heat, which sometimes makes it too hot in the winter. I have a window air conditioner, but it is loud and I am unable to hear someone in a phone conversation when it is on. I prefer to have the window opened, but when it is very hot and humid, that is not practical.
Selecting the efficient power supply option when purchasing new computers could save a good deal of energy. / Too many lights are left on when no people are present on campus.
The climate control has been problematic for the last 10 years. Near CONSTANT service calls. It takes week or MONTHS for a technician to arrive. Issue is sometimes resolved for short period of time only to return within a few days or weeks. Temp in office with 4 people fluctuates from 64-87 multiple times per day, every day. Its a running joke. There is presently a ticket open since 4/10. There is zero feedback to the service call requester. There are no fewer than three heating control groups that show up to "fix" the issue over the years. Each group has ZERO communication with the other 2 groups, or so I am told and have seen. This issue will be reported to IU's fraud and abuse hotline. IF its not criminal in intent, its gross negligence on the part of Physical Plant Management at the very least. My office is not the only office in this building with these identical problems.
I am glad that you are asking these questions and trying to save energy!
We spend a great deal of money renting space at 501 N Morton but have no control over energy. It would be cost effective to swap out all the flourescent overheads with LEDs. The air handlers are not cleaned regularly and there is mold and fungus in our air.

Hello, I would just like to add that although I have a primary office at the MAC, I spend up to 6 hours a day in MAC 305/309. There the temperature regulation and air quality is problematic. If I could answer your questions for those rooms, I wouldn't say 1-Hot, 2-Cold, or 3-Just right. I would actually need to make another choice: 4-Erratic. The MAC ballet studios are notoriously hot or cold with a long delay in being able to get any relief which jeopardizes the physical safety of myself and my students. For when it is hot, I do believe that ceiling fans or some sort of corner fans could make a big difference (but we do not have such fans). For when it is cold, it would be very helpful to have a quick solution since as it is now, we can wait a day or two for the temperature to come back up. Thank you very much for all your efforts on this assessment, and if I may be of any further help, please feel free to email me at viverdyATindiana.edu. With sincere regards, Violette Verdy, Distinguished Professor of Ballet
The space i use was never intended for use as an office/shop/lab so has rather marginal air handling, but the entire, rather large building has horrendously energy wastful HVAC, mostly from the 1970s, where air is drawn from outside, heated or cooled then exhausted to the outside, presumedly to minimize the concentrating of radioactive contamination, but could be greatly improved. There are also no efforts whatever here to get people to turn off computers or magnetic equipment or even lights when not needed, i am sometimes embarrased to work in such an energy wasteful building.
There is a ceiling air duct directly above the corner of my open cubicle. Often cold air can be felt coming from that duct, but never has warm air been felt coming from it.
Buildings need to have windows that open!!!
There are buildings on the IU-B campus that need to be cooled throughout the summer - Assembly Hall Athletic Training Room for athletes who may experience Heat problems such as Heat Exhaustion or Heat Stroke. / Physical Plant needs to evaluate other energy waste also such as things that are done that don't need to be.

Statistic	Value
Total Responses	269

Comments Received Via Email Correspondence with Dr. Henshel.

It [would] be good to check each building for inefficient use. A baseline check up. Then you can ask each person about comfort. For example when I worked at the Business school they regularly turned on the heat on the hottest days and said that they had been doing that for years. Then I heard about a building on 3rd street that had a many year water leak. Here I have no control over my office temp – my neighbor has it all and there is little negotiation and no access. I have a sweater and a fan…
The Indiana Prevention Resource Center leases space at the Showers Bldg on Morton. Technically, it is not an IU building. (I think the County owns it.)
One we have here is that we have some VERY leaky windows. Faculty and staff have taken to covering cracks with duct tape, but real weather stripping would be of great help. - Wells Library Ground Floor
I work in R.P.S. Facilities and I am the Maintenance man here at McNutt quad throughout our recent bathroom remodels we have asked about having a switch installed so we can turn off part of the hallway lights when the building is closed so all aren't burning all the time just half of them we have somewhere around a mile of hallways inside that are lit constantly while kids are here but when they aren't they still are on and we could turn them off at that time at least half of them anyway half would be adequate/safe during those times no one is here but staff maybe key activated ? this would save some energy also some of our bathrooms are automatic or motion/sound activated light switches but some wings still have flip switches in their bathrooms that get left on the motion/sound switches turn off after a certain amount of time those if we had those in every bathroom they would save energy and our patio and breezeway and side walk lights if they were L.E.D. or SOLAR or both with power back up those may save energy as well and the exit lights if those were L.E.D. That would help also sorry I didn't have time to take the survey today hope this helps with your project it just some things my building manager and I talked about in past meetings that we could never get moved forward Thanks for your time

Appendix D: Office Energy Audit Data

Data Collection										
Building	Floor	Room Number	Room Type	Appliance	Manufacturer	Model Number	Watts (Operational)	Watts (Standby)	Hours Use/Day	Total kWh/Day
Ballantine	7	744	Reception	Pencil Sharpener	X-Acto	17	240.0	0.5	0.167	0.052
Ballantine	7	744	Reception	Shredder	Fellowes	B-152C	N/A	0	0.167	N/A
Ballantine	7	744	Reception	Shredder	Fellowes	B-152C	N/A	0	0.167	N/A
Ballantine	7	744	Reception	Coffee Maker	Keurig	B70	1,500.0	9		2.560
Ballantine	7	744	Reception	All-in-One Printer	HP	Laserjet Pro 400 MFP M425DN	600.0	10.5	1.9	1.372
Ballantine	7	744	Reception	All-in-One Printer	HP	Laserjet Pro 400 MFP M425DN	600.0	10.5	1.9	1.372
Ballantine	7	744	Reception	Computer	Dell	Optiplex 790	35.6	1	8	0.301
Ballantine	7	744	Reception	Computer	Dell	Optiplex 790	35.6	1	8	0.301
Ballantine	7	744	Reception	Monitor	Dell	P2412HB	20.9		8	0.167
Ballantine	7	744	Reception	Monitor	Dell	P2412HB	20.9		8	0.167
Ballantine	7	744	Reception	Monitor	Dell	P2412HB	20.9		8	0.167
Ballantine	7	744	Reception	Printer	HP	P4015X	840.0	18	0.48	0.827
Ballantine	7	744	Reception	Pencil Sharpener	X-Acto	Powerhouse	240.0	0.5	0.167	0.052
Ballantine	7	744	Reception	Scanner	Fujitsu	ScanSnap S1500	35.0	4.5	0.72	0.028
Ballantine	7	744	Reception	Scanner	Fujitsu	ScanSnap S1500	35.0	4.5	0.72	0.028
Ballantine	7	744	Reception	Fax Machine	Panasonic	UF-5500	950.0	5.5	0.48	0.585
Ballantine	7	744	Reception	AM/FM Radio	Midland	WR300	15.0	0	2	0.030
Ballantine	7	744	Reception	Speakers	Harman/Kardon		16.5		2	0.033
Ballantine	7	744	Reception	Speakers	Harman/Kardon		16.5		2	0.033
Ballantine	7	747	Reception	Shredder	Fellowes	B-152C	N/A	0	0.167	N/A
Ballantine	7	747	Reception	All-in-One Printer	HP	Laserjet Pro 400 MFP M425DN	600.0	10.5	1.9	1.372
Ballantine	7	747	Reception	All-in-One Printer	HP	Laserjet Pro 400 MFP M425DN	600.0	10.5	1.9	1.372
Ballantine	7	747	Reception	Computer	Dell	Optiplex 760	39.4	1	8	0.331
Ballantine	7	747	Reception	Computer	Dell	Optiplex 790	35.6	1	8	0.301
Ballantine	7	747	Reception	Monitor	Dell	P2412HB	20.9		8	0.167

Ballantine	7	747	Reception	Monitor	Dell	P2412HB	20.9		8	0.167
Ballantine	7	747	Reception	Monitor	Dell	P2412HB	20.9		8	0.167
Ballantine	7	747	Reception	Monitor	Dell	P2412HB	20.9		8	0.167
Ballantine	7	747	Reception	Pencil Sharpener	X-Acto	Powerhouse	240.0	0.5	0.167	0.052
Ballantine	7	747	Reception	Scanner	Fujitsu	ScanSnap S1500	35.0	4.5	0.72	0.028
Ballantine	7	747	Reception	Scanner	Fujitsu	ScanSnap S1500	35.0	4.5	0.72	0.028
Ballantine	7	747	Reception	Speakers	Harman/Kardon		16.5		2	0.033
Ballantine	7	748	Break Room	Pencil Sharpener	Boston	18	240.0	0.5	0.167	0.052
Ballantine	7	748	Break Room	Fan	Lasko	3733	100.0	0	8	0.800
Ballantine	7	748	Break Room	Video Conversion Device	Go Video	DDV2001	32.0		2	0.064
Ballantine	7	748	Break Room	Microwave	Panasonic	NN-S446BA	700.0	3.08		0.460
Ballantine	7	748	Break Room	Computer	Dell	Optiplex 790	35.6	1	8	0.301
Ballantine	7	748	Break Room	Computer	Dell	Optiplex 790	35.6	1	8	0.301
Ballantine	7	748	Break Room	Computer	Dell	Optiplex 790	35.6	1	8	0.301
Ballantine	7	748	Break Room	Printer	HP	P2055DN	570.0	8	0.48	0.462
Ballantine	7	748	Break Room	Monitor	Dell	P2412HB	20.9		8	0.167
Ballantine	7	748	Break Room	Monitor	Dell	P2412HB	20.9		8	0.167
Ballantine	7	748	Break Room	Monitor	Dell	P2412HB	20.9		8	0.167
Ballantine	7	748	Break Room	Scanner	Epson	Perfection 1660 Photo	20.0	0	0.72	0.014
Ballantine	7	748	Break Room	Pencil Sharpener	X-Acto	Powerhouse	240.0	0.5	0.167	0.052
Ballantine	7	748	Break Room	Scanner	Fujitsu	ScanSnap S510	28.0	6	0.72	0.024
Ballantine	7	748	Break Room	Refrigerator	GE	TBX22PABWW	1,800.0		8	14.400
Ballantine	7	748	Break Room	Speakers	Harman/Kardon		16.5		2	0.033
Ballantine	7	748	Break Room	Speakers	Harman/Kardon		16.5		2	0.033
Ballantine	7	749	Office	Printer	HP	1320	345.0	6	0.48	0.307
Ballantine	7	749	Office	Monitor	Dell	1908FPC	35		8	0.280
Ballantine	7	749	Office	Monitor	Dell	1908FPC	35.0		8	0.280
Ballantine	7	749	Office	Telephone	Polycom	CX-300	2.5		24	0.060

Ballantine	7	749	Office	Computer	Dell	Optiplex 790	35.6	1	8	0.301
Ballantine	7	749	Office	Pencil Sharpener	Boston	Powerhouse	240.0	0.5	0.167	0.052
Ballantine	7	749	Office	Shredder	Fellowes	PS80C-2	N/A	0	0.167	N/A
Ballantine	7	749	Office	Scanner	Fujitsu	ScanSnap S1500	35.0	4.5	0.72	0.028
Ballantine	7	749	Office	Speakers	Harman/Kardon		16.5		2	0.033
Ballantine	7	755	Office	Printer	HP	400 M401 DN	570.0	7.3	0.48	0.445
Ballantine	7	755	Office	Computer	Dell	Optiplex 9020	144.0	N/A	8	N/A
Ballantine	7	755	Office	Speakers	Harman/Kardon		16.5		2	0.033
Ballantine	7	771	Office	Printer	HP	1300	320.0	7	0.48	0.318
Ballantine	7	771	Office	Telephone	Polycom	CX-300	2.5		24	0.060
Ballantine	7	771	Office	Tea Kettle	Proctor Silex	K2070Y	1,000.0		0.5	0.500
Ballantine	7	771	Office	Computer	Dell	Optiplex 7010	35.6	1.5	8	0.309
Ballantine	7	771	Office	Speakers	Dell	QDell	N/A		2	N/A
Ballantine	7	771	Office	Monitor	Dell	U2311HB	33.0		8	0.264
Ballantine	7	771	Office	External Data Storage	Rose-Will		72.0	0	8	0.576
Ballantine	7	776	Office	Printer	HP	1022	300.0	2	0.48	0.191
Ballantine	7	776	Office	Telephone	Polycom	CX-300	2.5		24	0.060
Ballantine	7	776	Office	Computer	Dell	Optiplex 790	35.6	1	8	0.301
Ballantine	7	776	Office	Monitor	Dell	P2412HB	20.9		8	0.167
Ballantine	7	776	Office	Stereo	Panasonic	SC-EN5	12.0		1	0.012
Ballantine	7	776	Office	Microphone	Logitech		N/A	0	2	N/A
Ballantine	7	776	Office	Speakers	Panasonic		5.0		2	0.010
Ballantine	7	776	Office	Speakers	Harman/Kardon		16.5		2	0.033
Ballantine	7	778	Copy Room	Copier	Toshiba	EStudio 856	2,000.0	1	1	2.023
Ballantine	9	901	Break Room	Toaster	Proctor Silex	24400	1,600.0		0.083	0.133
Ballantine	9	901	Break Room	Coffee Maker	Mr. Coffee	EC 13	1,100.0	1.14		2.560
Ballantine	9	901	Break Room	Microwave	Sunbeam	SGB8901	1,350.0	3.08		0.460
Ballantine	9	901	Break Room	Coffee Maker	Toastmaster	TCM12W	900.0	1.14		2.560
Ballantine	9	901	Break Room	Refrigerator	Kenmore		600.0		8	4.800
Ballantine	9	902	Office	Speakers	Dell	A225	2.5		2	0.005
Ballantine	9	902	Office	Computer	Dell	Optiplex 790	35.6	1	8	0.301

Ballantine	9	902	Office	Monitor	Dell	P190ST	18.3		8	0.146
Ballantine	9	902	Office	Surge Protector					24	0.000
Ballantine	9	903	Office	Printer	HP	1300	320.0	7	0.48	0.318
Ballantine	9	903	Office	Tea Kettle	West Bend	6400	1,000.0		0.5	0.500
Ballantine	9	903	Office	Refrigerator	Kenmore	94256	1,800.0		8	14.400
Ballantine	9	903	Office	AM/FM Radio	GE	2 Way Power Transistor Radio	N/A	0	2	N/A
Ballantine	9	903	Office	Monitor	Dell	E153FPC	26.0		8	0.208
Ballantine	9	903	Office	Monitor	Dell	E153FPC	26.0		8	0.208
Ballantine	9	903	Office	Monitor	Apple	iMac	93.1		8	0.745
Ballantine	9	903	Office	Power Adapter	Apple	MacBook Air	45.0	0.7	8	0.366
Ballantine	9	903	Office	Computer	Dell	Optiplex GX620	167.0	5	8	1.416
Ballantine	9	903	Office	Router	Netgear		24.0		24	0.576
Ballantine	9	903	Office	Speakers	Harman/Kardon		16.5		2	0.033
Ballantine	9	903	Office	Surge Protector					24	0.000
Ballantine	9	903	Office	Surge Protector					24	0.000
Ballantine	9	903	Office	Surge Protector					24	0.000
Ballantine	9	904	Office	Printer	Dell	1133	420.0	45	0.48	1.260
Ballantine	9	904	Office	Computer	Dell	Optiplex 790	35.6	1	8	0.301
Ballantine	9	904	Office	Monitor	Dell	P190ST	18.3		8	0.146
Ballantine	9	905	Office	Air Purifier	Hunter	30840	3.0	0.8		1.890
Ballantine	9	905	Office	Speakers	Dell	A225	2.5		2	0.005
Ballantine	9	905	Office	Computer	Dell	Optiplex 790	35.6	1	8	0.301
Ballantine	9	905	Office	Printer	HP	P1006	285.0	3	0.48	0.207
Ballantine	9	905	Office	Monitor	Dell	P190ST	18.3		8	0.146
Ballantine	9	905	Office	Surge Protector					24	0.000

Ballantine	9	906	Office	Printer	Brother	HL2140	460.0	80	0.48	2.102
Ballantine	9	906	Office	Speakers	Dell	Multimedia A225	2.5		2	0.005
Ballantine	9	906	Office	Computer	Dell	Optiplex 7010	35.6	1.5	8	0.309
Ballantine	9	906	Office	Monitor	Dell	P1913SF	14.0		8	0.112
Ballantine	9	906	Office	Shredder	Staples	SPL-616X	N/A	0	0.167	N/A
Ballantine	9	907	Office	Printer	HP	1320	345.0	6	0.48	0.307
Ballantine	9	907	Office	Speakers	Dell	A225	2.5		2	0.005
Ballantine	9	907	Office	Stereo	Sony	CFD-Z500	15.0		1	0.015
Ballantine	9	907	Office	Cappuccino Maker	Krups	Il Primo	800.0	0	0.5	0.400
Ballantine	9	907	Office	Computer	Dell	Optiplex 790	35.6	1	8	0.301
Ballantine	9	907	Office	Monitor	Dell	P190SB	16.6		8	0.133
Ballantine	9	907	Office	Surge Protector					24	0.000
Ballantine	9	908	Lounge	Printer	OKI	B410D	450.0	75	0.48	1.980
Ballantine	9	908	Lounge	Pencil Sharpener	Boston	Mighty Mite	16.0	0	0.167	0.003
Ballantine	9	908	Lounge	Router	ATI CentreCom	MR815T	12.0		24	0.288
Ballantine	9	908	Lounge	Computer	Dell	Optiplex GX620	167.0	5	8	1.416
Ballantine	9	908	Lounge	Computer	Dell	Optiplex GX620	167.0	5	8	1.416
Ballantine	9	908	Lounge	Computer	Dell	Optiplex GX620	167.0	5	8	1.416
Ballantine	9	908	Lounge	Monitor	Dell		N/A		8	N/A
Ballantine	9	908	Lounge	Monitor	Dell		N/A		8	N/A
Ballantine	9	908	Lounge	Monitor	Dell		N/A		8	N/A
Ballantine	9	913	Office	Pencil Sharpener	X-Acto	18XXXCN	240.0	0.5	0.167	0.052
Ballantine	9	913	Office	Fax Machine	Brother	IntelliFax 2910	1,032.0	80	0.48	2.377
Ballantine	9	914	Reception	Calculator	Bostitch	2210	230.0	0	0.167	0.038
Ballantine	9	914	Reception	Monitor	Dell	1704FPV	65.0		8	0.520
Ballantine	9	914	Reception	Printer	HP	3700N	400.0	26	0.48	0.804
Ballantine	9	914	Reception	Shredder	Fellowes	58-99CI	N/A	0	0.167	N/A
Ballantine	9	914	Reception	Printer	Toshiba	EStudio 256	1,500.0	N/A	0.48	N/A
Ballantine	9	914	Reception	Printer	Brother	HL5340D	675.0	75	0.48	2.088

Ballantine	9	914	Reception	Space Heater	Honeywell	HZ-370GP	1,500.0			1.010
Ballantine	9	914	Reception	Scanner	Canon	LiDE200	2.5	1.4	0.72	0.034
Ballantine	9	914	Reception	Computer	Dell	Optiplex GX620	167.0	5	8	1.416
Ballantine	9	914	Reception	Speakers	Harman/Kardon		16.5		2	0.033
Ballantine	9	914	Reception	Surge Protector					24	0.000
Ballantine	9	914	Reception	Surge Protector					24	0.000
Ballantine	9	915	Common Area	Monitor	Dell	1908FPT	24.9		8	0.199
Ballantine	9	915	Common Area	Pencil Sharpener	Boston	Mighty Mite	16.0	0	0.167	0.003
Ballantine	9	915	Common Area	Computer	Dell	Optiplex GX620	167.0	5	8	1.416
Ballantine	9	916	Conference Room	Overhead Projector	3M	213	360.0	0.5	2	0.731
Ballantine	9	916	Conference Room	Monitor	Dell	E771P	80.0		8	0.640
Ballantine	9	916	Conference Room	Telephone	AT&T	HAC 1856	2.1		24	0.050
Ballantine	9	916	Conference Room	Space Heater	Honeywell	HZ-338	1,500.0			1.010
Ballantine	9	917	Office	Printer	Dell	1133	420.0	45	0.48	1.260
Ballantine	9	917	Office	Monitor	Dell	1908FPT	24.9		8	0.199
Ballantine	9	917	Office	Speakers	Dell	Multimedia A225	2.5		2	0.005
Ballantine	9	917	Office	Computer	Dell	Optiplex 755	92.9	2	8	0.775
Ballantine	9	918	Office	Printer	HP	6940	59.0	1	0.48	0.052
Ballantine	9	918	Office	Answering Machine	GE	29875GE1-B	5.0	0	24	0.120
Ballantine	9	918	Office	Tea Kettle	Braun	3217/WK200	1,500.0		0.5	0.750
Ballantine	9	918	Office	Monitor	Apple	iMac	93.1		8	0.745
Ballantine	9	918	Office	Surge Protector					24	0.000
Ballantine	9	918	Office	Surge Protector					24	0.000
Ballantine	9	919	Office	Speakers	Dell	A225	2.5		2	0.005
Ballantine	9	919	Office	Printer	Brother	HL2140	460.0	80	0.48	2.102

Ballantine	9	919	Office	Tea Kettle	Toastmaster	KET300WUS	1,200.0		0.5	0.600
Ballantine	9	919	Office	Computer	Dell	Optiplex 790	35.6	1	8	0.301
Ballantine	9	919	Office	Monitor	Dell	P190ST	18.3		8	0.146
Ballantine	9	919	Office	Surge Protector					24	0.000
Ballantine	9	920	Office	Printer	HP	6122	70.0	2	0.48	0.081
Ballantine	9	920	Office	Speakers	Dell	A225	2.5		2	0.005
Ballantine	9	920	Office	Computer	Dell	Optiplex 790	35.6	1	8	0.301
Ballantine	9	920	Office	Monitor	Dell	P190SB	16.6		8	0.133
Ballantine	9	921	Office	Printer	Brother	HL2140	460.0	80	0.48	2.102
Ballantine	9	921	Office	Printer	Brother	HL2140	460.0	80	0.48	2.102
Ballantine	9	921	Office	Computer	Dell	Optiplex 790	35.6	1	8	0.301
Ballantine	9	921	Office	Monitor	Dell	P190SB	16.6		8	0.133
Ballantine	9	921	Office	Monitor	Dell	P190SB	16.6		8	0.133
Ballantine	9	921	Office	Speakers	Harman/Kardon		16.5		2	0.033
Ballantine	9	922	Office	Tea Kettle	Rival	4071	1,000.0		0.5	0.500
Ballantine	9	922	Office	Monitor	Dell	1908FPT	24.9		8	0.199
Ballantine	9	922	Office	Speakers	Dell	AX210	1.2		2	0.002
Ballantine	9	922	Office	Stereo	Sony	CFS-W501	14.0		1	0.014
Ballantine	9	922	Office	Printer	Canon	F189402 or MF3240	580.0	5	0.48	0.396
Ballantine	9	922	Office	Computer	Dell	Optiplex 790	35.6	1	8	0.301
Ballantine	9	922	Office	Surge Protector					24	0.000
Ballantine	9	923	Shared Office	Printer	HP	4000	330.0	18	0.48	0.582
Ballantine	9	923	Shared Office	Printer	HP	1022N	300.0	2	0.48	0.191
Ballantine	9	923	Shared Office	Computer	Apple	iMac M6498 EMC	51.9	1	8	0.431
Ballantine	9	923	Shared Office	Speakers	Cambridge Soundworks	SBS36	3.6		2	0.007
Ballantine	9	923	Shared Office	Coffee Maker	Black & Decker	Smart Brew	975.0	1.14		2.560
Ballantine	9	923	Shared Office	Surge Protector					24	0.000
Ballantine	7	744A	Office	Printer	HP	400 MFP M425DN	600.0	10.5	0.48	0.535
Ballantine	7	744A	Office	Shredder	Fellowes	B-752C	N/A	0	0.167	N/A
Ballantine	7	744A	Office	Telephone	Polycom	CX-300	2.5		24	0.060

Ballantine	7	744A	Office	Calculator	Sharp	EL-1197PIII	16.3	0	0.167	0.003
Ballantine	7	744A	Office	Printer	Brother	HL4570CDW	560.0	70	0.48	1.915
Ballantine	7	744A	Office	Television	NEC	LCD E424	86.0	0.5	2	0.183
Ballantine	7	744A	Office	Computer	Dell	Optiplex 790	35.6	1	8	0.301
Ballantine	7	744A	Office	Monitor	Dell	P2412HB	20.9		8	0.167
Ballantine	7	744A	Office	Monitor	Dell	P2412HB	20.9		8	0.167
Ballantine	7	744A	Office	Scanner	Scansnap	S1300	9.0	5	0.72	0.123
Ballantine	7	744A	Office	Computer	Dell	XE2	N/A	1	8	N/A
Ballantine	7	744A	Office	Refrigerator	Kenmore		92.0		8	0.736
Ballantine	7	744A	Office	Router	TPLink		N/A		24	N/A
Ballantine	7	744A	Office	Speakers	Harman/Kardon		16.5		2	0.033
Ballantine	7	744B	Office	Shredder	Fellowes	B-152C	N/A	0	0.167	N/A
Ballantine	7	744B	Office	All-in-One Printer	HP	Laserjet Pro 400 MFP M425DN	600.0	10.5	1.9	1.372
Ballantine	7	744B	Office	Computer	Dell	Optiplex 7010	35.6	1.5	8	0.309
Ballantine	7	744B	Office	Monitor	Dell	P2412HB	20.9		8	0.167
Ballantine	7	744B	Office	Monitor	Dell	P2412HB	20.9		8	0.167
Ballantine	9	913A	Office	Pencil Sharpener	X-Acto	18XXXCN	240.0	0.5	0.167	0.052
Ballantine	9	913A	Office	Printer	HP	400 M401 DN	570.0	7.3	0.48	0.445
Ballantine	9	913A	Office	Scanner	Canon	LiDE200	2.5	1.4	0.72	0.034
Ballantine	9	913A	Office	Type Writer	Brother	ML100	37.2		0.083	0.003
Ballantine	9	913A	Office	Speakers	Dell	Multimedia A225	2.5		2	0.005
Ballantine	9	913A	Office	Computer	Dell	Optiplex 790	35.6	1	8	0.301
Ballantine	9	913A	Office	Monitor	Dell	P190ST	18.3		8	0.146
Ballantine	9	913A	Office	Shredder	Fellowes	SV-99CI	N/A	0	0.167	N/A
Ballantine	9	913A	Office	Refrigerator	GE	TAX3SNTARWH	N/A	N/A	8	N/A
Ballantine	9	914A	Office	Calculator	Bostitch	2011	230.0	0	0.167	0.038
Ballantine	9	914A	Office	Printer	Brother	DCP-8080DN	680.0	85	0.48	2.326
Ballantine	9	914A	Office	Calculator	Sharp	EL-1801V	16.3	0	0.167	0.003
Ballantine	9	914A	Office	Fan	Holmes	HAOF1233	100.0	0	8	0.800
Ballantine	9	914A	Office	Space Heater	Honeywell	HZ-338	1,500.0			1.010
Ballantine	9	914A	Office	Monitor	Dell	P190ST	18.3		8	0.146
Ballantine	9	914A	Office	Monitor	Dell	P1914SF	14.0		8	0.112

Ballantine	9	914A	Office	Speakers	Harman/Kardon		16.5		2	0.033
Ballantine	9	914A	Office	Surge Protector					24	0.000
Ballantine	9	914A	Office	Surge Protector					24	0.000
Ballantine	9	916A	Office	Printer	HP	1012	250.0	2	0.48	0.167
Ballantine	9	916A	Office	Cassette-Corder	Sony	CFD-V25	20.0	2	0.167	0.051
Ballantine	9	916A	Office	Speakers	Dell	Multimedia A225	2.5		2	0.005
Ballantine	9	916A	Office	Computer	Dell	Optiplex 790	35.6	1	8	0.301
Ballantine	9	916A	Office	Monitor	Dell	P190ST	18.3		8	0.146
Ballantine	9	916A	Office	Monitor	Dell	P1914SF	14.0		8	0.112
CIB	2	243	Interview Room	Video Camera	Logitech	Carl Zeiss Tessar	N/A		2	N/A
CIB	2	243	Interview Room	Television	NEC	Multisync V321-2	75.0	0.5	2	0.151
CIB	2	243	Interview Room	Computer	Dell	Optiplex 790	35.6	1	8	0.301
CIB	2	245	Interview Room	Video Camera	Logitech	Carl Zeiss Tessar	N/A		2	N/A
CIB	2	245	Interview Room	Television	NEC	Multisync V321-2	75.0	0.5	2	0.151
CIB	2	245	Interview Room	Computer	Dell	Optiplex 790	35.6	1	8	0.301
CIB	2	247	Interview Room	Video Camera	Logitech	Carl Zeiss Tessar	N/A		2	N/A
CIB	2	247	Interview Room	Television	NEC	Multisync V321-2	75.0	0.5	2	0.151
CIB	2	247	Interview Room	Computer	Dell	Optiplex 790	35.6	1	8	0.301
CIB	2	249	Office	Video Camera	Logitech	Carl Zeiss Tessar	N/A		2	N/A
CIB	2	249	Office	Lamp	Teknion	Conflux Task Light	2.5	0	8	0.020
CIB	2	249	Office	Thin Client	Wyse	DX0D	12.8	11.5	8	0.286
CIB	2	249	Office	Docking Station Power Adapter	Dell	KO9	N/A	0	8	N/A
CIB	2	249	Office	Speakers	Logitech	S120	12.0		2	0.024
CIB	2	249	Office	Monitor	Samsung	S27A650D	28.0		8	0.224
CIB	2	249	Office	Monitor	Samsung	S27A650D	28.0		8	0.224
CIB	2	249	Office	Monitor	Dell		N/A		8	N/A
CIB	2	249	Office	Thin Client			12.8	11.5	8	0.286
CIB	3	301	Reception	Uninterruptible Power Supply	APC	1500	1,000.0		0	0.000

CIB	3	301	Reception	Label Maker	Dymo	93105	144.0	0	0.083	0.012
CIB	3	301	Reception	Lamp	Teknion	Conflux Task Light	2.5	0	8	0.020
CIB	3	301	Reception	Weather Alert Radio	Midland	D123000CEC	6.0		24	0.144
CIB	3	301	Reception	Walkie Talkie Charger	Motorola	NU20-C140150-13	21.0		24	0.504
CIB	3	301	Reception	Computer	Dell	Optiplex 755	92.9	2	8	0.775
CIB	3	301	Reception	Headset	Plantonics	SSA-SW090050	24.0	0	1	0.024
CIB	3	301	Reception	Monitor	Dell	U2913WMT	27.9		8	0.223
CIB	3	301	Reception	Surge Protector					24	0.000
CIB	3	313	Conference Room	Video Conference Device	Polycom	HDX8000HD	39.6		2	0.079
CIB	3	313	Conference Room	Television	Sharp	LC-60LE632U	220.0	0.5	2	0.451
CIB	3	318	Office	Monitor	Apple	Cinema HD	93.1		8	0.745
CIB	3	318	Office	Lamp	Teknion	Conflux Task Light	2.5	0	8	0.020
CIB	3	318	Office	Power Adapter	Flypower	PS12K0502000U5	100.0	0	8	0.800
CIB	3	318	Office	Surge Protector					24	0.000
CIB	3	320	Office	Monitor	Dell	3007WFPT	147.0		8	1.176
CIB	3	320	Office	Speakers	Altec Lansing	61SB	120.0		2	0.240
CIB	3	320	Office	Picture Frame	Asian Power Devices Inc	ADS-12G-O6 05010GPCU	36.0	0	8	0.288
CIB	3	320	Office	Lamp	Teknion	Conflux Task Light	2.5	0	8	0.020
CIB	3	320	Office	Power Adapter	Apple	Magsafe 2	60.0	0	8	0.480
CIB	3	320	Office	External Data Storage	WD	My Book WA-18Q12FU	6.0	0	8	0.048
CIB	3	320	Office	Lamp	IKEA		50.0	0	8	0.400
CIB	3	322	Interview Room	Video Camera	Logitech	Carl Zeiss Tessar	N/A		2	N/A
CIB	3	322	Interview Room	Television	NEC	Multisync V321-2	75.0	0.5	2	0.151
CIB	3	322	Interview Room	Computer	Dell	Optiplex 790	35.6	1	8	0.301

CIB	3	324	Interview Room	Video Camera	Logitech	Carl Zeiss Tessar	N/A		2	N/A
CIB	3	324	Interview Room	Television	NEC	Multisync V321-2	75.0	0.5	2	0.151
CIB	3	324	Interview Room	Computer	Dell	Optiplex 790	35.6	1	8	0.301
CIB	3	325	Conference Room	Television	Sharp	LC-60LE632U	220.0	0.5	2	0.451
CIB	3	325	Conference Room	Video Amplifier	Tandberg	TTC7-14	48.0		2	0.096
CIB	3	325	Conference Room	Power Adapter	Extron	UP01011120	10.0	0	8	0.080
CIB	3	325	Conference Room	Speakers	Extron		N/A		2	N/A
CIB	3	326	Interview Room	Video Camera	Logitech	Carl Zeiss Tessar	N/A		2	N/A
CIB	3	326	Interview Room	Television	NEC	Multisync V321-2	75.0	0.5	2	0.151
CIB	3	326	Interview Room	Computer	Dell	Optiplex 790	35.6	1	8	0.301
CIB	3	328	Copy Room	3 Hole Punch	Acco	535	1,092.5	0	0.017	0.019
CIB	3	328	Copy Room	Pencil Sharpener	X-Acto	18XXXCN	240.0	0.5	0.167	0.052
CIB	3	328	Copy Room	Printer	HP	5550DN	632.0	54	0.48	1.573
CIB	3	328	Copy Room	Monitor	Dell	E1709VC	N/A		8	N/A
CIB	3	328	Copy Room	Printer	Fujitsu	FI-5530C2	57.0	12	0.48	0.310
CIB	3	328	Copy Room	All-in-One Printer	Sharp	MX-5001N	1,920.0	1920	1.9	46.080
CIB	3	328	Copy Room	Monitor	Dell	No Model	N/A		8	N/A
CIB	3	328	Copy Room	Computer	Dell	Optiplex 380	57.0	1	8	0.472
CIB	3	328	Copy Room	Computer	Dell	Optiplex 790	35.6	1	8	0.301
CIB	3	328	Copy Room	Surge Protector					24	0.000
CIB	3	341	Kitchen	Vending Machine	Ivend	3535	138.0		24	3.312
CIB	3	341	Kitchen	Vending Machine	Coca Cola	D276E	1,207.5		24	28.980
CIB	3	341	Kitchen	Dishwasher	Fisher & Paykel	DD24DDFX6B2	336.0	0	1	0.336
CIB	3	341	Kitchen	Microwave	GE	JES2251SJ02	1,200.0	3.08		0.460
CIB	3	341	Kitchen	Microwave	GE	JES2251SJ02	1,200.0	3.08		0.460
CIB	3	341	Kitchen	Coffee Maker	Curtis	TLP	1,500.0	1.14		2.560

CIB	3	341	Kitchen	Refrigerator	Viking	VCFF136SSSB	816.5		8	6.532
CIB	3	341	Kitchen	Refrigerator	Viking Professional	VCFF136SSSB	816.5		8	6.532
CIB	2	250-1	Cubicle	Monitor	Apple	Cinema HD	93.1		8	0.745
CIB	2	250-1	Cubicle	Lamp	Teknion	Conflux Task Light	2.5	0	8	0.020
CIB	2	250-1	Cubicle	Thin Client	Wyse	DX0D	12.8	11.5	8	0.286
CIB	2	250-1	Cubicle	Computer	Apple	iMac	51.9	1	8	0.431
CIB	2	250-1	Cubicle	Computer	Dell	Optiplex 390	98.0	2	8	0.816
CIB	2	250-1	Cubicle	Thin Client	Wyse	RX0L	12.8	11.5	8	0.286
CIB	2	250-16	Cubicle	External Data Storage	Apple	A1283	111.0	0	8	0.888
CIB	2	250-16	Cubicle	Lamp	Teknion	Conflux Task Light	2.5	0	8	0.020
CIB	2	250-16	Cubicle	Computer	Apple	iMac	51.9	1	8	0.431
CIB	2	250-16	Cubicle	Telephone	LG-Nortel		12.0		24	0.288
CIB	2	250-17	Cubicle	Lamp	Teknion	Conflux Task Light	2.5	0	8	0.020
CIB	2	250-17	Cubicle	Power Adapter	Apple	Magsafe	85.0	0	8	0.680
CIB	2	250-17	Cubicle	Computer	Dell	Precision 490	N/A	N/A	8	N/A
CIB	2	250-17	Cubicle	Monitor	Dell	U3011T	105.5		8	0.844
CIB	2	250-2	Cubicle	Cell Phone Charger	Apple	A1265	5.0	0.3	2	0.017
CIB	2	250-2	Cubicle	Lamp	Teknion	Conflux Task Light	2.5	0	8	0.020
CIB	2	250-2	Cubicle	Power Adapter	Apple	Magsafe	85.0	0	8	0.680
CIB	2	250-2	Cubicle	Power Adapter	Apple	Magsafe	85.0	0	8	0.680
CIB	2	250-2	Cubicle	Monitor	Dell	U3011T	105.5		8	0.844
CIB	3	301D	Conference Room	Video Conference Device	Cisco	CTS-CTRL-DBC8	9.6		2	0.019
CIB	3	301D	Conference Room	Television	Sharp	LC-60LE632U	220.0	0.5	2	0.451
CIB	3	301S	Break/Copy Room	Dishwasher	Fisher & Paykel	DD24DDFX6B2	336.0	0	1	0.336
CIB	3	301S	Break/Copy	Espresso	Jura	Impressa C5	1,450.0	1	0.5	0.749

			Room	Maker						
CIB	3	301S	Break/Copy Room	Microwave	GE	JES2251SJ02	1,200.0	3.08		0.460
CIB	3	301S	Break/Copy Room	All-in-One Printer	Sharp	MX-3501N	1,440.0	13	1.9	3.023
CIB	3	301S	Break/Copy Room	Coffee Maker	Curtis	TLP	1,500.0	1.14		2.560
CIB	3	301S	Break/Copy Room	Refrigerator	Viking Professional		1,725.0		8	13.800
CIB	3	313A	Conference Room	Television	LG	55LW5600	204.0	0.1	2	0.410
CIB	3	321-10	Cubicle	Computer	Apple	iMac	51.9	1	8	0.431
CIB	3	321-10	Cubicle	Power Adapter	Apple	Magsafe 2	60.0	0	8	0.480
CIB	3	321-10	Cubicle	Cell Phone Charger	Research In Motion Limited	RIM-C-0004ADUUS	24.0	0	2	0.048
CIB	3	321-11	Cubicle	Lamp	Teknion	Conflux Task Light	2.5	0	8	0.020
CIB	3	321-11	Cubicle	Computer	Apple	iMac	51.9	1	8	0.431
CIB	3	321-12	Cubicle	Lamp	Teknion	Conflux Task Light	2.5	0	8	0.020
CIB	3	321-12	Cubicle	Computer	Apple	iMac	51.9	1	8	0.431
CIB	3	321-13	Cubicle	Monitor	Dell	1907FPT	34.2		8	0.274
CIB	3	321-14	Cubicle	Monitor	Apple	Cinema HD	93.1		8	0.745
CIB	3	321-14	Cubicle	Lamp	Teknion	Conflux Task Light	2.5	0	8	0.020
CIB	3	321-14	Cubicle	Modem	Asian Power Device	DA-48M12	6.0	1	24	0.144
CIB	3	321-14	Cubicle	Scanner	Epson	Perfection V500 Photo	16.0	4	0.72	0.105
CIB	3	321-34	Cubicle	Lamp	Teknion	Conflux Task Light	2.5	0	8	0.020
CIB	3	321-34	Cubicle	External Data Storage	Seagate	FreeAgent Goflex	90.0	0	8	0.720
CIB	3	321-34	Cubicle	Docking Station Power Adapter	Dell	LA130PM121	130.0	0	8	1.040
CIB	3	321-34	Cubicle	Monitor	Dell	U2412MB	23.5		8	0.188
CIB	3	321-34	Cubicle	Monitor	Dell	U2412MB	23.5		8	0.188

CIB	3	321-35	Cubicle	Docking Station Power Adapter	Lenovo	4337	90.0	0	8	0.720
CIB	3	321-35	Cubicle	Lamp	Teknion	Conflux Task Light	2.5	0	8	0.020
CIB	3	321-35	Cubicle	Monitor	Dell	U2412MB	23.5		8	0.188
CIB	3	321-35	Cubicle	External Data Storage	Starteck		N/A	0	8	N/A
CIB	3	321-49	Cubicle	Monitor	Samsung	B2430H	45.0		8	0.360
CIB	3	321-49	Cubicle	Lamp	Teknion	Conflux Task Light	2.5	0	8	0.020
CIB	3	321-49	Cubicle	Computer	Dell	Optiplex 790	35.6	1	8	0.301
CIB	3	321-50	Cubicle	Monitor	Samsung	B2430H	45.0		8	0.360
CIB	3	321-50	Cubicle	Lamp	Teknion	Conflux Task Light	2.5	0	8	0.020
CIB	3	321-50	Cubicle	Docking Station Power Adapter	Dell	DA130PE1-00	130.0	0	8	1.040
CIB	3	321-50	Cubicle	Computer	Dell	Optiplex 790	35.6	1	8	0.301
CIB	3	321-50	Cubicle	Monitor	Dell		N/A		8	N/A
CIB	3	321-51	Cubicle	Monitor	Samsung	B2430H	45.0		8	0.360
CIB	3	321-51	Cubicle	Lamp	Teknion	Conflux Task Light	2.5	0	8	0.020
CIB	3	321-51	Cubicle	Docking Station Power Adapter	Dell	DA130PE1-00	130.0	0	8	1.040
CIB	3	321-51	Cubicle	Power Adapter	Sennheiser	SAW02-5.0-150USC	N/A	0	8	N/A
CIB	3	321-52	Cubicle	Monitor	Samsung	B2430H	45.0		8	0.360
CIB	3	321-52	Cubicle	Lamp	Teknion	Conflux Task Light	2.5	0	8	0.020
CIB	3	321-52	Cubicle	Docking Station Power Adapter	Dell	DA130PE1-00	130.0	0	8	1.040
CIB	3	321-52	Cubicle	External Data Storage	WD	My Passport	18.0	0	8	0.144
CIB	3	321-52	Cubicle	Monitor	Samsung	Syncmaster SA450	30.0		8	0.240
CIB	3	321-53	Cubicle	Monitor	Dell	1907FPC	32.6		8	0.261
CIB	3	321-53	Cubicle	Monitor	Dell	1907FPVT	75.0		8	0.600
CIB	3	321-53	Cubicle	Lamp	Teknion	Conflux Task Light	2.5	0	8	0.020

CIB	3	321-53	Cubicle	Docking Station Power Adapter	Dell	FA90PE1-00	90.0	0	8	0.720
CIB	3	321-54	Cubicle	Monitor	Dell	1907FPC	32.6		8	0.261
CIB	3	321-54	Cubicle	Monitor	Dell	1907FPVT	75.0		8	0.600
CIB	3	321-54	Cubicle	Lamp	Teknion	Conflux Task Light	2.5	0	8	0.020
CIB	3	321-54	Cubicle	Docking Station Power Adapter	Dell	FA90PE1-00	90.0	0	8	0.720
CIB	3	321-54	Cubicle	Shredder	Royal	JS1100	172.5	0	0.167	0.029
CIB	3	321-55	Cubicle	Monitor	Dell	1907FPVT	75.0		8	0.600
CIB	3	321-55	Cubicle	Monitor	Dell	1907FPVT	75.0		8	0.600
CIB	3	321-55	Cubicle	Lamp	Teknion	Conflux Task Light	2.5	0	8	0.020
CIB	3	321-55	Cubicle	Docking Station Power Adapter	Dell	DA130PE1-00	130.0	0	8	1.040
CIB	3	321-55	Cubicle	Laptop Power Adapter	Dell	FA90PE1-00	90.0	0	8	0.720
CIB	3	321-56	Cubicle	Monitor	Dell	1907FPC	32.6		8	0.261
CIB	3	321-56	Cubicle	Monitor	Dell	1908FPB	35.0		8	0.280
CIB	3	321-56	Cubicle	Docking Station Power Adapter	Dell	DA130PE1-00	130.0	0	8	1.040
CIB	3	321-56	Cubicle	External Data Storage	Seagate	Expansion External Drive	78.0	0	8	0.624
CIB	3	321-56	Cubicle	Fan	Holmes	HANF-95	54.0	0	8	0.432
CIB	3	321-56	Cubicle	Walkie Talkie Charger	Motorola	NU20-C140150-13	21.0		24	0.504
CIB	3	321-56	Cubicle	Laptop Power Adapter	Dell		N/A	0	8	N/A
CIB	3	321-57	Cubicle	Monitor	Dell	1907FPC	32.6		8	0.261
CIB	3	321-57	Cubicle	Monitor	Dell	1907FPC	32.6		8	0.261
CIB	3	321-57	Cubicle	Monitor	Dell	1907FPC	32.6		8	0.261
CIB	3	321-57	Cubicle	Lamp	Teknion	Conflux Task Light	2.5	0	8	0.020
CIB	3	321-57	Cubicle	Laptop Power	Dell	DA130PE1-00	130.7	0	8	1.045

				Adapter						
CIB	3	321-57	Cubicle	Laptop Power Adapter	Dell	DA130PE1-00	130.7	0	8	1.045
CIB	3	321-57	Cubicle	Laptop Power Adapter	Dell	DA90PE1-00	90.1	0	8	0.721
CIB	3	321-57	Cubicle	Docking Station Power Adapter	Dell	LA90PE1-01	90.1	0	8	0.721
CIB	3	321-57	Cubicle	Laptop Power Adapter	Dell	Latitude E6500	90.0	0	8	0.720
CIB	3	321-58	Cubicle	Monitor	Dell	1907FPVT	75.0		8	0.600
CIB	3	321-58	Cubicle	Cell Phone Charger	Apple	A1265	5.0	0.3	2	0.017
CIB	3	321-58	Cubicle	Cell Phone Charger	Apple	A1265	5.0	0.3	2	0.017
CIB	3	321-58	Cubicle	Lamp	Teknion	Conflux Task Light	2.5	0	8	0.020
CIB	3	321-58	Cubicle	Computer	Dell	LA90PE1-01	N/A	N/A	8	N/A
CIB	3	321-59	Cubicle	Monitor	Dell	1907FPC	32.6		8	0.261
CIB	3	321-59	Cubicle	Monitor	Dell	1907FPVT	75.0		8	0.600
CIB	3	321-59	Cubicle	Lamp	Teknion	Conflux Task Light	2.5	0	8	0.020
CIB	3	321-59	Cubicle	Docking Station Power Adapter	Dell	DA130PE1-00	130.0	0	8	1.040
CIB	3	321-60	Cubicle	Monitor	Dell	2405FPW	80.0		8	0.640
CIB	3	321-60	Cubicle	Lamp	Teknion	Conflux Task Light	2.5	0	8	0.020
CIB	3	321-62	Cubicle	Monitor	Dell	2007FPB	39.9		8	0.319
CIB	3	321-62	Cubicle	Monitor	Samsung	B2430H	45.0		8	0.360
CIB	3	321-62	Cubicle	Monitor	Samsung	B2430H	45.0		8	0.360
CIB	3	321-62	Cubicle	Lamp	Teknion	Conflux Task Light	2.5	0	8	0.020
CIB	3	321-62	Cubicle	Computer	Dell	D7500	N/A	N/A	8	N/A
CIB	3	321-63	Cubicle	Monitor	Samsung	B2430H	45.0		8	0.360
CIB	3	321-63	Cubicle	Monitor	Samsung	B2430H	45.0		8	0.360
CIB	3	321-63	Cubicle	Lamp	Teknion	Conflux Task Light	2.5	0	8	0.020
CIB	3	321-63	Cubicle	Computer	Dell	Optiplex 755	92.9	2	8	0.775
CIB	3	321-63	Cubicle	Cell Phone	Sanyo	SCP-20ADT	24.0	0	2	0.048

				Charger						
CIB	3	321-64	Cubicle	Monitor	Dell	2405FPW	80.0		8	0.640
CIB	3	321-64	Cubicle	Lamp	Teknion	Conflux Task Light	2.5	0	8	0.020
CIB	3	321-64	Cubicle	Docking Station Power Adapter	Dell	DA210PE1-00	210.0	0	8	1.680
CIB	3	321-64	Cubicle	Modem	D-Link	DGS-1005G	6.0	1	24	0.144
CIB	3	321-64	Cubicle	Computer	Dell	Precision 380	167.0	1	8	1.352
CIB	3	321-64	Cubicle	Laptop Power Adapter	Dell	Precision M6600	65.0	0	8	0.520
CIB	3	321-64	Cubicle	Monitor	Dell	U2711	2.4		8	0.019
CIB	3	321-8	Cubicle	Lamp	Teknion	Conflux Task Light	2.5	0	8	0.020
CIB	3	321-8	Cubicle	Computer	Apple	iMac	51.9	1	8	0.431
CIB	3	321-9	Cubicle	Power Adapter	Apple	A1357	10.7	0	8	0.086
CIB	3	321-9	Cubicle	Computer	Apple	iMac	51.9	1	8	0.431
CIB	3	3231-13	Cubicle	Lamp	Teknion	Conflux Task Light	2.5	0	8	0.020
Kelley	3	3000	Office	Pencil Sharpener	Boston	18	240.0	0.5	0.167	0.052
Kelley	3	3000	Office	Printer	HP	1320	345.0	6	0.48	0.307
Kelley	3	3000	Office	Fan	Honeywell	13520	180.0	0	8	1.440
Kelley	3	3000	Office	Monitor	Dell	2208WFPT	75.0		8	0.600
Kelley	3	3000	Office	Monitor	Dell	2208WFPT	75.0		8	0.600
Kelley	3	3000	Office	Monitor	Dell	2208WFPT	75.0		8	0.600
Kelley	3	3000	Office	Monitor	Dell	2208WFPT	75.0		8	0.600
Kelley	3	3000	Office	Monitor	Dell	2208WFPT	75.0		8	0.600
Kelley	3	3000	Office	Monitor	Dell	2208WFPT	75.0		8	0.600
Kelley	3	3000	Office	Monitor	Dell	2208WFPT	75.0		8	0.600
Kelley	3	3000	Office	Monitor	Dell	2208WFPT	75.0		8	0.600
Kelley	3	3000	Office	Printer	HP	4250N	680.0	20	0.48	0.797
Kelley	3	3000	Office	Printer	HP	600 M602	820.0	21	0.48	0.888
Kelley	3	3000	Office	Printer	HP	600 M602	820.0	21	0.48	0.888
Kelley	3	3000	Office	Printer	HP	600 M602	820.0	21	0.48	0.888
Kelley	3	3000	Office	Space Heater	Broan	6201A	1,500.0			1.010

Kelley	3	3000	Office	Speakers	Dell	AS501	12.0	2	2	0.068
Kelley	3	3000	Office	Speakers	Dell	AS501	12.0	2	2	0.068
Kelley	3	3000	Office	Speakers	Dell	AS501	12.0	2	2	0.068
Kelley	3	3000	Office	Printer	HP	CP2025	445.0	18	0.48	0.637
Kelley	3	3000	Office	Printer	HP	CP4525	740.0	72	0.48	2.049
Kelley	3	3000	Reception	Telephone	Polycom	CX-300	2.5	1.8	24	0.060
Kelley	3	3000	Office	Telephone	Polycom	CX-300	2.5	1.8	24	0.060
Kelley	3	3000	Office	Telephone	Polycom	CX-300	2.5	1.8	24	0.060
Kelley	3	3000	Office	Telephone	Polycom	CX-600	4.9	2.4	24	0.118
Kelley	3	3000	Office	Telephone	Polycom	CX-600	4.9	2.4	24	0.118
Kelley	3	3000	Office	Telephone	Polycom	CX-600	4.9	2.4	24	0.118
Kelley	3	3000	Office	Laptop Power Adapter	Dell	E6420	60.0	0	8	0.480
Kelley	3	3000	Office	Scanner	HP	G3110	15.0	0	0.72	0.011
Kelley	3	3000	Office	Space Heater	Maxi-Heat	H022	1,500.0			1.010
Kelley	3	3000	Office	Pencil Sharpener	Panasonic	KP-110	100.0	0.5	0.167	0.029
Kelley	3	3000	Office	Pencil Sharpener	Panasonic	KP-77	100.0	0.5	0.167	0.029
Kelley	3	3000	Office	Printer	HP	M451	425.0	15.2	0.48	0.562
Kelley	3	3000	Office	Shredder	Fellowes	MS-4503	N/A	0	0.167	N/A
Kelley	3	3000	Reception	Computer	Dell	Optiplex 7010	35.6	1.5	8	0.309
Kelley	3	3000	Office	Computer	Dell	Optiplex 760	39.4	1	8	0.331
Kelley	3	3000	Office	Computer	Dell	Optiplex 760	39.4	1	8	0.331
Kelley	3	3000	Office	Computer	Dell	Optiplex 780	92.9	1	8	0.759
Kelley	3	3000	Office	Computer	Dell	Optiplex 780	92.9	1	8	0.759
Kelley	3	3000	Office	Computer	Dell	Optiplex 790	35.6	1	8	0.301
Kelley	3	3000	Office	Computer	Dell	Optiplex 790	35.6	1	8	0.301
Kelley	3	3000	Office	Computer	Dell	Optiplex 790	35.6	1	8	0.301
Kelley	3	3000	Office	Computer	Dell	Optiplex 790	35.6	1	8	0.301
Kelley	3	3000	Office	Printer	HP	P1505	380.0	2.37	0.48	0.238
Kelley	3	3000	Reception	Printer	HP	P1606DN	440.0	2.2	0.48	0.263
Kelley	3	3000	Office	Printer	HP	P1606DN	440.0	2.2	0.48	0.263
Kelley	3	3000	Office	Fan		SP-48126C	12.0	0	8	0.096

Kelley	3	3000	Office	Fax Machine	Panasonic	UF-6000	470.0	1.2	0.48	0.254
Kelley	3	3000	Office	AM/FM Radio	Midland	wr300	15.0	0	2	0.030
Kelley	3	3000	Office	Walkie Talkie Charger	Motorola	xpr	4.0		24	0.096
Kelley	3	3000	Office	Walkie Talkie Charger	Motorola	xpr	4.0		24	0.096
Kelley	3	3000	Office	Walkie Talkie Charger	Motorola	xpr	4.0		24	0.096
Kelley	3	3000	Office	Walkie Talkie Charger	Motorola	xpr	4.0		24	0.096
Kelley	3	3000	Office	Lamp	FML		27.0	0	8	0.216
Kelley	3	3000	Reception	Monitor	Dell		N/A		8	N/A
Kelley	3	3000	Reception	Monitor	Dell		N/A		8	N/A
Kelley	3	3000	Office	Monitor	Dell		N/A		8	N/A
Kelley	3	3000	Office	Monitor	Dell		N/A		8	N/A
Kelley	3	3000	Office	Monitor	Dell		N/A		8	N/A
Kelley	3	3000	Office	Monitor	Dell		N/A		8	N/A
Kelley	3	3002	Office	Monitor	Dell	2007FPB	39.9		8	0.319
Kelley	3	3002	Office	Monitor	Dell	2007FPB	39.9		8	0.319
Kelley	3	3002	Office	Computer	Dell	Optiplex 790	35.6	1	8	0.301
Kelley	3	3002	Office	Lamp			60.0	0	8	0.480
Kelley	3	3002	Office	Lamp			60.0	0	8	0.480
Kelley	3	3002	Office	Lamp			60.0	0	8	0.480
Kelley	3	3002	Office	Lamp			60.0	0	8	0.480
Kelley	3	3002	Office	Surge Protector					24	0.000
Kelley	3	3003	Office	Space Heater	Boston	25986	1,500.0			1.010
Kelley	3	3003	Office	Humidifer	Oreck	AIRHGQ	40.0	0.5	8	0.328
Kelley	3	3003	Office	Speakers	Dell	AS501	12.0	2	2	0.068
Kelley	3	3003	Office	Speakers	Dell	AS501	12.0	2	2	0.068
Kelley	3	3003	Office	Speakers	Dell	AY410-R	45.0	2	2	0.094
Kelley	3	3003	Office	Telephone	Polycom	CX-300	2.5	1.8	24	0.060
Kelley	3	3003	Office	Telephone	Polycom	CX-300	2.5	1.8	24	0.060
Kelley	3	3003	Office	Space Heater		DFS-220	1,500.0			1.010

Kelley	3	3003	Office	Picture Frame	Westinghouse	DPS-0802	18.0	0	8	0.144
Kelley	3	3003	Office	Computer	Dell	Optiplex 7010	35.6	1.5	8	0.309
Kelley	3	3003	Office	Computer	Dell	Optiplex 7010	35.6	1.5	8	0.309
Kelley	3	3003	Office	Coffee Maker	Keurig		1,500.0	9		0.640
Kelley	3	3003	Office	Fan			N/A	0	8	N/A
Kelley	3	3003	Office	Lamp			150.0	0	8	1.200
Kelley	3	3003	Office	Lamp			N/A	0	8	N/A
Kelley	3	3003	Office	Printer	HP		N/A	N/A	0.48	N/A
Kelley	3	3004	Conference Room	Television	Panasonic	TC-P60S60	304.0	0.2	2	0.612
Kelley	3	3005	Office	Coffee Maker	Keurig	831	1,425.0	9		2.560
Kelley	3	3005	Office	Monitor	Dell	2208WFPT	75.0		8	0.600
Kelley	3	3005	Office	Printer	HP	3600N	335.0	51	0.48	1.360
Kelley	3	3005	Office	Speakers	Dell	AS501	12.0	2	2	0.068
Kelley	3	3005	Office	Telephone	Polycom	CX-300	2.5	1.8	24	0.060
Kelley	3	3005	Office	Computer	Dell	Optiplex 7010	35.6	1.5	8	0.309
Kelley	3	3005	Office	Fan	Honeywell		1,500.0	0	8	12.000
Kelley	3	3006	Office	Printer	HP	4250N	680.0	20	0.48	0.797
Kelley	3	3006	Office	Speakers	Dell	AY410	44.0	2	2	0.132
Kelley	3	3006	Office	Fan	Duracraft	DT-12	42.0	0	8	0.336
Kelley	3	3006	Office	Cell Phone Charger	Apple	iPhone A1537	10.0	0.7	2	0.035
Kelley	3	3006	Office	Computer	Dell	Optiplex 790	35.6	1	8	0.301
Kelley	3	3006	Office	Computer	Dell	Optiplex 790	35.6	1	8	0.301
Kelley	3	3006	Office	Monitor	Dell	S2409WB	36.1		8	0.289
Kelley	3	3006	Office	Monitor	Dell	S2409WB	36.1		8	0.289
Kelley	3	3007	Office	Monitor	Dell	2208WFPT	75.0		8	0.600
Kelley	3	3007	Office	Monitor	Dell	2208WFPT	75.0		8	0.600
Kelley	3	3007	Office	Fan	Air King	4C523L/9154L	72.0	0	8	0.576
Kelley	3	3007	Office	Telephone	Polycom	CX-300	2.5	1.8	24	0.060
Kelley	3	3007	Office	Computer	Dell	Optiplex 780	92.9	1	8	0.759
Kelley	3	3007	Office	Printer	HP	P3015	780.0	14.5	0.48	0.715
Kelley	3	3007	Office	Walkie Talkie Charger	Motorola	xpr	4.0		24	0.096

Kelley	3	3007	Office	Coffee Maker	Keurig		1,500.0	9		0.640
Kelley	3	3008	Office	Scanner	HP	4070	15.0	0	0.72	0.011
Kelley	3	3008	Office	Monitor	Dell	1908WFPF	75.0		8	0.600
Kelley	3	3008	Office	Monitor	Dell	2208WFPT	75.0		8	0.600
Kelley	3	3008	Office	Monitor	Dell	2208WFPT	75.0		8	0.600
Kelley	3	3008	Office	Printer	HP	4250N	680.0	20	0.48	0.797
Kelley	3	3008	Office	Laptop Power Adapter	Dell	DA90PE1-00	90.1	0	8	0.721
Kelley	3	3008	Office	Fan	Cool Breeze	EB22013	42.0	0	8	0.336
Kelley	3	3008	Office	Power Adapter	Iomega	HDD 1H4-2	18.0	0	8	0.144
Kelley	3	3008	Office	Cell Phone Charger	Apple	iPhone A1537	10.0	0.7	2	0.035
Kelley	3	3008	Office	Computer	Dell	Optiplex 755	92.9	2	8	0.775
Kelley	3	3008	Office	Computer	Dell	Optiplex 790	35.6	1	8	0.301
Kelley	3	3008	Office	Monitor	Dell	P2011HT	17.3		8	0.138
Kelley	3	3008	Office	Surge Protector					24	0.000
Kelley	3	3008	Office	Surge Protector					24	0.000
Kelley	3	3010	Office	Pencil Sharpener	Boston	18	240.0	0.5	0.167	0.052
Kelley	3	3010	Office	Refrigerator	Avanti	37RG	175.5		8	1.404
Kelley	3	3010	Office	Calculator	Casio	DR-210TM	20.4	0	0.167	0.003
Kelley	3	3010	Office	Space Heater	Maxi-Heat	H022	1,500.0			1.010
Kelley	3	3010	Office	Fan	Windmere	NR-9	30.0	0	8	0.240
Kelley	3	3010	Office	Computer	Dell	Optiplex 7010	35.6	1.5	8	0.309
Kelley	3	3010	Office	Monitor	Dell	P1913SF	14.0		8	0.112
Kelley	3	3010	Office	Monitor	Dell	P1913SF	14.0		8	0.112
Kelley	3	3010	Office	Printer	HP	P2035	550.0	7	0.48	0.429
Kelley	3	3010	Office	Lamp			100.0	0	8	0.800
Kelley	3	3010	Office	Surge Protector					24	0.000
Kelley	3	3010	Office	Surge Protector					24	0.000

Kelley	3	3011	Office	Telephone	Polycom	CX-300	2.5	1.8	24	0.060
Kelley	3	3011	Office	Laptop Power Adapter	Dell	Latitude E6410	90.0	0	8	0.720
Kelley	3	3011	Office	Computer	Dell	Optiplex 7010	35.6	1.5	8	0.309
Kelley	3	3011	Office	Monitor	Dell	U2412MB	23.5		8	0.188
Kelley	3	3011	Office	Monitor	Dell	U2412MB	23.5		8	0.188
Kelley	3	3011	Office	Walkie Talkie Charger	Motorola	xpr	4.0		24	0.096
Kelley	3	3013	Office	Monitor	Dell	2208WFPT	75.0		8	0.600
Kelley	3	3013	Office	Telephone	Polycom	CX-300	2.5	1.8	24	0.060
Kelley	3	3013	Office	Space Heater	Homebasix	NH500A	1,500.0			1.010
Kelley	3	3013	Office	Computer	Dell	Optiplex 790	35.6	1	8	0.301
Kelley	3	3013	Office	Printer	HP	P1606DN	440.0	2.2	0.48	0.263
Kelley	3	3014	Office	Lamp	Teknion	Conflux Task Light	2.5	0	8	0.020
Kelley	3	3014	Office	Computer	Apple	iMac	51.9	1	8	0.431
Kelley	3	3014	Office	Cell Phone Charger	Apple	iPhone	7.0	0.7	2	0.029
Kelley	3	3014	Office	Power Adapter	Apple	MacBook Air	45.0	0.7	8	0.366
Kelley	3	3014	Office	Power Adapter	Apple	MacBook Pro	85.0	2	8	0.712
Kelley	3	3014	Office	Lamp			N/A	0	8	N/A
Kelley	3	3014	Office	Surge Protector					24	0.000
Kelley	3	3014	Office	Telephone	LG-Nortel		12.0		24	0.288
Kelley	3	3016	Office	Uninterruptible Power Supply	APC	1500	1,000.0	N/A	0	N/A
Kelley	3	3016	Office	Scanner (audio, not to be confused with photo scanner)	Uniden Bearcat	BCD996XT	10.4	0	0.5	0.005
Kelley	3	3016	Office	Telephone	Polycom	CX-600	4.9	2.4	24	0.118
Kelley	3	3016	Office	Fan	Lakewood	MTF-15	N/A	0	8	N/A
Kelley	3	3016	Office	Computer	Dell	Optiplex 7010	35.6	1.5	8	0.309

Kelley	3	3016	Office	Monitor	Dell		N/A		8	N/A
Kelley	3	3016	Office	Monitor	Dell		N/A		8	N/A
Kelley	3	3016	Office	Monitor	Dell		N/A		8	N/A
Kelley	3	3016	Office	Monitor	Dell		N/A		8	N/A
Kelley	3	3016	Office	Surge Protector					24	0.000
Kelley	3	3016	Office	Tablet			N/A	N/A	8	N/A
Kelley	3	3016	Office	Walkie Talkie Charger			8.5		24	0.204
Kelley	3	3016	Office	Walkie Talkie Charger			8.5		24	0.204
Kelley	3	3017	Office	Tea Kettle	GE	106832	1,000.0	N/A	0.5	N/A
Kelley	3	3017	Office	Monitor	Dell	2208WFPT	75.0		8	0.600
Kelley	3	3017	Office	Speakers	Dell	AS501	12.0	2	2	0.068
Kelley	3	3017	Office	Fan	Optimus	F-1663	N/A	0	8	N/A
Kelley	3	3017	Office	Monitor	Dell	U2412MB	23.5		8	0.188
Kelley	3	3017	Office	Monitor	Dell		N/A		8	N/A
Kelley	3	3018	Office	Monitor	Dell	2208WFPT	75.0		8	0.600
Kelley	3	3018	Office	Telephone	Polycom	CX-300	2.5	1.8	24	0.060
Kelley	3	3018	Office	Power Adapter	Apple	MacBook Air	45.0	0.7	8	0.366
Kelley	3	3018	Office	Computer	Dell	Optiplex 780	92.9	1	8	0.759
Kelley	3	3018	Office	Monitor	Dell	P190SB	16.6		8	0.133
Kelley	3	3018	Office	Surge Protector					24	0.000
Kelley	3	3019	Office	Monitor	Dell	2208WFPT	75.0		8	0.600
Kelley	3	3019	Office	Space Heater	Holmes	HCH4166	1,500.0			1.010
Kelley	3	3019	Office	Computer	Dell	Optiplex 790	35.6	1	8	0.301
Kelley	3	3019	Office	Printer	HP	P2035	550.0	7	0.48	0.429
Kelley	3	3019	Office	Surge Protector					24	0.000
Kelley	3	3020	Break Room	Coffee Maker	Keurig	K70	1,500.0	9		2.560
Kelley	3	3020	Break Room	Coffee Maker	Kitchenaid	KCM2220B0	1,100.0	1.14		2.560

Kelley	3	3020	Break Room	Toaster	Kitchenaid Proline	KPTT890PM1	1,500.0	0	0.083	0.125
Kelley	3	3020	Break Room	Microwave	Whirlpool	MT4155SPB-4	1,200.0	3.08		0.460
Kelley	3	3020	Break Room	Refrigerator	Whirlpool	WRT771REYB00	747.5		8	5.980
Kelley	3	3022	Conference Room	Fan			165.0	0	8	1.320
Kelley	3	3022	Conference Room	Ethernet Switch	Allied Telesis	AT-FS705LE	7.5	0	24	0.180
Kelley	3	3022	Conference Room	Computer	IOGear	GKM541RA	N/A	N/A	8	N/A
Kelley	3	3022	Conference Room	Television	Sony	KDL-52XBR3	298.0	0.5	2	0.607
Kelley	3	3022	Conference Room	Computer	Dell	Optiplex 790	35.6	1	8	0.301
Kelley	3	3022	Conference Room	Video Camera	Tandberg	Precision HD TTC8-01	24.0	N/A	2	N/A
Kelley	3	3022	Conference Room	Sound Mixer	Peavey	PV8	17.6	0	0.5	0.009
Kelley	3	3022	Conference Room	Video Conversion Device	Geffen	Scaler +	27.5	N/A	2	N/A
Kelley	3	3022	Conference Room	Audio Amplifier	Extron	SW2VGADA2A/AF	8.4	0.5	1	0.020
Kelley	3	3022	Conference Room	Audio Amplifier	Extron	SW2VGADA2A/AF	8.4	0.5	1	0.020
Kelley	3	3022	Conference Room	Video Amplifier	Tandberg	TTC7-14	48.0		2	0.096
Kelley	3	3022	Conference Room	Surge Protector					24	0.000
Kelley	3	3025	Shared Office	3 Hole Punch	Sparco	96003	26.4	0	0.017	0.000
Kelley	3	3025	Shared Office	Label Maker	Dymo	450 Turbo	30.0	0	0.083	0.002
Kelley	3	3025	Shared Office	Label Maker	Dymo	450 Turbo	30.0	0	0.083	0.002
Kelley	3	3025	Shared Office	Telephone	Polycom	CX-600	4.9	2.4	24	0.118
Kelley	3	3025	Shared Office	Calculator	Sharp	EL2630P III	15.1	0	0.167	0.003
Kelley	3	3025	Shared Office	Calculator	Sharp	EL2630P III	15.1	0	0.167	0.003

Kelley	3	3025	Shared Office	Pencil Sharpener	Bostitch	EPS8HD	252.0	0.5	0.167	0.054
Kelley	3	3025	Shared Office	Stapler	Swingline	Optima 20	7.5	1.3	0.017	0.031
Kelley	3	3025	Office	Stapler	Swingline	Optima 45	14.4	1.3	0.017	0.031
Kelley	3	3025	Shared Office	Stapler	Swingline	Optima 45	14.4	1.3	0.017	0.031
Kelley	3	3025	Shared Office	Computer		Optiplex 780	92.9	1	8	0.759
Kelley	3	3025	Shared Office	Computer	Dell	Optiplex 790	35.6	1	8	0.301
Kelley	3	3025	Shared Office	Printer	HP	P1606DN	440.0	2.2	0.48	0.263
Kelley	3	3025	Shared Office	Printer	HP	P1606DN	440.0	2.2	0.48	0.263
Kelley	3	3025	Shared Office	Monitor			N/A		8	N/A
Kelley	3	3025	Shared Office	Monitor			N/A		8	N/A
Kelley	3	3025	Shared Office	Monitor			N/A		8	N/A
Kelley	3	3025	Shared Office	Monitor			N/A		8	N/A
Kelley		3025	Office	Monitor			N/A		8	N/A
Kelley	3	3025	Shared Office	Surge Protector					24	0.000
Kelley	3	3027	Shared Office	Telephone	Polycom	CX-600	4.9	2.4	24	0.118
Kelley	3	3027	Shared Office	Tablet		ID370	49.9	N/A	8	N/A
Kelley	3	3027	Shared Office	Computer	Dell	Optiplex 7010	35.6	1.5	8	0.309
Kelley	3	3027	Shared Office	Computer	Dell	Optiplex 7010	35.6	1.5	8	0.309
Kelley	3	3027	Shared Office	Computer	Dell	Optiplex 780	92.9	1	8	0.759
Kelley	3	3027	Shared Office	Laptop Power Adapter	Dell		90.1	0	8	0.721
Kelley	3	3027	Shared Office	Laptop Power Adapter	Dell		90.1	0	8	0.721
Kelley	3	3027	Shared Office	Monitor			N/A		8	N/A
Kelley	3	3027	Shared Office	Monitor			N/A		8	N/A
Kelley	3	3027	Shared Office	Monitor			N/A		8	N/A
Kelley	3	3027	Shared Office	Monitor			N/A		8	N/A
Kelley	3	3027	Shared Office	Surge Protector					24	0.000
Kelley	3	3027	Shared Office	Walkie Talkie Charger	Motorola		4.0	N/A	24	N/A
Kelley	3	3027	Shared Office	Walkie Talkie	Motorola		4.0	N/A	24	N/A

				Charger						
Kelley	3	3029	Office	Pencil Sharpener	Boston	19	240.0	0.5	0.167	0.052
Kelley	3	3029	Office	Router	Asante	10THUB	15.0		24	0.360
Kelley	3	3029	Office	3 Hole Punch	GBCBates	350MD	N/A	0	0.017	N/A
Kelley	3	3029	Office	Calculator	Sharp	EL2630P III	15.1	0	0.167	0.003
Kelley	3	3029	Office	Space Heater	Holmes	HCH4062	1,500.0			1.010
Kelley	3	3029	Office	Stapler	Swingline	Optima 45	14.4	1.3	0.017	0.031
Kelley	3	3029	Office	Computer	Dell	Optiplex 790	35.6	1	8	0.301
Kelley	3	3029	Office	Printer	HP	P2055DN	570.0	8	0.48	0.462
Kelley	3	3029	Office	Fan	Duracraft		N/A	0	8	N/A
Kelley	3	3029	Office	Lamp			60.0	0	8	0.480
Kelley	3	3029	Office	Lamp			60.0	0	8	0.480
Kelley	3	3029	Office	Monitor			N/A		8	N/A
Kelley	3	3029	Office	Monitor			N/A		8	N/A
Kelley	3	3029	Office	Surge Protector					24	0.000
Kelley	3	3029	Office	Surge Protector					24	0.000
Kelley	3	3029	Office	Telephone			N/A	N/A	24	N/A
Kelley	3	3031	Shared Office	Fan	Boston	25971	16.0	0	8	0.128
Kelley	3	3031	Shared Office	Label Maker	Dymo	450 Turbo	30.0	0	0.083	0.002
Kelley	3	3031	Shared Office	Label Maker	Dymo	450 Turbo	30.0	0	0.083	0.002
Kelley	3	3031	Shared Office	Telephone	Polycom	CX-600	4.9	2.4	24	0.118
Kelley	3	3031	Shared Office	Calculator	Sharp	EL-1197PIII	16.3	0	0.167	0.003
Kelley	3	3031	Shared Office	Calculator	Sharp	EL2630P III	15.1	0	0.167	0.003
Kelley	3	3031	Shared Office	Space Heater	Holmes	HFH442	1,500.0			1.010
Kelley	3	3031	Shared Office	Fan	Holmes	HT26	48.0	0	8	0.384
Kelley	3	3031	Shared Office	Stapler	Swingline	Optima 20	7.5	1.3	0.017	0.031
Kelley	3	3031	Shared Office	Stapler	Swingline	Optima 45	14.4	1.3	0.017	0.031
Kelley	3	3031	Shared Office	Computer	Dell	Optiplex 790	35.6	1	8	0.301
Kelley	3	3031	Shared Office	Computer	Dell	Optiplex 790	35.6	1	8	0.301
Kelley	3	3031	Shared Office	Printer	HP	P1606DN	440.0	2.2	0.48	0.263
Kelley	3	3031	Shared Office	Printer	HP	P1606DN	440.0	2.2	0.48	0.263

Kelley	3	3031	Shared Office	Fan			N/A	N/A	8	N/A
Kelley	3	3031	Shared Office	Monitor	Dell		N/A		8	N/A
Kelley	3	3031	Shared Office	Monitor	Dell		N/A		8	N/A
Kelley	3	3031	Shared Office	Monitor			N/A		8	N/A
Kelley	3	3031	Shared Office	Monitor			N/A		8	N/A
Kelley	3	3031	Shared Office	Mouse	Logitech		N/A	0	8	N/A
Kelley	3	3031	Shared Office	Telephone			N/A	N/A	24	N/A
Kelley	3	3033	Copy Room	Copier	Ricoh	Aficio MP3351	1,320.0	120	1	4.080
Kelley	3	3033	Copy Room	Dust Buster	Black & Decker	CHV7202	17.0	0	0.083	0.001
Kelley	3	3033	Copy Room	Fan	GD Midea	FB50-A1	90.0	0	8	0.720
Kelley	3	3033	Copy Room	Fan	GD Midea	FB50-A1	90.0	0	8	0.720
Kelley	3	3033	Copy Room	Vacuum Cleaner	Hoover	S2543	792.0	1.2	0.017	0.042
Kelley	3	3033	Copy Room	Surge Protector					24	0.000
Kelley	3	3009A	Office	Monitor	Dell	2208WFPT	75.0		8	0.600
Kelley	3	3009A	Office	Telephone	Polycom	CX-300	2.5	1.8	24	0.060
Kelley	3	3009A	Office	Computer	Dell	Optiplex 7010	35.6	1.5	8	0.309
Kelley	3	3009A	Office	Laptop Power Adapter	Sony	SVS131G21L	76.1	0	8	0.608
Kelley	3	3009A	Office	Fan	Duracraft		N/A	N/A	8	N/A
Kelley	3	3009A	Office	Lamp			150.0	0	8	1.200
Kelley	3	3009B	Office	Monitor	Dell	2208WFPT	75.0		8	0.600
Kelley	3	3009B	Office	Monitor	Dell	2208WFPT	75.0		8	0.600
Kelley	3	3009B	Office	Speakers	Dell	AS501	12.0	2	2	0.068
Kelley	3	3009B	Office	Fan	Holmes	HSH442	1,500.0	0	8	12.000
Kelley	3	3009B	Office	Fan	Polarwind	KHD-1208	66.0	0	8	0.528
Kelley	3	3009B	Office	Telephone	LG-Nortel	IP8540-1N	12.0	2	24	0.288
Kelley	3	3009B	Office	Computer	Dell	Optiplex 760	39.4	1	8	0.331
Kelley	3	3009B	Office	Lamp			100.0	0	8	0.800
Kelley	3	3009B	Office	Lamp			150.0	0	8	1.200
Kelley	3	3009B	Office	Refrigerator	Canvas		N/A		8	N/A
Kelley	3	3023A	Cubicle	Telephone	Polycom	CX-600	4.9	2.4	24	0.118
Kelley	3	3023A	Cubicle	All-In-One	Brother	DCP-7060D	445.0	55	1.9	2.061

				Printer						
Kelley	3	3023A	Cubicle	Space Heater	Holmes	HFH112	1,500.0			1.010
Kelley	3	3023A	Cubicle	Computer	Dell	Optiplex 790	35.6	1	8	0.301
Kelley	3	3023A	Cubicle	Monitor	Dell	U2212HMC	19.6		8	0.156
Kelley	3	3023A	Cubicle	Fan	Holmes		84.0	N/A	8	N/A
Kelley	3	3023A	Cubicle	Surge Protector					24	0.000
Kelley	3	3023B	Cubicle	Fan	Boston	25971	16.0	0	8	0.128
Kelley	3	3023B	Cubicle	Monitor	Dell	2208WFPT	75.0		8	0.600
Kelley	3	3023B	Cubicle	Scanner	Canon	9000F	15.0	0.9	0.72	0.032
Kelley	3	3023B	Cubicle	Printer	HP	BOISB-0602-00	325.0	7	0.48	0.321
Kelley	3	3023B	Cubicle	Calculator	Sharp	Compet CS-2194H	15.1	0	0.167	0.003
Kelley	3	3023B	Cubicle	Telephone	Polycom	CX-600	4.9	2.4	24	0.118
Kelley	3	3023B	Cubicle	Stapler	Swingline	Optima 20	7.5	1.3	0.017	0.031
Kelley	3	3023B	Cubicle	Computer	Dell	Optiplex 780	92.9	1	8	0.759
Kelley	3	3023B	Cubicle	Mouse	Microsoft		0.5	0	8	0.004
Kelley	3	3023B	Cubicle	Space Heater	Holmes		1,500.0			1.010
Kelley	3	3023B	Cubicle	Surge Protector					24	0.000
Kelley	3	3023C	Cubicle	Monitor	Dell	2208WFPT	75.0		8	0.600
Kelley	3	3023C	Cubicle	Calculator	Sharp	Compet CS-2194H	15.1	0	0.167	0.003
Kelley	3	3023C	Cubicle	All-in-One Printer	Brother	DCP-7060D	445.0	55	1.9	2.061
Kelley	3	3023C	Cubicle	Stapler	Swingline	Optima 20	7.5	1.3	0.017	0.031
Kelley	3	3023C	Cubicle	Computer	Dell	Optiplex 780	92.9	1	8	0.759
Kelley	3	3023C	Cubicle	Monitor	Dell	P190ST	18.3		8	0.146
Kelley	3	3023C	Cubicle	Fan	Holmes		48.0	N/A	8	N/A
Kelley	3	3023C	Cubicle	Mouse	Gyration		3.6	0	8	0.029
Kelley	3	3023C	Cubicle	Surge Protector					24	0.000
Kelley	3	3023C	Cubicle	Surge Protector					24	0.000
Kelley	3	3023C	Cubicle	Telephone	Qualcomm		N/A	N/A	24	N/A
Kelley	3	3023D	Cubicle	Telephone	Polycom	CX-600	4.9	2.4	24	0.118

Kelley	3	3023D	Cubicle	All-in-One Printer	Brother	DCP-7060D	445.0	55	1.9	2.061
Kelley	3	3023D	Cubicle	Fan	Duracraft	DT-124	42.0	0	8	0.336
Kelley	3	3023D	Cubicle	Calculator	Casio	FR-2650TM	18.7	0	0.167	0.003
Kelley	3	3023D	Cubicle	Fan	Holmes	HACP10B	48.0	0	8	0.384
Kelley	3	3023D	Cubicle	Space Heater	Lasko	MyHeat 106	200.0			1.010
Kelley	3	3023D	Cubicle	Computer	Dell	Optiplex 790	35.6	1	8	0.301
Kelley	3	3023D	Cubicle	Monitor	Dell	U2212HMC	19.6		8	0.156
Kelley	3	3023D	Cubicle	Monitor	Dell	U2212HMC	19.6		8	0.156
Kelley	3	3023D	Cubicle	Mouse	Microsoft		0.5	0	8	0.004
Kelley	3	3023D	Cubicle	Stapler	Swingline		N/A	1.3	0.017	N/A
Kelley	3	3023E	Cubicle	Router	Asante	10THUB	15.0		24	0.360
Kelley	3	3023E	Cubicle	Monitor	Dell	2208WFPT	75.0		8	0.600
Kelley	3	3023E	Cubicle	Label Maker	Dymo	450 Turbo	30.0	0	0.083	0.002
Kelley	3	3023E	Cubicle	Clock Radio	GE	7-4836B	4.0	2.01	24	0.096
Kelley	3	3023E	Cubicle	Scanner	Canon	9000F	15.0	0.9	0.72	0.032
Kelley		3023E	Cubicle	Printer	HP	BOISB-0801-00	570.0	7	0.48	0.438
Kelley	3	3023E	Cubicle	Calculator	Sharp	Compet CS-1780	32.0	0	0.167	0.005
Kelley	3	3023E	Cubicle	Fan	Holmes	HACP-7	42.0	0	8	0.336
Kelley	3	3023E	Cubicle	Space Heater	Holmes	NFH111	1,500.0			1.010
Kelley	3	3023E	Cubicle	Computer	Dell	Optiplex 790	35.6	1	8	0.301
Kelley	3	3023E	Cubicle	Fan	Windmere	RF1010	72.0	0	8	0.576
Kelley	3	3023E	Cubicle	Surge Protector					24	0.000
Kelley	3	3023E	Cubicle	Telephone	Qualcomm		N/A	N/A	24	N/A
Kelley	3	3023F	Cubicle	Label Maker	Dymo	450 Turbo	30.0	0	0.083	0.002
Kelley	3	3023F	Cubicle	Stapler	Swingline	520E	15.0	1.3	0.017	0.031
Kelley	3	3023F	Cubicle	Telephone	Polycom	CX-600	4.9	2.4	24	0.118
Kelley	3	3023F	Cubicle	All-in-One Printer	Brother	DCP-7060D	445.0	55	1.9	2.061
Kelley	3	3023F	Cubicle	Calculator	Casio	DR-210TM	20.4	0	0.167	0.003
Kelley	3	3023F	Cubicle	Fan	Honeywell	DT-12	42.0	0	8	0.336
Kelley	3	3023F	Cubicle	Fan	Holmes	HACP10B	48.0	0	8	0.384
Kelley	3	3023F	Cubicle	Space Heater	Holmes	HFH2986	1,500.0			1.010

Kelley	3	3023F	Cubicle	Computer	Dell	Optiplex 780	92.9	1	8	0.759
Kelley	3	3023F	Cubicle	Monitor	Dell	P190ST	18.3		8	0.146
Kelley	3	3023F	Cubicle	Monitor	Dell	P190ST	18.3		8	0.146
Kelley	3	3023F	Cubicle	Check Scanner	Digital Check	Teller Scan TS230	45.0	1.8	0.017	0.001
Kelley	3	3023F	Cubicle	Surge Protector					24	0.000
Kelley	3		Cubicle	Shredder	Fellowes	225CI	1,000.0	0	0.167	0.167
Kelley	3		Cubicle	Space Heater	Whirlpool	AP45030H0	1,500.0			1.010
SPEA	3	300	Conference Room	Toaster	Sunbeam	3837	800.0		0.083	0.066
SPEA	3	300	Conference Room	Space Heater	Boston	25964	1,500.0			1.010
SPEA	3	300	Dean's Office	Fan	Air King	18P	108.0	0	8	0.864
SPEA	3	300	Dean's Office	Monitor	Dell	2208WFPT	75.0		8	0.600
SPEA	3	300	Dean's Office	Monitor	Dell	2208WFPT	75.0		8	0.600
SPEA	3	300	Conference Room	Monitor	Dell	2208WFPT	75.0		8	0.600
SPEA	3	300	Dean's Office	Fan	Holmes	HACP-9	48.0	0	8	0.384
SPEA	3	300	Dean's Office	Space Heater	Honeywell	HC-135	1,500.0			1.010
SPEA	3	300	Dean's Office	Computer	Dell	Optiplex 7010	35.6	1.5	8	0.309
SPEA	3	300	Dean's Office	Computer	Dell	Optiplex 7010	35.6	1.5	8	0.309
SPEA	3	300	Dean's Office	Printer	HP	P2015D	325.0	7	0.48	0.321
SPEA	3	300	Dean's Office	Computer	Dell	W07B	N/A	N/A	8	N/A
SPEA	3	300	Dean's Office	Lamp			23.0	0	8	0.184
SPEA	3	300	Conference Room	Refrigerator	Whirlpool	ET0MSRXTBO2	747.5		8	5.980
SPEA	3	300	Conference Room	Television	LG	Flatron	N/A		2	N/A
SPEA	3	300	Dean's Office	Lamp			60.0	0	8	0.480
SPEA	3	300	Dean's Office	Lamp			104.0	0	8	0.832
SPEA	3	300	Dean's Office	Refrigerator	Excellence		N/A		8	N/A
SPEA	3	300	Dean's Office	Surge Protector					24	0.000
SPEA	3	300	Dean's Office	Surge					24	0.000

				Protector						
SPEA	3	300	Conference Room	Microwave	Emerson	MW1161SB	1,500.0	3.08		0.460
SPEA	3	300	Conference Room	Computer	Dell	Optiplex 790	35.6	1	8	0.301
SPEA	3	300	Conference Room	Computer	Dell	Optiplex 790	35.6	1	8	0.301
SPEA	3	300	Conference Room	Television	Samsung	PN63A650T1F	760.0	1	2	1.542
SPEA	3	300	Conference Room	Surge Protector					24	0.000
SPEA	3	300	Reception	Fan	Lasko	12-1	45.6	0	8	0.365
SPEA	3	300	Reception	Fan	Air King	18P	108.0	0	8	0.864
SPEA	3	300	Reception	Monitor	Dell	2208WFPT	75.0		8	0.600
SPEA	3	300	Reception	Monitor	Dell	2208WFPT	75.0		8	0.600
SPEA	3	300	Reception	Air Purifier	Honeywell	502050S	180.0	0		1.890
SPEA	3	300	Reception	Air Purifier	Honeywell	502050S	180.0	0		1.890
SPEA	3	300	Reception	Shredder	Fellowes	58-95C	N/A	0	0.167	N/A
SPEA	3	300	Reception	Space Heater	Holmes	HFH103	1,500.0			1.010
SPEA	3	300	Reception	Space Heater	Holmes	HFH111	1,500.0			1.010
SPEA	3	300	Reception	Scanner	Canon	LiDE210	2.5	1.4	0.72	0.034
SPEA	3	300	Reception	All-in-One Printer	Dell	MFP3115CN	465.0	108	1.9	3.270
SPEA	3	300	Reception	Computer	Dell	Optiplex 7010	35.6	1.5	8	0.309
SPEA	3	300	Reception	Computer	Dell	Optiplex 7010	35.6	1.5	8	0.309
SPEA	3	300	Reception	Type Writer	IBM	Wheel Writer 2	55.0		0.083	0.005
SPEA	3	300	Reception	Lamp			26.0	0	8	0.208
SPEA	3	300	Reception	Lamp			26.0	0	8	0.208
SPEA	3	300	Reception	Lamp			40.0	0	8	0.320
SPEA	3	300	Reception	Surge Protector					24	0.000
SPEA	3	312	Reception	Pencil Sharpener	Boston	19	240.0	0.5	0.167	0.052
SPEA	3	312	Reception	Monitor	Dell	2208WFPT	75.0		8	0.600
SPEA	3	312	Reception	Monitor	Dell	2208WFPT	75.0		8	0.600

SPEA	3	312	Reception	Printer	HP	400 M401 DN	570.0	7.3	0.48	0.445
SPEA	3	312	Reception	Air Purifier	Honeywell	502050S	180.0	0		1.890
SPEA	3	312	Reception	All-in-One Printer	Ricoh	Aficio CL7200	1,320.0	19	1.9	2.928
SPEA	3	312	Reception	Fan	Lasko	Breeze Machine	30.0	0	8	0.240
SPEA	3	312	Reception	All-in-One Printer	Dell	C3765DNF	750.0	78	1.9	3.149
SPEA	3	312	Reception	Telephone	Polycom	CX-600	4.9		24	0.118
SPEA	3	312	Reception	Space Heater	Duracraft	CZ-2200	1,500.0			1.010
SPEA	3	312	Reception	Fan	Optimus	F-1663	N/A	0	8	N/A
SPEA	3	312	Reception	Refrigerator	Haier	HSA02WNDWW	1,725.0		8	13.800
SPEA	3	312	Reception	Space Heater		HZ-315	1,500.0			1.010
SPEA	3	312	Reception	Computer	Dell	Optiplex 7010	35.6	1.5	8	0.309
SPEA	3	312	Reception	Computer	Dell	Optiplex 990	79.8	1.92	8	0.669
SPEA	3	312	Reception	Printer	HP	P2005DN	570.0	8	0.48	0.462
SPEA	3	312	Reception	Monitor	Dell	U2312HMT	24.9		8	0.199
SPEA	3	312	Reception	Lamp			23.0	0	8	0.184
SPEA	3	312	Reception	Lamp			23.0	0	8	0.184
SPEA	3	312	Reception	Lamp			23.0	0	8	0.184
SPEA	3	312	Reception	Lamp			23.0	0	8	0.184
SPEA	3	312	Reception	Surge Protector					24	0.000
SPEA	3	314	Shared Office	Monitor	Dell	2208WFPT	75.0		8	0.600
SPEA	3	314	Shared Office	Monitor	Dell	2208WFPT	75.0		8	0.600
SPEA	3	314	Shared Office	Monitor	Dell	2208WFPT	75.0		8	0.600
SPEA	3	314	Shared Office	Air Purifier	Honeywell	502050S	180.0	0		1.890
SPEA	3	314	Shared Office	Calculator	Sharp	EL-2192R	13.2	0	0.167	0.002
SPEA	3	314	Shared Office	Fan	Holmes	HANF76BLZ	48.0	0	8	0.384
SPEA	3	314	Shared Office	Space Heater	Pelonis	HF-0020T	1,500.0			1.010
SPEA	3	314	Shared Office	Scanner	Canon	LiDE210	2.5	1.4	0.72	0.034
SPEA	3	314	Shared Office	Printer	HP	M401	570.0	7.3	0.48	0.445
SPEA	3	314	Shared Office	All-in-One Printer	Dell	MFP3115CN	465.0	108	1.9	3.270
SPEA	3	314	Shared Office	Computer	Dell	Optiplex 7010	35.6	1.5	8	0.309

SPEA	3	314	Shared Office	Computer	Dell	Optiplex 755	92.9	2	8	0.775
SPEA	3	314	Shared Office	Computer	Dell	Optiplex 960	44.0	1	8	0.368
SPEA	3	314	Shared Office	Printer	HP	P2055DN	570.0	8	0.48	0.462
SPEA	3	314	Shared Office	Shredder	Fellowes	PS60C-2	N/A	0	0.167	N/A
SPEA	3	314	Shared Office	Space Heater	Sunbeam	SCH160	1,500.0			1.010
SPEA	3	314	Shared Office	Fax Machine	Panasonic	UF-4000	470.0	1.2	0.48	0.254
SPEA	3	314	Shared Office	Lamp			10.0	0	8	0.080
SPEA	3	314	Shared Office	Lamp			10.0	0	8	0.080
SPEA	3	314	Shared Office	Monitor	Dell		N/A		8	N/A
SPEA	3	314	Shared Office	Surge Protector					24	0.000
SPEA	3	316	Reception	Lamp	Dazor	1069	60.0	0	8	0.480
SPEA	3	316	Reception	Monitor	Dell	2208WFPT	75.0		8	0.600
SPEA	3	316	Reception	Space Heater	Lakewood	C32A	1,500.0			1.010
SPEA	3	316	Reception	Telephone	Polycom	CX-600	4.9		24	0.118
SPEA	3	316	Reception	Calculator	Casio	HR-152TM	2.0	0	0.167	0.000
SPEA	3	316	Reception	Computer	Dell	Optiplex 7010	35.6	1.5	8	0.309
SPEA	3	316	Reception	Printer	HP	P2055DN	570.0	8	0.48	0.462
SPEA	3	316	Reception	Type Writer	IBM	Wheel Writer 1000	N/A		0.083	N/A
SPEA	3	321	Office	Refrigerator	Emerson	CR177WE	139.2		8	1.113
SPEA	3	321	Office	Computer	Dell	Optiplex 7010	35.6	1.5	8	0.309
SPEA	3	321	Office	Monitor	Dell	U2312HMT	24.9		8	0.199
SPEA	3	321	Office	Surge Protector					24	0.000
SPEA	3	321	Office	Surge Protector					24	0.000
SPEA	3	322	Office	Monitor	Dell	2208WFPT	75.0		8	0.600
SPEA	3	322	Office	Speakers	Dell	AS501	12.0		2	0.024
SPEA	3	322	Office	Computer	Dell	Optiplex 755	92.9	2	8	0.775
SPEA	3	322	Office	Computer	Dell	Optiplex 980	35.6	1.92	8	0.316
SPEA	3	322	Office	Lamp			N/A	0	8	N/A
SPEA	3	323	Office	Telephone	Polycom	CX-600	4.9		24	0.118
SPEA	3	323	Office	Printer	Brother	HL2270DW	1,000.0	65	0.48	2.009
SPEA	3	323	Office	Telephone			N/A		24	N/A

SPEA	3	324	Office	Monitor	Dell	2208WFPT	75.0		8	0.600
SPEA	3	324	Office	External Data Storage	Seagate	Expansion External Drive	78.0	0	8	0.624
SPEA	3	324	Office	Fan	Cool Breeze	HF-S40X	60.0	0	8	0.480
SPEA	3	324	Office	Coffee Maker	Kering	k40	1,500.0	9		0.640
SPEA	3	324	Office	Computer	Dell	Optiplex 980	35.6	1.92	8	0.316
SPEA	3	324	Office	Laptop Power Adapter	Acer	P1VE6	90.0	0	8	0.720
SPEA	3	324	Office	Monitor	Samsung	P2770FH	50.0		8	0.400
SPEA	3	324	Office	Speakers	Sony	SRSD25	24.0		2	0.048
SPEA	3	324	Office	Laptop Power Adapter	ASUS		90.0	0	8	0.720
SPEA	3	324	Office	Laptop Power Adapter	ASUS		90.0	0	8	0.720
SPEA	3	325	Office	Coffee Maker	Keurig	B145 Office Pro	1,500.0	1.14		0.640
SPEA	3	325	Office	Coffee Maker	Hamilton Beach	Beach A49	900.0	1.14		0.640
SPEA	3	325	Office	Computer	Dell	Optiplex 7010	35.6	1.5	8	0.309
SPEA	3	325	Office	Monitor	Dell	U2312HMT	24.9		8	0.199
SPEA	3	325	Office	Surge Protector					24	0.000
SPEA	3	327	Office	Computer	Dell	Optiplex 980	35.6	1.92	8	0.316
SPEA	3	327	Office	Monitor	Dell	P2411HB	27.0		8	0.216
SPEA	3	327	Office	Lamp			60.0	0	8	0.480
SPEA	3	327	Office	Surge Protector					24	0.000
SPEA	3	328	Office	Computer	Dell	Optiplex 990	79.8	1.92	8	0.669
SPEA	3	328	Office	Monitor	Dell	U2311HB	33.0		8	0.264
SPEA	3	328	Office	Surge Protector					24	0.000
SPEA	3	329	Office	Fan	Lasko	12	60.0	0	8	0.480
SPEA	3	329	Office	Monitor	Dell	2208WFPT	75.0		8	0.600
SPEA	3	329	Office	Speakers	Dell	AY410-R	45.0		2	0.090
SPEA	3	329	Office	Synthesizer	Venom	GEP125-090100-1	9.0		0.5	0.005
SPEA	3	329	Office	Synthesizer	Roland	JP8000	24.0		0.5	0.012

SPEA	3	329	Office	Power Adapter	Apple	Magsafe 2	60.0	0	8	0.480
SPEA	3	329	Office	Sound Mixer	Artcessories	Power Mixer 3	N/A	0	0.5	N/A
SPEA	3	329	Office	Monitor	Dell	U2412MB	23.5		8	0.188
SPEA	3	329	Office	Lamp		UV Filter 001	50.0	0	8	0.400
SPEA	3	329	Office	Computer	Dell	XPS 8300	N/A	N/A	8	N/A
SPEA	3	329	Office	Surge Protector					24	0.000
SPEA	3	330	Reception	Pencil Sharpener	Boston	18	240.0	0.5	0.167	0.052
SPEA	3	330	Reception	Monitor	Dell	2208WFPT	75.0		8	0.600
SPEA	3	330	Reception	Space Heater	Lakewood	C32A	1,500.0			1.010
SPEA	3	330	Reception	Telephone	Polycom	CX-600	4.9		24	0.118
SPEA	3	330	Reception	Computer	Dell	Optiplex 980	35.6	1.92	8	0.316
SPEA	3	330	Reception	Type Writer	IBM	Wheel Writer 2	55.0		0.083	0.005
SPEA	3	330	Reception	Printer			N/A	N/A	0.48	N/A
SPEA	3	331	Office	Tea Kettle	Hamilton Beach	40616	950.0		0.5	0.475
SPEA	3	331	Office	Monitor	Dell	2208WFPT	75.0		8	0.600
SPEA	3	331	Office	Speakers	Dell	AS501	12.0		2	0.024
SPEA	3	331	Office	Speakers	Dell	AS501	12.0		2	0.024
SPEA	3	331	Office	Telephone	Polycom	CX-300	2.5		24	0.060
SPEA	3	331	Office	Computer	Dell	Optiplex 960	44.0	1	8	0.368
SPEA	3	333	Office	Monitor	Dell	2208WFPT	75.0		8	0.600
SPEA	3	333	Office	CD Player	Sony	ICFCD855V	10.0	7	1	0.171
SPEA	3	333	Office	Tea Kettle	Melittaexpress Kettle	MEK17W	1,500.0		0.5	0.750
SPEA	3	333	Office	Computer	Dell	Optiplex 7010	35.6	1.5	8	0.309
SPEA	3	333	Office	Telephone	Plantronix	P540-M	0.5		24	0.012
SPEA	3	333	Office	Refrigerator	GE		N/A		8	N/A
SPEA	3	334	Copy Room	Pencil Sharpener	Boston	1645	240.0	0.5	0.167	0.052
SPEA	3	334	Copy Room	Shredder	Fellowes	220C	720.0	0	0.167	0.120
SPEA	3	334	Copy Room	Printer	HP	CP4525	740.0	72	0.48	2.049
SPEA	3	334	Copy Room	All-in-One	HP	Laserjet M4555MFP	960.0	54	1.9	3.017

				Printer						
SPEA	3	334	Copy Room	All-in-One Printer	Ricoh	MPC4503	759.0	110	1.9	3.873
SPEA	3	334	Copy Room	Stapler	Swingline	Optima 20	7.5		0.017	0.000
SPEA	3	334	Copy Room	Power Conditioning System	Ricoh	XG-PCS-15D	4.0	0	24	0.096
SPEA	3	335	Office	Monitor	Dell	U2312HMT	24.9		8	0.199
SPEA	3	339	Office	Space Heater	Boston	25964	1,500.0			1.010
SPEA	3	339	Office	Monitor	Dell	2208WFPT	75.0		8	0.600
SPEA	3	339	Office	Lamp	Hemma	B0713	40.0	0	8	0.320
SPEA	3	339	Office	Refrigerator	Black & Decker	BNA17	130.0		8	1.040
SPEA	3	339	Office	Coffee Maker	Mr. Coffee	CHX23	900.0	1.14		0.640
SPEA	3	339	Office	Telephone	Polycom	CX-600	4.9		24	0.118
SPEA	3	339	Office	Space Heater	Feature Comforts	DQ720	1,500.0			1.010
SPEA	3	339	Office	Fan	Optimus	F-1663	N/A	0	8	N/A
SPEA	3	339	Office	Fan	Intertek	JD160076	15.0	0	8	0.120
SPEA	3	339	Office	Scanner	Canon	LiDE200	2.5	1.4	0.72	0.034
SPEA	3	339	Office	Microwave	Emerson	MW9339SB	1,350.0	3.08		0.115
SPEA	3	339	Office	Hot Plate	N/A	N/A	360.0	0	1	0.360
SPEA	3	339	Office	Computer	Dell	Optiplex 7010	35.6	1.5	8	0.309
SPEA	3	339	Office	Computer	Dell	Optiplex 7010	35.6	1.5	8	0.309
SPEA	3	339	Office	Computer	Dell	Optiplex 990	79.8	1.92	8	0.669
SPEA	3	339	Office	Monitor	Dell	U2312HMT	24.9		8	0.199
SPEA	3	339	Office	External Data Storage	Seagate		N/A	0	8	N/A
SPEA	3	339	Office	Lamp			40.0	0	8	0.320
SPEA	3	339	Office	Refrigerator	Sanyo		N/A		8	N/A
SPEA	3	339	Office	Surge Protector					24	0.000
SPEA	3	339	Office	Surge Protector					24	0.000
SPEA	3	340	Reception	Pencil Sharpener	Boston	19	240.0	0.5	0.167	0.052

SPEA	3	340	Reception	Monitor	Dell	2208WFPT	75.0		8	0.600
SPEA	3	340	Reception	Computer	Dell	Optiplex 960	44.0	1	8	0.368
SPEA	3	340	Reception	Printer	HP	P2005DN	570.0	8	0.48	0.462
SPEA	3	340	Reception	Surge Protector					24	0.000
SPEA	3	341	Office	Refrigerator	Black & Decker	ECFA27B	724.5		8	5.796
SPEA	3	341	Office	Space Heater	Honeywell	HZ-315	1,500.0			1.010
SPEA	3	341	Office	Computer	Dell	Optiplex 7010	35.6	1.5	8	0.309
SPEA	3	341	Office	Printer	HP	P2005DN	570.0	8	0.48	0.462
SPEA	3	341	Office	Laptop Power Adapter	Toshiba	Satellite A75-S2131	119.7	0	8	0.958
SPEA	3	341	Office	Laptop Power Adapter	Compaq	Series PPP014S	90.1	0	8	0.720
SPEA	3	341	Office	Monitor	Dell	U2312HMT	24.9		8	0.199
SPEA	3	341	Office	Monitor	Dell		N/A		8	N/A
SPEA	3	341	Office	Surge Protector					24	0.000
SPEA	3	343	Office	Tea Kettle	Krups	AC16	1,750.0		0.5	0.875
SPEA	3	343	Office	Docking Station Power Adapter	iHome	IH5BR	16.5	0	8	0.132
SPEA	3	343	Office	Computer	Dell	Optiplex 990	79.8	1.92	8	0.669
SPEA	3	343	Office	Monitor	Dell	U2311HB	33.0		8	0.264
SPEA	3	343	Office	Monitor	Dell	U2311HB	33.0		8	0.264
SPEA	3	343	Office	Surge Protector					24	0.000
SPEA	3	345	Office	Monitor	Dell	2208WFPT	75.0		8	0.600
SPEA	3	345	Office	Refrigerator	Avanti	489RC-RA-RW	80.0		8	0.640
SPEA	3	345	Office	Computer	Dell	Optiplex 980	35.6	1.92	8	0.316
SPEA	3	345	Office	Scanner	Microtek	Scan Maker 4800	15.0	0	0.72	0.011
SPEA	3	347	Office	Fluorescent Music Lamp	Nfk Lite Mfg. Co., Ltd.	4026S	49.2		2	0.098
SPEA	3	347	Office	Fluorescent Music Lamp	Nfk Lite Mfg. Co., Ltd.	4026S	49.2		2	0.098
SPEA	3	347	Office	Cell Phone	Apple	A1265	5.0	0.3	2	0.017

				Charger						
SPEA	3	347	Office	Telephone	Polycom	CX-600	4.9		24	0.118
SPEA	3	347	Office	Monitor	Apple	iMac	93.1		8	0.745
SPEA	3	349	Office	Uninterruptible Power Supply	APC	650	410.0		0	0.000
SPEA	3	349	Office	Computer	Cooler Master	ATCS840	N/A	N/A	8	N/A
SPEA	3	349	Office	Scanner	HP	C6260A	28.7	3.3	0.72	0.097
SPEA	3	349	Office	Computer	Sony		N/A	N/A	8	N/A
SPEA	3	349	Office	Surge Protector					24	0.000
SPEA	3	351	Office	Monitor	Dell	2208WFPT	75.0		8	0.600
SPEA	3	351	Office	Telephone	Polycom	CX-300	2.5		24	0.060
SPEA	3	351	Office	Computer	Dell	Optiplex 7010	35.6	1.5	8	0.309
SPEA	3	353	Office	Monitor	Dell	2208WFPT	75.0		8	0.600
SPEA	3	353	Office	Telephone	Polycom	CX-300	2.5		24	0.060
SPEA	3	353	Office	External Data Storage	Seagate	NAS	N/A	0	8	N/A
SPEA	3	353	Office	Computer	Dell	Optiplex 980	35.6	1.92	8	0.316
SPEA	3	353	Office	Refrigerator	Sanyo	SR-257W	1,608.0		8	12.864
SPEA	3	353	Office	Lamp			260.0	0	8	2.080
SPEA	3	355	Office	Monitor	Dell	2208WFPT	75.0		8	0.600
SPEA	3	355	Office	Refrigerator	Emerson	CR188WE	172.5		8	1.380
SPEA	3	355	Office	Telephone	Polycom	CX-300	2.5		24	0.060
SPEA	3	355	Office	Computer	Dell	Optiplex 7010	35.6	1.5	8	0.309
SPEA	3	355	Office	Monitor	Dell		N/A		8	N/A
SPEA	3	356	Office	Power Adapter	Apple	MacBook Pro	90.0	2	8	0.752
SPEA	3	356	Office	Computer	Dell	Optiplex 7010	35.6	1.5	8	0.309
SPEA	3	356	Office	Computer	Dell	Optiplex 7010	35.6	1.5	8	0.309
SPEA	3	356	Office	Monitor	Dell	U2312HMT	24.9		8	0.199
SPEA	3	356	Office	Monitor	Dell	U2312HMT	24.9		8	0.199
SPEA	3	356	Office	Lamp			50.0	0	8	0.400
SPEA	3	356	Office	Lamp	IKEA		60.0	0	8	0.480
SPEA	3	356	Office	Surge					24	0.000

				Protector						
SPEA	3	356	Office	Surge Protector					24	0.000
SPEA	3	357	Office	Light Box	Halt Productions	1824	N/A	0	0.167	N/A
SPEA	3	357	Office	Monitor	Dell	2208WFPT	75.0		8	0.600
SPEA	3	357	Office	External Data Storage	Simpletech	90000-40479-002	18.0	0	8	0.144
SPEA	3	357	Office	External Data Storage	Simpletech	90000-40479-002	18.0	0	8	0.144
SPEA	3	357	Office	Speakers	Altec Lansing	ACS90	30.0		2	0.060
SPEA	3	357	Office	Telephone	Polycom	CX-300	2.5		24	0.060
SPEA	3	357	Office	Computer	Dell	Optiplex 980	35.6	1.92	8	0.316
SPEA	3	357	Office	Monitor	ASUS		N/A		8	N/A
SPEA	3	357	Office	Refrigerator	Tatung		N/A		8	N/A
SPEA	3	359	Office	Monitor	Dell	2208WFPT	75.0		8	0.600
SPEA	3	359	Office	Monitor	Dell	2208WFPT	75.0		8	0.600
SPEA	3	359	Office	Television	TCL	LE39FHDF3300TA	90.0	0.2	2	0.184
SPEA	3	359	Office	Scanner	Canoscan	LiDE100	2.5	1.4	0.72	0.034
SPEA	3	359	Office	Computer	Dell	Optiplex 980	35.6	1.92	8	0.316
SPEA	3	359	Office	Printer	HP	P2005DN	570.0	8	0.48	0.462
SPEA	3	359	Office	Microwave	Sunbeam	SGS90701B	1,050.0	3.08		0.115
SPEA	3	359	Office	Surge Protector					24	0.000
SPEA	3	380	Break Room	Microwave	GE	JES1142SJ06		3.08		0.460
SPEA	3	380	Break Room	Microwave	GE	JES1142SJ06		3.08		0.460
SPEA	3	380	Break Room	Dishwasher	Frigidaire	FDB1502RGC4	1,200.0	0	1	1.200
SPEA	3	380	Break Room	Refrigerator	Frigidaire	FRT21HS6JSO	517.5		8	4.140
SPEA	3	380	Break Room	Television	Vizio	GV52LFHDTV10A	420.0	0	2	0.840
SPEA	3	380	Break Room	Ice Machine	KitchenAid	KUIC15PLTS2	747.5	0	24	17.940
SPEA	3	380	Break Room	Toaster	Kitchen Selectives	TS47	800.0		0.083	0.066
SPEA	3	380	Break Room	Coffee Maker	Bunn	VPR Series 522894		1.14		2.560
SPEA	3	380	Break Room	Lamp			30.0	0	8	0.240

SPEA	3	380	Break Room	Lamp			30.0	0	8	0.240
SPEA	3	312A	Shared Office	Monitor	Dell	2208WFPT	75.0		8	0.600
SPEA	3	312A	Shared Office	Monitor	Dell	2208WFPT	75.0		8	0.600
SPEA	3	312A	Shared Office	Air Purifier	Honeywell	502050S	180.0	0		1.890
SPEA	3	312A	Shared Office	Tea Kettle	Aroma	AWK-125S	1,500.0		0.5	0.750
SPEA	3	312A	Shared Office	Space Heater	Honeywell	HZ-135	1,500.0			1.010
SPEA	3	312A	Shared Office	Space Heater	Honeywell	HZ-135	1,500.0			1.010
SPEA	3	312A	Shared Office	Docking Station Power Adapter	Dell	LA130PM121	130.0	0	8	1.040
SPEA	3	312A	Shared Office	Computer	Dell	Optiplex 990	79.8	1.92	8	0.669
SPEA	3	312A	Shared Office	Monitor	Dell	U2312HMT	24.9		8	0.199
SPEA	3	312B	Office	Monitor	Dell	2208WFPT	75.0		8	0.600
SPEA	3	312B	Office	Docking Station Power Adapter	Targus	ACP70USZ	90.0	0	8	0.720
SPEA	3	312B	Office	Telephone	Polycom	CX-600	4.9		24	0.118
SPEA	3	312B	Office	Fan	Lakewood		252.0	N/A	8	N/A
SPEA	3	312B	Office	Lamp			72.0	0	8	0.576
SPEA	3	312C	Office	Monitor	Dell	2208WFPT	75.0		8	0.600
SPEA	3	312C	Office	Fan	Cool Breeze	HF-S40X	60.0	0	8	0.480
SPEA	3	312C	Office	Computer	Dell	Optiplex 990	79.8	1.92	8	0.669
SPEA	3	312C	Office	Camera Charger	Olympus	PS-BCS1	48.0	0	1	0.048
SPEA	3	312C	Office	Surge Protector					24	0.000
SPEA	3	312D	Office	Printer	HP	5200	550.0	27	0.48	0.899
SPEA	3	312D	Office	Air Purifier	Honeywell	502050S	180.0	0		1.890
SPEA	3	312D	Office	Scanner	Epson	G860A	9.7	0	0.72	0.007
SPEA	3	312D	Office	Monitor	Apple	iMac	93.1		8	0.745
SPEA	3	312D	Office	Monitor	Apple	iMac	93.1		8	0.745
SPEA	3	312D	Office	Server	Apple		N/A	N/A	24	N/A
SPEA	3	312D	Office	Server	Apple		N/A	N/A	24	N/A
SPEA	3	312E	Storage Room	Air Purifier	Honeywell	502050S	180.0	0		1.890

SPEA	3	312E	Storage Room	Refrigerator	Kelvinator	TPK140JN	546.3		8	4.370
SPEA	3	316A	Office	Telephone	Polycom	CX-600	4.9		24	0.118
SPEA	3	316A	Office	Fan	Honeywell	DT-70 series	88.8	0	8	0.710
SPEA	3	316A	Office	Printer	HP	P2055DN	570.0	8	0.48	0.462
SPEA	3	316A	Office	Docking Station Power Adapter	Dell		19.3	0	8	0.154
SPEA	3	316A	Office	Lamp			30.0	0	8	0.240
SPEA	3	341A	Office	Monitor	Dell	2208WFPT	75.0		8	0.600
SPEA	3	341A	Office	Fan	Vornado	CR1 0001	144.0	0	8	1.152
SPEA	3	341A	Office	Telephone	Polycom	CX-300	2.5		24	0.060
SPEA	3	341A	Office	Computer	Dell	Optiplex 990	79.8	1.92	8	0.669
SPEA	3	341B	Office	Computer	Dell	Optiplex 7010	35.6	1.5	8	0.309
SPEA	3	341B	Office	Monitor	Dell	U2312HMT	24.9		8	0.199
Swain West	2	201	Empty Room							
Swain West	2	202	Office	Monitor	Dell	1908FPT	24.9		8	0.199
Swain West	2	202	Office	Speakers	Dell	A215	6.0		2	0.012
Swain West	2	202	Office	Speakers	Dell	A225	2.5		2	0.005
Swain West	2	202	Office	Microwave	Goldstar Inteliwave	Intellowave	1,020.0	3.08		0.115
Swain West	2	202	Office	External Data Storage	Poppstart	NE15	24.0	0	8	0.192
Swain West	2	202	Office	Computer	Dell	Optiplex 755	92.9	2	8	0.775
Swain West	2	202	Office	Monitor	Dell	P1913SF	14.0		8	0.112
Swain West	2	202	Office	Surge Protector					24	0.000
Swain West	2	203	Office	Printer	Dell	1815DN	450.0	30	0.48	0.922
Swain	2	203	Office	Monitor	Dell	3007WFPT	147.0		8	1.176

West										
Swain West	2	203	Office	Speakers	Dell	A225	2.5		2	0.005
Swain West	2	203	Office	Speakers	Altec Lansing	BXR1220	4.0		2	0.008
Swain West	2	203	Office	Telephone	Polycom	CX-600	4.9		24	0.118
Swain West	2	203	Office	Power Adapter	HP	EADP-15DBA	18.8	0	8	0.150
Swain West	2	203	Office	Computer	Dell	Optiplex 7010	35.6	1.5	8	0.309
Swain West	2	203	Office	Coffee Maker	Mr. Coffee	SKX26	900.0	1.14		0.640
Swain West	2	203	Office	Computer	Dell	T7400	N/A	N/A	8	N/A
Swain West	2	203	Office	External Data Storage	WD		18.0	0	8	0.144
Swain West	2	203	Office	Laptop Power Adapter	Fujitsu		80.2	0	8	0.641
Swain West	2	203	Office	Monitor	Dell		N/A		8	N/A
Swain West	2	203	Office	Printer			N/A	N/A	0.48	N/A
Swain West	2	203	Office	Surge Protector					24	0.000
Swain West	2	203	Office	Telephone			N/A		24	N/A
Swain West	2	203	Office	Television	NEC		N/A		2	N/A
Swain West	2	204	Office	Monitor	Dell	1901FP	55.0		8	0.440
Swain West	2	204	Office	Laptop Power Adapter	Acer	ASIREV3-571G	90.0	0	8	0.720
Swain West	2	204	Office	Coffee Maker	Mr. Coffee	DRX 5	650.0	1.14		0.640
Swain	2	204	Office	Computer	Dell	GX620	167.0	5	8	1.416

West										
Swain West	2	204	Office	Microwave	Sunbeam	SBM7700W	7,700.0	3.08		0.115
Swain West	2	204	Office	Lamp			12.0	0	8	0.096
Swain West	2	205	Office	Laptop Power Adapter	IBM	2373	72.0	0	8	0.576
Swain West	2	205	Office	Speakers	Dell	A225	2.5		2	0.005
Swain West	2	205	Office	Coffee Maker	Mr. Coffee	BL4	625.0	1.14		0.640
Swain West	2	205	Office	Computer	Dell	Optiplex 7010	35.6	1.5	8	0.309
Swain West	2	205	Office	Monitor	Dell	P1913SF	14.0		8	0.112
Swain West	2	205	Office	Ethernet Switch	Netgear	SF105	7.5	0	24	0.180
Swain West	2	206	Office	Type Writer	IBM	12	156.0		0.083	0.013
Swain West	2	206	Office	Clock	GE	8125	2.5	1.74	24	0.060
Swain West	2	206	Office	Monitor	Dell	1908FPT	24.9		8	0.199
Swain West	2	206	Office	Speakers	Dell	A225	2.5		2	0.005
Swain West	2	206	Office	Computer	Dell	Optiplex 755	92.9	2	8	0.775
Swain West	2	206	Office	Headset	Plantronix	SSA-SW090050	60.0	0	1	0.060
Swain West	2	206	Office	Lamp			30.0	0	8	0.240
Swain West	2	207	Office	Uninterruptible Power Supply	APC	1000	600.0		0	0.000
Swain West	2	207	Office	Monitor	Dell	1704FPVT	65.0		8	0.520
Swain	2	207	Office	Monitor	Dell	1908FPT	24.9		8	0.199

West										
Swain West	2	207	Office	Computer	Dell	GX520	130.6	1	8	1.060
Swain West	2	207	Office	Computer	Dell	Optiplex 7010	35.6	1.5	8	0.309
Swain West	2	207	Office	Computer	Dell	Optiplex 755	92.9	2	8	0.775
Swain West	2	207	Office	Printer	HP	P1006	285.0	3	0.48	0.207
Swain West	2	207	Office	Monitor	Dell	U2312HMT	24.9		8	0.199
Swain West	2	207	Office	External Data Storage	Blacx		36.0	0	8	0.288
Swain West	2	207	Office	Lamp			30.0	0	8	0.240
Swain West	2	207	Office	Speakers	Harman/Kardon		16.5		2	0.033
Swain West	2	207	Office	Speakers	Harman/Kardon		16.5		2	0.033
Swain West	2	223	Office	Printer	Brother	HL2240	495.0	65	0.48	1.766
Swain West	2	223	Office	Computer	Apple	iMac	51.9	1	8	0.431
Swain West	2	223	Office	Scanner	Epson	V30	20.3	0	0.72	0.015
Swain West	2	223	Office	Lamp			75.0	0	8	0.600
Swain West	2	223	Office	Lamp			75.0	0	8	0.600
Swain West	2	223	Office	Surge Protector					24	0.000
Swain West	2	224	Office	Monitor	Apple	A1418	N/A		8	N/A
Swain West	2	224	Office	Lamp	IKEA	APC542201	24.5	0	8	0.196
Swain	2	224	Office	Telephone	Polycom	CX-300	2.5		24	0.060

West										
Swain West	2	224	Office	Power Adapter	Apple	MacBook Air	45.0	0.7	8	0.366
Swain West	2	224	Office	Lamp			15.0	0	8	0.120
Swain West	2	225	Office	Computer	Apple	iMac	51.9	1	8	0.431
Swain West	2	225	Office	External Data Storage	Seagate	SRD0SD0	36.0	0	8	0.288
Swain West	2	226	Office	Uninterruptible Power Supply	APC	650	410.0		0	0.000
Swain West	2	226	Office	Router	Netgear	GS605	9.0		24	0.216
Swain West	2	226	Office	Printer	Samsung	ML-1210	180.0	10	0.48	0.322
Swain West	2	226	Office	Computer	Dell	Optiplex 7010	35.6	1.5	8	0.309
Swain West	2	226	Office	Computer	Dell	Optiplex 755	92.9	2	8	0.775
Swain West	2	226	Office	Computer	Sun	Sparc Station LX	N/A	N/A	8	N/A
Swain West	2	226	Office	Monitor	Samsung	Syncmaster 213T	75.0		8	0.600
Swain West	2	226	Office	Monitor	Samsung	Syncmaster 950P	120.0		8	0.960
Swain West	2	226	Office	AM/FM Radio	Madnavox		10.0	0	2	0.020
Swain West	2	226	Office	Server	IU		N/A	N/A	24	N/A
Swain West	2	226	Office	Speakers	Harman/Kardon		16.5		2	0.033
Swain West	2	226	Office	Telephone	Cortelco		N/A		24	N/A
Swain West	2	227	Office	Answering Machine	AT&T	1719	42.0	0	24	1.008
Swain	2	227	Office	Coffee Maker	Hamilton-	48131	625.0	1.14		0.640

West					Beach					
Swain West	2	227	Office	Laptop Power Adapter	Lenovo	42T4416	90.0	0	8	0.720
Swain West	2	227	Office	DVD Re-Writer	LG	GSA-E60L	24.0	0	2	0.048
Swain West	2	227	Office	Computer	Dell	Optiplex 7010	35.6	1.5	8	0.309
Swain West	2	227	Office	Monitor	Dell	P1913SF	14.0		8	0.112
Swain West	2	227	Office	Lamp			75.0	0	8	0.600
Swain West	2	227	Office	Surge Protector					24	0.000
Swain West	2	228	Office	Tea Kettle	Hamilton Beach	40894	1,500.0		0.5	0.750
Swain West	2	228	Office	Coffee Maker	Nespresso	Acesenza Automatic Type D-100	1,260.0	1.14		0.640
Swain West	2	228	Office	Computer	Apple	iMac	51.9	1	8	0.431
Swain West	2	228	Office	External Data Storage	WD	KSAS024120015HU	18.0	0	8	0.144
Swain West	2	228	Office	Lamp	Ottlite		13.0	0	8	0.104
Swain West	2	228	Office	Power Adapter	Apple		N/A	0	8	N/A
Swain West	2	228	Office	Refrigerator	Black & Decker		N/A		8	N/A
Swain West	2	228	Office	Surge Protector					24	0.000
Swain West	2	229	Office	Fan	Lasko	3510	156.0	0	8	1.248
Swain West	2	229	Office	Speakers	Harman/Kardon	HK195	16.5		2	0.033
Swain West	2	229	Office	Printer	Samsung	ML-1450	350.0	12	0.48	0.450
Swain	2	229	Office	Computer	Dell	Optiplex 7010	35.6	1.5	8	0.309

West											
Swain West	2	229	Office	Computer	Dell	Optiplex 790	35.6	1	8	0.301
Swain West	2	229	Office	Monitor	Dell	P190ST	18.3		8	0.146
Swain West	2	229	Office	Monitor	Dell	P190ST	18.3		8	0.146
Swain West	2	229	Office	Fan	Westinghouse	WWDF07A	42.0	0	8	0.336
Swain West	2	229	Office	Lamp			16.0	0	8	0.128
Swain West	2	229	Office	Surge Protector					24	0.000
Swain West	2	230	Office	Tea Kettle	Proctor Silex	45802	1,000.0		0.5	0.500
Swain West	2	230	Office	Power Adapter	Apple	A1098	150.0	1	8	1.216
Swain West	2	230	Office	Power Adapter	Apple	A1357	10.7	0	8	0.086
Swain West	2	230	Office	External Data Storage	Lacie	ACML-51	26.4	0	8	0.211
Swain West	2	230	Office	External Data Storage	Lacie	ACML-51	26.4	0	8	0.211
Swain West	2	230	Office	Lamp	Arcadia	AF37827ES	5.0	0	8	0.040
Swain West	2	230	Office	Monitor	Apple	Cinema HD	93.1		8	0.745
Swain West	2	230	Office	Refrigerator	Emerson	CR175W	149.5		8	1.196
Swain West	2	230	Office	Computer	Apple	iMac	51.9	1	8	0.431
Swain West	2	230	Office	Power Adapter	Apple	MacBook Pro	90.0	2	8	0.752
Swain West	2	230	Office	Scanner	Fujitsu	S300M	9.0	5	0.72	0.123
Swain	2	230	Office	Laptop Power	Fujitsu	T5010	80.2	0	8	0.641

West				Adapter						
Swain West	2	230	Office	External Data Storage	WD		18.0	0	8	0.144
Swain West	2	230	Office	Lamp			30.0	0	8	0.240
Swain West	2	230	Office	Server	Apple		N/A	N/A	24	N/A
Swain West	2	230	Office	Surge Protector					24	0.000
Swain West	2	231	Office	Tea Kettle	Hamilton Beach	40870	1,500.0		0.5	0.750
Swain West	2	231	Office	Telephone	Polycom	CX-300	2.5		24	0.060
Swain West	2	231	Office	Router	Netgear	GS105	12.0		24	0.288
Swain West	2	231	Office	Computer	Apple	iMac 27-inch	51.9	1	8	0.431
Swain West	2	231	Office	Computer	Dell	Optiplex 790	35.6	1	8	0.301
Swain West	2	231	Office	Monitor	Dell	P1913SF	14.0		8	0.112
Swain West	2	231	Office	Microwave	Sharp	R-308NW	1,560.0	3.08		0.115
Swain West	2	231	Office	Surge Protector					24	0.000
Swain West	2	232	Office	Stapler	Swingline	48200	7.5		0.017	0.000
Swain West	2	232	Office	Speakers	Dell	A225	2.5		2	0.005
Swain West	2	232	Office	Fan		CT1608S	100.0	0	8	0.800
Swain West	2	232	Office	Refrigerator	Haier	HSP03WNAWW	172.5		8	1.380
Swain West	2	232	Office	Pencil Sharpener	Panasonic	KP-100N	100.0	0.5	0.167	0.029
Swain	2	232	Office	Printer	HP	M1212NF	375.0	4.7	0.48	0.291

West										
Swain West	2	232	Office	Computer	Dell	Optiplex 790	35.6	1	8	0.301
Swain West	2	232	Office	Space Heater	Omni Heat	PTC 5000	1,500.0			1.010
Swain West	2	232	Office	Calculator	Sharp	QS-2760H	15.0	0	0.167	0.003
Swain West	2	232	Office	Shredder	Fellowes	SB85C	N/A	0	0.167	N/A
Swain West	2	232	Office	Label Maker	Smart Label Printer	SLP 420	9.0	0	0.083	0.001
Swain West	2	232	Office	Monitor	Dell	U2212HMC	19.6		8	0.156
Swain West	2	232	Office	Microwave	Radarrang		1,000.0	3.08		0.115
Swain West	2	232	Office	Telephone			N/A		24	N/A
Swain West	2	233	Office	Printer	HP	7960	40.0	2.1	0.48	0.069
Swain West	2	233	Office	External Data Storage	Maxtor	1 Touch 4 Plus	24.0	0	8	0.192
Swain West	2	233	Office	Monitor	Apple	A1418	N/A		8	N/A
Swain West	2	233	Office	Router	D-Link	des 1005 E	3.0		24	0.072
Swain West	2	233	Office	Power Adapter	Apple Landingzone	LZ2013AL	85.0	0	8	0.680
Swain West	2	234	Office	Water Cooler	Black & Decker	900143	125.0	1.05	24	3.000
Swain West	2	234	Office	Speakers	Dell	A215	6.0		2	0.012
Swain West	2	234	Office	External Data Storage	Lacie	ACD048A	48.0	0	8	0.384
Swain West	2	234	Office	Power Adapter	Apple	Magsafe	85.0	0	8	0.680
Swain	2	234	Office	Monitor	Dell	U3011T	105.5		8	0.844

West										
Swain West	2	234	Office	Lamp			16.0	0	8	0.128
Swain West	2	234	Office	Server	IU		N/A	N/A	24	N/A
Swain West	2	235	Office	Monitor	Dell	2208WFPT	75.0		8	0.600
Swain West	2	235	Office	Computer	HP	735/125	N/A	1	8	N/A
Swain West	2	235	Office	Monitor	Silicon Graphics	GDM17E21	N/A		8	N/A
Swain West	2	235	Office	Router	Netgear	GS605	9.0		24	0.216
Swain West	2	235	Office	Coffee Maker	Mr. Coffee	MWC	65.0	1.14		0.640
Swain West	2	235	Office	Computer	Dell	Optiplex 790	35.6	1	8	0.301
Swain West	2	235	Office	Coffee Maker	Mr. Coffee	TF6	600.0	1.14		0.640
Swain West	2	235	Office	Lamp			26.0	0	8	0.208
Swain West	2	235	Office	Speakers			N/A		2	N/A
Swain West	2	237	Office	Router	Asante	10THUB	15.0		24	0.360
Swain West	2	237	Office	Printer	HP	P2055DN	570.0	8	0.48	0.462
Swain West	2	237	Office	Printer	Ricoh	SPC 320DN	1,300.0	5.5	0.48	0.753
Swain West	2	238	Office	Overhead Projector	Overhead Projector	3980 SWA	500.0	0.9	2	1.020
Swain West	2	238	Office	Television	Sony	KDL60EX 700	208.0	0.2	2	0.420
Swain West	2	238	Office	Television	Toshiba	SVF 34	135.0	0.5	2	0.281
Swain	2	238	Office	Coffee Maker	Bunn	VPS BLK LTB SW	1,660.0	1.14		0.640

West										
Swain West	2	238	Office	Camera Charger	Tandberg		48.0	0	1	0.048
Swain West	2	241	Office	Monitor	Dell	1908FPT	24.9		8	0.199
Swain West	2	241	Office	Speakers	Dell	A225	2.5		2	0.005
Swain West	2	241	Office	Computer	Dell	Optiplex 755	92.9	2	8	0.775
Swain West	2	241	Office	Surge Protector					24	0.000
Swain West	2	242	Office	Monitor	Dell	1908FPT	24.9		8	0.199
Swain West	2	242	Office	Coffee Maker	Keurig	B60	1,500.0	9		0.640
Swain West	2	242	Office	Telephone	Polycom	CX-600	4.9		24	0.118
Swain West	2	242	Office	Refrigerator	Damby	DCR080BLWEY-7	78.0		8	0.624
Swain West	2	242	Office	Fan	Holmes	HAOF12R	60.0	0	8	0.480
Swain West	2	242	Office	Computer	Dell	Optiplex 745	92.9	3	8	0.791
Swain West	2	242	Office	Computer	Dell	Optiplex 755	92.9	2	8	0.775
Swain West	2	242	Office	Microwave	Sharp	R-230HW	1,236.0	3.08		0.115
Swain West	2	242	Office	Monitor	Dell		N/A		8	N/A
Swain West	2	243	Office	Router	SMC	3608T-EZ	8.0		24	0.192
Swain West	2	243	Office	Computer	Apple	iMac	51.9	1	8	0.431
Swain West	2	243	Office	Computer		iMac	51.9	1	8	0.431
Swain	2	243	Office	Computer	Apple	iMac	51.9	1	8	0.431

West										
Swain West	2	243	Office	Lamp			67.0	0	8	0.536
Swain West	2	244	Office	Telephone	Polycom	CX-300	2.5		24	0.060
Swain West	2	244	Office	Space Heater	Holmes	HCH5250	1,500.0			1.010
Swain West	2	244	Office	Fan	Honeywell	HT-904-TGT	72.0	0	8	0.576
Swain West	2	244	Office	Printer	Canon	MF4150	680.0	3	0.48	0.397
Swain West	2	244	Office	Shredder	Office Max	OM96431	N/A	0	0.167	N/A
Swain West	2	244	Office	Computer	Dell	Optiplex 790	35.6	1	8	0.301
Swain West	2	244	Office	Monitor	Dell	P190ST	18.3		8	0.146
Swain West	2	244	Office	Monitor	Dell	P190ST	18.3		8	0.146
Swain West	2	244	Office	Lamp			60.0	0	8	0.480
Swain West	2	244	Office	Speakers	Harman/Kardon		16.5		2	0.033
Swain West	2	244	Office	Surge Protector					24	0.000
Swain West	3	305	Conference/Copy Room	Stapler	Boston	100	150.0		0.017	0.003
Swain West	3	305	Conference/Copy Room	Printer	HP	2420DN	625.0	11	0.48	0.559
Swain West	3	305	Conference/Copy Room	Television	Sony	Bravia	135.0	0.2	2	0.274
Swain West	3	305	Conference/Copy Room	Printer	HP	CP3505X	465.0	46	0.48	1.305
Swain West	3	305	Conference/Copy Room	Coffee Maker	Mr. Coffee	DW 13	900.0	1.14		2.560

Swain West	3	305	Conference/Copy Room	Coffee Grinder	Mr. Coffee	IDS55	130.0	0	0.017	0.002
Swain West	3	305	Conference/Copy Room	Copier	Canon	imageRUNNER 2800	1,800.0	1.5	1	1.835
Swain West	3	305	Conference/Copy Room	Computer	Dell	Inspiron 5305 (WL-138G V2)	N/A	N/A	8	N/A
Swain West	3	305	Conference/Copy Room	Telephone	Polycom	J8120102E1D1	24.0		24	0.576
Swain West	3	311	Computer Lab	Toaster	Sunbeam	183837	800.0		0.083	0.066
Swain West	3	311	Computer Lab	Monitor	Dell	1905FP	34.0		8	0.272
Swain West	3	311	Computer Lab	Printer	HP	2300N	426.0	8.8	0.48	0.411
Swain West	3	311	Computer Lab	External Data Storage	APC	Backups RS1200	144.0	0	8	1.152
Swain West	3	311	Computer Lab	Coffee Maker	Mr. Coffee	CGX5	700.0	1.14		2.560
Swain West	3	311	Office	Computer	Apple	iMac 20-inch	51.9	1	8	0.431
Swain West	3	311	Office	Computer	Apple	iMac 21-inch	51.9	1	8	0.431
Swain West	3	311	Office	Computer	Dell	Optiplex 745	92.9	3	8	0.791
Swain West	3	311	Office	Computer	Dell	Optiplex GX260	93.0	5	8	0.824
Swain West	3	311	Office	Computer	Dell	Optiplex GX260	93.0	5	8	0.824
Swain West	3	311	Office	Computer	Dell	Optiplex GX260	93.0	5	8	0.824
Swain West	3	311	Office	Computer	Dell	Precision 380	167.0	1	8	1.352
Swain West	3	311	Computer Lab	External Data Storage	Seagate	WA-24312	24.0	0	8	0.192
Swain	3	311	Computer Lab	External Data	Seagate	WA-24312	24.0	0	8	0.192

West				Storage						
Swain West	3	311	Computer Lab	Coffee Grinder	Black & Decker		110.0	0	0.017	0.002
Swain West	3	311	Computer Lab	Server	IU		N/A	N/A	24	N/A
Swain West	3	311	Office	Surge Protector					24	0.000
Swain West	3	340	Office	Monitor	Dell	2208WFPT	75.0		8	0.600
Swain West	3	340	Office	Tea Kettle	Aroma	AWK-125S	1,500.0		0.5	0.750
Swain West	3	340	Office	Coffee Maker	Keurig	B31	1,425.0	9		0.640
Swain West	3	340	Office	Pressure Cooker	Cuisinart	CPC600	1,000.0	0	2	2.000
Swain West	3	340	Office	Coffee Maker	Black & Decker	DLX 1050b	975.0	1.14		0.640
Swain West	3	340	Office	Coffee Maker	Mr. Coffee	DMX 20	900.0	1.14		0.640
Swain West	3	340	Office	Computer	Dell	GX620	167.0	5	8	1.416
Swain West	3	340	Office	Printer	Brother	HL4570CDW	560.0	70	0.48	1.915
Swain West	3	340	Office	Fan	Lakewood	HV9 C	60.0	0	8	0.480
Swain West	3	340	Office	Coffee Grinder	Mr. Coffee	IBS55	130.0	0	0.017	0.002
Swain West	3	340	Office	Microwave	Goldstar	Intellowave	1,260.0	3.08		0.115
Swain West	3	340	Office	Microwave	Goldstar	Intellowave	1,260.0	3.08		0.115
Swain West	3	340	Office	Monitor	LG	IPS235VX	20.7		8	0.165
Swain West	3	340	Office	Pencil Sharpener	Panasonic	KP-110	100.0	0.5	0.167	0.029
Swain	3	340	Office	Printer	Xerox	Phaser 3250	400.0	70	0.48	1.838

West											
Swain West	3	340	Office	Monitor	Samsung	Syncmaster 730B	34.0		8	0.272
Swain West	3	340	Office	Toaster	Black & Decker	T	1,500.0		0.083	0.125
Swain West	3	340	Office	Toaster	Black & Decker	T101	1,350.0		0.083	0.112
Swain West	3	340	Office	Lamp			80.0	0	8	0.640
Swain West	3	340	Office	Microwave	Montgomery Ward		600.0	3.08		0.115
Swain West	3	340	Office	Power Adapter	Samsung		10.0	0	8	0.080
Swain West	3	340	Office	Tea Kettle	6400		1,000.0		0.5	0.500

Appendix E: Office Data Collection Summary Tables

Building	Office Area	Total Daily kWh Consumption	Average Daily kWh Consumption	Audited Square Footage	Total Office Square Footage	Total Building Square Footage	Total Office Daily kWh Consumption	Percentage of Total Building Demand
Ballantine	Office & Reception	82.47	3.17	4,678	58,764		1,035.97	20.67%
	Kitchen/Copy/Break Rooms	34.83	11.61	1455	5531		132.40	2.64%
	Conference Rooms	2.43	2.43	164	2517		37.29	0.74%
	Total	**119.73**		**6297**	**66812**	**258742**	**1,205.67**	**24.05%**
Kelley	Office & Reception	78.33	3.92	4,359	25,226		453.30	4.23%
	Kitchen/Copy/Break Rooms	11.69	11.69	335	7202		251.32	2.35%
	Conference Rooms	3.27	1.63	501	6578		42.93	0.40%
	Total	**93.29**		**5195**	**39006**	**166093**	**747.56**	**6.98%**
CIB	Office & Reception	51.32	1.56	1,897.00	33,704.00		911.80	14.14%
	Kitchen/Copy/Break Rooms	70.1	35.05	366	37298		7,143.69	N/A
	Conference Rooms	2.04	0.51	1128	8806		15.93	0.25%
	Total	**123.46**		**2191**	**79808**	**786519**	**927.73**	**14.38%**

SPEA	Office & Reception	119.62	3.42	7,711.00	25,616.00		397.38	4.24%
	Kitchen/Copy/Break Rooms	28.15	28.15	633	6221		276.65	2.95%
	Conference Rooms	10.26	10.26	548	1689		31.62	0.34%
	Total	**158.03**		**8892**	**33526**	**116598**	**705.65**	**7.53%**
Swain West	Individual Offices	86.59	3.21	6365	17056		232.03	
	Reception Areas	0.00	0	0	3594			
	Kitchen/Copy/Break Rooms	0.00	0	0	2909			
	Conference Rooms	0.00	0	0	1834			
	Total	**86.59**		**6365**	**25393**	**130350**		

Appendix F: Office Data Cleaning References

Wattage	CitatIon
Architect Maps Reference	http://www.indiana.edu/~spaceinf/services/spaceinf-terms/room-types/index.shtml
Apple Power Adapter	http://www.macobserver.com/tmo/article/watt_to_know_about_iphone_ipad_power_adapters
MX-3501N	http://www.cnet.com/products/sharp-mx-3501n-multifunction-printer-color/specs/
MX-5001N	http://copiers.findthebest.com/l/155/Sharp-MX-5001N
Laserjet Pro 400 MFP M425DN	http://www.hp.com/hpinfo/newsroom/press_kits/2012/ppsinfluencersummit2012/LaserJetPro_M425dn.pdf
C3765DNF	http://www.cnet.com/products/dell-multifunction-color-laser-printer-c3765dnf-multifunction-printer-color-series/specs/
MFP3115CN	http://www.cnet.com/products/dell-multifunction-color-laser-printer-3115cn-2226548/specs/
Aficio CL7200	http://www.gcopnet.com/pdf/ricoh/CL7200.pdf
MPC4503	http://www.ricoh.com.au/MP_C4503_-_Specifications
E Studio 856	http://business.toshiba.com/media/downloads/products/copiers/eStudio856SeriesBrochure.pdf
Aficio MP3351	http://www.manualsprinter.com/ricoh-aficio-mp-3351
imageRUNNER 2800	http://www.americanbusinesscopiers.com/Brochures/iR2800brochure.pdf
DA130PE1-00	http://us.hardware.info/productinfo/147217/dell-ac-adaptor-130w

DA210PE1-00	http://www.sears.com/dell-da210pe1-00-210-watt-ac-adapter/p-SP101A9816S7035899304
FA90PE1-00	http://www.dx.com/p/fa90pe1-00-genuine-dell-laptop-90w-ultra-thin-power-supply-adapter-7-4-x-5-0mm-94550
UF-6000	http://www.abetco.com/pdf/Panasonic/UF-6000.pdf
UF-4000	https://www.amatteroffax.com/xPC_Panasonic_Panafax_Uf_4000
IntelliFax 2910	http://www.cnet.com/products/brother-intellifax-2910-fax-copier-b-w/specs/
UF-5500	http://www.cnet.com/products/panasonic-laser-fax-uf-5500-multifunction-printer-b-w/specs/
1908FPC	http://www.ascendtech.us/dell-19-1908fpc-ultrasharp-lcd-monitor_i_m19del1908fpcdm.aspx
1908WFPF	http://www.ascendtech.us/dell-19-1908wfpf-widescreen-monitor_i_m19del1908wfpfw.aspx
U2311HB	https://www.htmlvalidator.com/CSEForum/viewtopic.php?f=6&t=921
1704FPV	http://www.manualowl.com/m/Dell/1704FPVT/Manual/362525?page=1
1908FPT	http://www.dell.com/downloads/global/corporate/environ/comply/disp_1908fpt_blk.pdf
E153FPC	http://www.saveonkit.com/dell-15-tft-lcdflat-screen-monitor-computer-monitor-model-e153fpc-8323-p.asp
E771P	http://www.cnet.com/products/dell-e771p/specs/
U3011T	http://www.cnet.com/products/dell-ultrasharp-u3011/specs/
1907FPC	http://www.teachmefinance.com/Energy_Efficiency/Monitors/Dell%201907FPc.html
1907FPT	e.com/Energy_Efficiency/Monitors/Dell%201907FPt.html
1907FPVT	http://www.cowboom.com/product/750775

1908FPB	http://www.newegg.com/Product/Product.aspx?Item=N82E16824260065
2007FPB	http://www.ayosdito.ph/Dell+2007fpb+20+1inch+lcd+monitor-7068193.htm
2405FPW	http://www.cnet.com/products/dell-ultrasharp-2405fpw/specs/
3007WFPT	http://www.dell.com/content/topics/topic.aspx/global/products/monitors/topics/en/monitor_3007wfp?c=us&l=en&s=gen&~section=specs
U2412MB	http://www.energystar.gov/productfinder/product/certified-displays/details/2168632
U2913WMT	http://www.energystar.gov/productfinder/product/certified-displays/details/2172119
B2430H	http://www.samsung.com/my/consumer/pc-peripherals-printer/monitor/lcd-monitor/LS24PUHKFV/XM-spec
2208WFPT	http://www.ascendtech.us/dell-22-2208wfpt-widescreen-lcd-monitor_i_m22del2208wfptc.aspx
U2212HMC	http://www.energystar.gov/productfinder/product/certified-displays/details/2170057
S2409WB	http://www.cnet.com/products/dell-s2409w-series/specs/
U2312HMT	http://www.teachmefinance.com/Energy_Efficiency/Monitors/Dell%20Inc.%20DELL%20U2312HM%20U2312HMt%20monitor.html
1905FP	http://www.cnet.com/products/dell-ultrasharp-1905fp-lcd-monitor-19-series/specs/
Syncmaster 730B	http://www.energystar.gov/productfinder/product/certified-displays/details/2190824
UP01011120	http://www.woettsern.com/prodp041.html
ScanSnap S510	http://www.fujitsu.com/us/services/computing/peripherals/scanners/scansnap/s510.html
EADP-15DBA	http://www.impactcomputers.com/EADP-15DBA.html

Multisync V321-2	http://www.necdisplay.com/p/large--screen-displays/v321-2
NU20-C140150-13	https://www.energystar.gov/ia/products/prod_lists/eps_prod_list.xls
Dell Optiplex Computers	ftp://ftp.dell.com/Manuals/all-products/esuprt_desktop/esuprt_optiplex_desktop/
Computer and Monitor Standby Info	https://secure.www.upenn.edu/computing/resources/category/hardware/article/computer-power-usage
Computer and Monitor Standby Info	http://www.hccfl.edu/media/809306/computer%20power%20management%20options%20-%20daya%20pendharkar.pdf
Computer and Monitor Standby Info	http://www.colorado.edu/envs/sites/default/files/attached-files/Studentcomputer%20labs%20Power%20Point--%20ENVS%203001.pdf
Computer and Monitor Standby Info	http://www.sust-it.net/energy-saving.php?id=20
Computer and Monitor Standby Info	http://file.lacounty.gov/ccpp/cms1_131281.pdf
Computer and Monitor Standby Info	http://www.mcmaster.ca/sustainability/documents/Internship2011.%203BB3.Energy%20Usage%20in%20McMaster%20Libraries.ONLINE.pdf

Appendix G: Office Duke Energy Bill Calculations (from IU Physical Plant)

1/22/14-2/20/14	BALLANTINE HALL	CIB	GODFREY GRAD&EXEC ED CTR	SPEA	SWAIN WEST
Usage over period	110,283.57	141,887.60	235,591.84	206,116.06	92,016.40
Demand @ Time of Campus peak	229.60	250.58	433.37	382.40	162.00
Calculated Usage Charge	$4,328.30	$5,568.66	$9,246.27	$8,089.44	$3,611.37
Calculated Demand Charge	$5,138.43	$5,607.95	$9,698.73	$8,558.07	$3,625.54
Total	9,466.72	11,176.62	18,945.00	16,647.51	7,236.91

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LEED for New Construction and Major Renovations (v2009)

GOLD, AWARDED JUL 2013

SUSTAINABLE SITES — AWARDED: 23 / 26

SSc1	Site selection	1 / 1
SSc2	Development density and community connectivity	5 / 5
SSc3	Brownfield redevelopment	0 / 1
SSc4.1	Alternative transportation - public transportation access	6 / 6
SSc4.2	Alternative transportation - bicycle storage and changing rooms	1 / 1
SSc4.3	Alternative transportation - low-emitting and fuel-efficient vehicles	3 / 3
SSc4.4	Alternative transportation - parking capacity	2 / 2
SSc5.1	Site development - protect or restore habitat	0 / 1
SSc5.2	Site development - maximize open space	1 / 1
SSc6.1	Stormwater design - quantity control	1 / 1
SSc6.2	Stormwater design - quality control	1 / 1
SSc7.1	Heat island effect - nonroof	1 / 1
SSc7.2	Heat island effect - roof	1 / 1
SSc8	Light pollution reduction	0 / 1

WATER EFFICIENCY — AWARDED: 8 / 10

WEc1	Water efficient landscaping	4 / 4
WEc2	Innovative wastewater technologies	0 / 2
WEc3	Water use reduction	4 / 4

ENERGY & ATMOSPHERE — AWARDED: 14 / 35

EAc1	Optimize energy performance	8 / 19
EAc2	On-site renewable energy	0 / 7
EAc3	Enhanced commissioning	2 / 2
EAc4	Enhanced refrigerant Mgmt	2 / 2
EAc5	Measurement and verification	0 / 3
EAc6	Green power	2 / 2

MATERIAL & RESOURCES — AWARDED: 7 / 14

MRc1.1	Building reuse - maintain existing walls, floors and roof	0 / 3
MRc1.2	Building reuse - maintain interior nonstructural elements	0 / 1
MRc2	Construction waste Mgmt	2 / 2
MRc3	Materials reuse	0 / 2
MRc4	Recycled content	2 / 2
MRc5	Regional materials	2 / 2

MATERIAL & RESOURCES — CONTINUED

MRc6	Rapidly renewable materials	0 / 1
MRc7	Certified wood	1 / 1

INDOOR ENVIRONMENTAL QUALITY — AWARDED: 12 / 15

EQc1	Outdoor air delivery monitoring	1 / 1
EQc2	Increased ventilation	0 / 1
EQc3.1	Construction IAQ Mgmt plan - during construction	1 / 1
EQc3.2	Construction IAQ Mgmt plan - before occupancy	0 / 1
EQc4.1	Low-emitting materials - adhesives and sealants	1 / 1
EQc4.2	Low-emitting materials - paints and coatings	1 / 1
EQc4.3	Low-emitting materials - flooring systems	1 / 1
EQc4.4	Low-emitting materials - composite wood and agrifiber products	1 / 1
EQc5	Indoor chemical and pollutant source control	1 / 1
EQc6.1	Controllability of systems - lighting	1 / 1
EQc6.2	Controllability of systems - thermal comfort	1 / 1
EQc7.1	Thermal comfort - design	1 / 1
EQc7.2	Thermal comfort - verification	1 / 1
EQc8.1	Daylight and views - daylight	0 / 1
EQc8.2	Daylight and views - views	1 / 1

INNOVATION — AWARDED: 6 / 6

IDc1	Innovation in design	5 / 5
IDc2	LEED Accredited Professional	1 / 1

REGIONAL PRIORITY — AWARDED: 4 / 4

EAc1	Optimize energy performance	1 / 1
EQc8.1	Daylight and views - daylight	0 / 1
MRc5	Regional materials	0 / 1
SSc1	Site selection	1 / 1
SSc6.1	Stormwater design - quantity control	1 / 1
SSc6.2	Stormwater design - quality control	1 / 1

TOTAL 74 / 110

40-49 Points	50-59 Points	60-79 Points	80+ Points
CERTIFIED	SILVER	GOLD	PLATINUM

Appendix H: STC Inventory Data

Part Number	Number of Units
Monitors/Apple Systems	2115
Dell 1707FPc	111
Dell 1907FPt	552
Dell P2210	1052
Dell E157FP	14
Apple iMac 20-inch Mid-2009	30
Apple iMac 21.5-inch Mid-2011	186
Apple iMac 20-inch Early 2008	11
Apple iMac 27-inch Mid-2011	73
Apple iMac 21.5-inch Late 2009	1
Dell U2711	10
Dell 2009WFP	31
Dell 1505FP	2
Dell 1504FP	2
Dell P2213t	27
Dell U2410	11
Dell 2408WFP	2
CPU Models	1630
Dell Optiplex GX755	208
Dell Optiplex 7010	225
Dell Optiplex 780 DT	700
Dell Optiplex 790	316
Dell Optiplex GX620DT	45
Dell Optiplex 360	15
Dell Optiplex 760	39
Dell Optiplex 760 DT	21
Dell Precision T3500	10
Dell Optiplex 755	3
Dell Optiplex GX745DT	47
Apple Mac Pro (Early 2008)	1
Thin Clients	160
WYSE Dx0D	152
WYSE Rx0L	8
Printers/Scanners/Other Equipment	183
HP4515	49

HP4700	10
M603dn	23
Canon CanoScan 5600f	39
Canon CanoScan 4400f	15
NS - HP 4108gl	12
Sony GV HD700 - VCR	11
HP 5550dtn	3
HP 9050	6
Epson Expression 10000XL	3
Steelcase Media Scape Collaborative Table	4
HP Z3200ps	1
HP Z6100PS	4
CB523A - Printer tray	1
HP130	1
HP4350	1

Appendix I: STC Computer Usage State Power Demand Testing Data

Computers

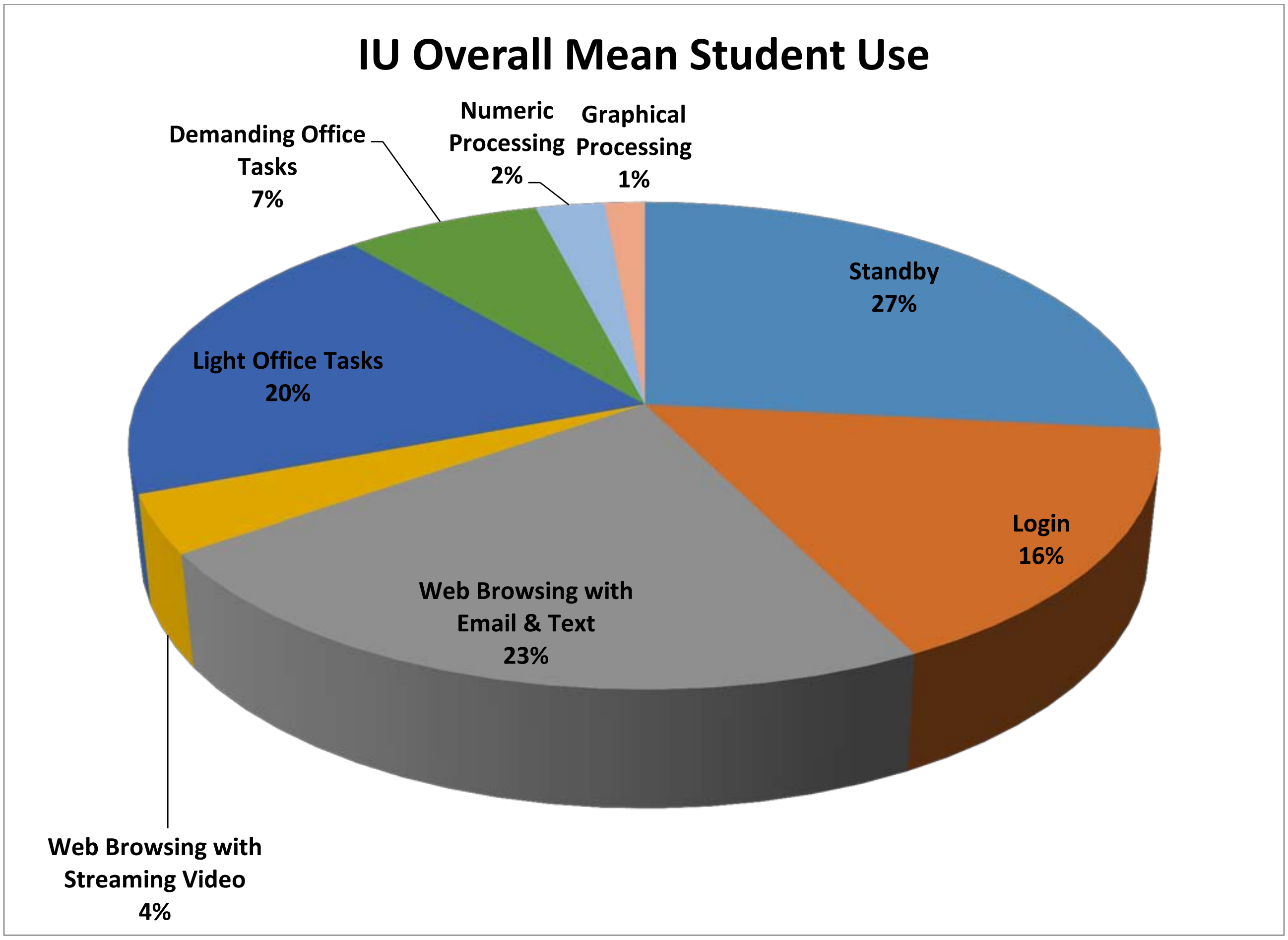
Time must be entered in hh:mm:ss format!!

Model Number	ID	OS, Processor, & RAM	Date & Time	Location & Person	Login Screen	Web Browsing	Web Browsing	Light Office	Demanding	Numeric	Graphical
					Average Watts	Average Watts	Average Watts	Average Wa	Average Watts	Average Watts	Average Watts
Dell Optiplex 7010	1	W7, Intel Core i5-3550, 4.0GB	3/24/14 3:23 PM	PV 224 Ryan	48.0	51.6	41.9	32.1	48.2	52.1	
Dell Optiplex 7010	1	W7, Intel Core i5-3550, 4.0GB	3/24/14 5:01 PM	PV 224 Ryan	45.0	48.55813953	48.6	45.4	49.5	54.0	
Dell Optiplex 7010	2	W7, Intel Core i5-3550, 4.0GB	4/6/14 9:30 AM	PV 224 Ryan	27.3	39.52941176	36.0	32.9	36.0	38.7	
Dell Optiplex 7010	2	W7, Intel Core i5-3550, 4.0GB	4/6/14 10:15 AM	PV 224 Ryan	39.5	35.78947368	32.7	29.4	33.2	39.5	
Dell Optiplex 7010	2	W7, Intel Core i5-3550, 4.0GB	4/6/14 10:55 AM	PV 224 Ryan	26.9	33.55932203	37.9	29.5	32.5	42.5	
Dell Optiplex 7010	2	W7, Intel Core i5-3550, 4.0GB	4/6/14 11:40 AM	PV 224 Ryan	27.5	31.95266272	31.1	29.6	33.4	40.0	
Dell Optiplex 7010	2	W7, Intel Core i5-3550, 4.0GB	4/6/14 1:08 PM	PV 224 Ryan	28.1	33.26086957	31.5	29.0	34.0	49.5	
Dell Optiplex 7010	2	W7, Intel Core i5-3550, 4.0GB	4/6/14 2:09 PM	PV 224 Ryan	27.7	34.4	30.50847458	29.0	31.1	41.5	
Dell Optiplex 790	3	W7, Intel Core i5-2400, 4.0 GB	4/12/14 9:30 AM	PV 151 Ryan	43.5	45.61085973	45.3	44.0	47.3	49.7	
Dell Optiplex 790	4	W7, Intel Core i5-2400, 4.0 GB	4/12/14 10:15 AM	PV 151 Ryan	37.4	38.91891892	38.2	37.4	40.4	49.0	
Dell Optiplex 790	5	W7, Intel Core i5-2400, 4.0 GB	4/12/14 12:47 PM	PV 151 Ryan	39.0	41.79775281	42.5	40.4	42.0	45.4	
Dell Optiplex 790	6	W7, Intel Core i5-2400, 4.0 GB	4/12/14 1:30 PM	PV 151 Ryan	31.0	40.85889571	36.8	36.7	40.9	44.3	
Dell Optiplex 790	7	W7, Intel Core i5-2400, 4.0 GB	4/13/14 1:30 PM	PV 151 Ryan						32.6	
Dell Optiplex 7010	8	W7, Intel Core i5-3550, 4.0GB	4/6/14 9:30 AM	PV 224 David	36.9	33	35.0	40.0	45.0	48.0	
Dell Optiplex 7010	9	W7, Intel Core i5-3550, 4.0GB	4/6/14 10:15 AM	PV 224 David	46.0	41	41.0	39.0	36.0	47.5	
Dell Optiplex 7010	10	W7, Intel Core i5-3550, 4.0GB	4/6/14 11:00 AM	PV 224 David	44.0	43	36.0	40.0	45.0	48.0	
Dell Optiplex 780	11	W7, Core™2 Duo E8400, 4.0GB	3/26/14 6:00 PM	Info Commons Saurabh	100.9	74.66666667	90.0	96.5			101.3
Dell Optiplex 780	11	W7, Core™2 Duo E8400, 4.0GB	3/26/14 7:10 PM	Info Commons Saurabh	100.1	100.8	114.9	102.0			102.0
Dell Optiplex 780	11	W7, Core™2 Duo E8400, 4.0GB	3/26/14 8:23 PM	Info Commons Saurabh	98.0	86.13496933	106.0	92.0			103.5
Dell Optiplex 780	11	W7, Core™2 Duo E8400, 4.0GB	3/26/14 9:45 PM	Info Commons Saurabh	99.1	90.7826087	103.7	99.7			103.4
Dell Optiplex 780	12	W7, Core™2 Duo E8400, 4.0GB	4/6/14 5:32 PM	Info Commons Saurabh	93.5	90.45685279	93.3	92.5			101.4
Dell Optiplex 780	12	W7, Core™2 Duo E8400, 4.0GB	4/6/14 6:45 PM	Info Commons Saurabh	95.9	78.04195804	81.8	72.5			88.1
Dell Optiplex 780	12	W7, Core™2 Duo E8400, 4.0GB	4/6/14 8:00 PM	Info Commons Saurabh	69.0	100.733945	102.5	95.4			100.6
Dell Optiplex 780	13	W7, Core™2 Duo E8400, 4.0GB	4/11/14 5:25 PM	Info Commons Saurabh	79.4	101.0769231	103.8	92.8			103.2
Apple iMac 20-inch Mid-2009	14	Macintosh, Core 2 Duo Processor,	4/16/14 9:25 PM	SPEA PV 150a Saurabh	50.0	55.125	53.2	51.6			
Apple iMac 20-inch Mid-2009	14	Macintosh, Core 2 Duo Processor,	4/16/14 10:00 PM	SPEA PV 150a Saurabh	52.10526316	54.75728155	51.4	51.4			
Apple iMac 20-inch Mid-2009	14	Macintosh, Core 2 Duo Processor,	4/16/14 10:25 PM	SPEA PV 150a Saurabh	49.5	54.51104101	55.2	51.8			
Apple iMac 20-inch Mid-2009	14	Macintosh, Core 2 Duo Processor,	4/16/14 11:10 PM	SPEA PV 150a Saurabh	50.0	53.88535032	54.1	52.7			

Appendix J: STC Student Usage Observation Data

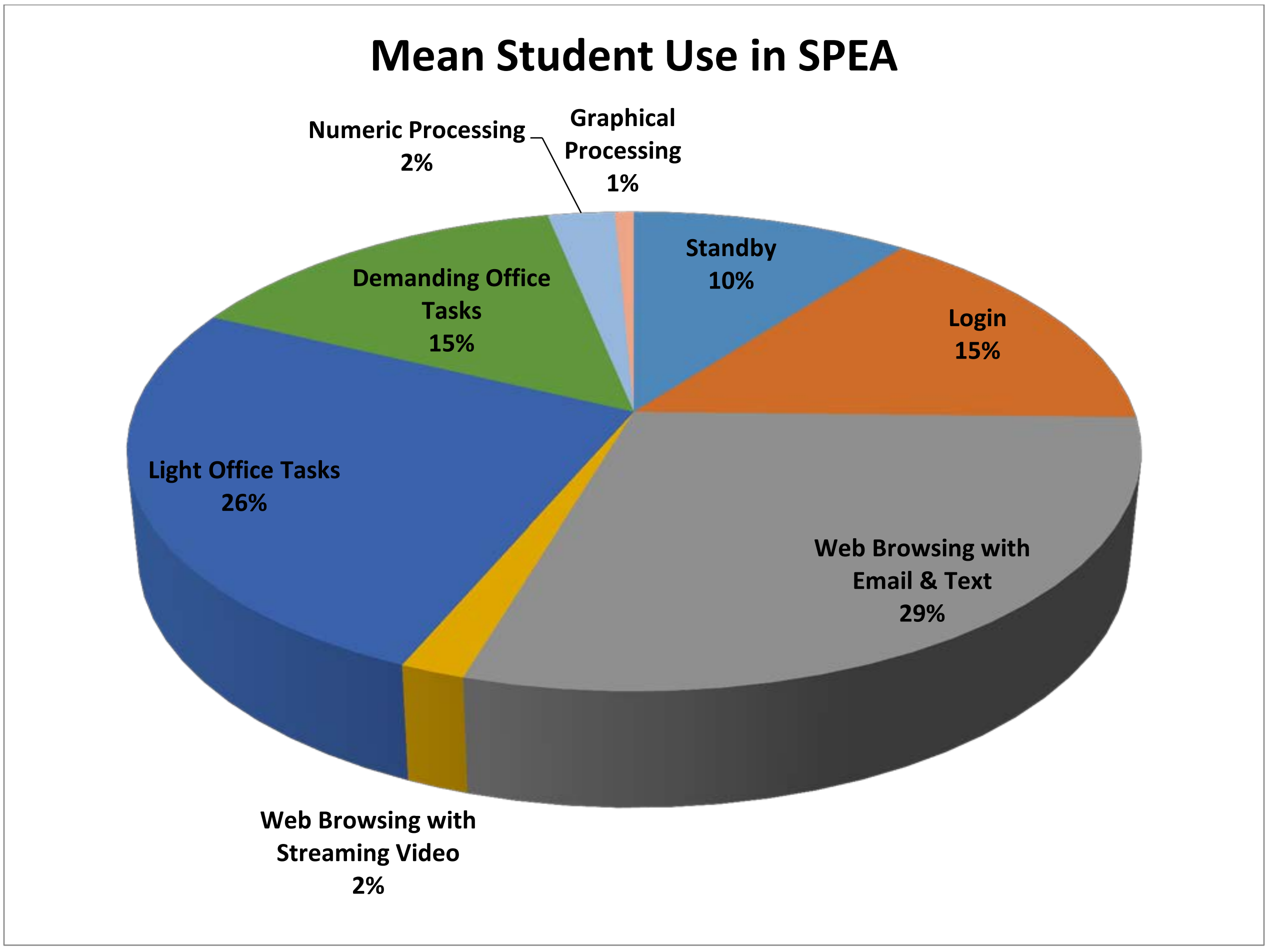
STC Computer Use Observations										
Lab	Date & Time	Number of Computers	Standby	Login	Web Browsing with Email & Text	Web Browsing with Streaming Video	Light Office Tasks	Demanding Office Tasks	Numeric Processing	Graphical Processing
SPEA Info Commons Cluster	3/25/14 11:00 AM	40	1	4	17	1	12	5	0	0
SPEA Info Commons Cluster	3/25/14 11:35 AM	40	8	6	8	1	12	4	1	0
SPEA Info Commons Cluster	3/25/14 1:10 PM	40	4	9	9	2	6	7	2	1
SPEA Info Commons Cluster	3/25/14 2:00 PM	40	0	6	11	0	14	5	3	1
SPEA Info Commons Cluster	3/25/14 3:05 PM	40	3	2	17	0	12	6	0	0
SPEA Info Commons Cluster	3/25/14 4:35 PM	40	5	5	13	1	7	9	0	0
SPEA Info Commons Cluster	3/25/14 5:40 PM	40	8	10	7	0	9	5	1	0
Library Info Commons	3/28/14 2:05 PM	137	25	21	33	9	33	10	4	2
Library Info Commons	3/28/14 3:05 PM	137	20	11	36	7	35	20	5	3
Library Info Commons	3/28/14 4:25 PM	137	27	17	28	6	39	10	5	5
Library Info Commons	3/28/14 7:05 PM	137	68	20	19	1	19	9	1	0
Library Info Commons	3/28/14 8:05 PM	137	73	28	14	2	9	5	6	0
Library Info Commons	3/31/14 3:30 PM	137	23	17	43	4	34	5	8	3
Library Info Commons	3/31/14 4:30 PM	137	19	14	48	8	33	7	4	4
Library Info Commons	3/31/14 5:30 PM	137	15	17	47	6	36	8	6	2
Library Info Commons	4/2/14 6:00 PM	137	23	19	36	7	28	18	3	3
Library Info Commons	4/2/14 7:30 PM	137	26	23	44	4	26	9	4	1
Library Info Commons	4/2/14 9:15 PM	137	34	29	37	3	21	6	3	4
Library Info Commons	4/4/14 1:35 PM	137	25	25	31	6	36	9	3	2
Library Info Commons	4/4/14 5:30 PM	137	36	19	29	11	27	7	2	6
Library Info Commons	4/12/14 1:00 AM	137	72	29	15	6	11	2	2	0
Library Info Commons	4/12/14 2:15 AM	137	78	31	11	3	9	5	0	0
Library Info Commons	4/13/14 9:15 PM	137	48	26	21	8	22	11	1	0
Library Info Commons	4/14/14 12:15 AM	137	54	28	20	4	21	6	2	2

Appendix K: STC Student Usage Supplementary Charts



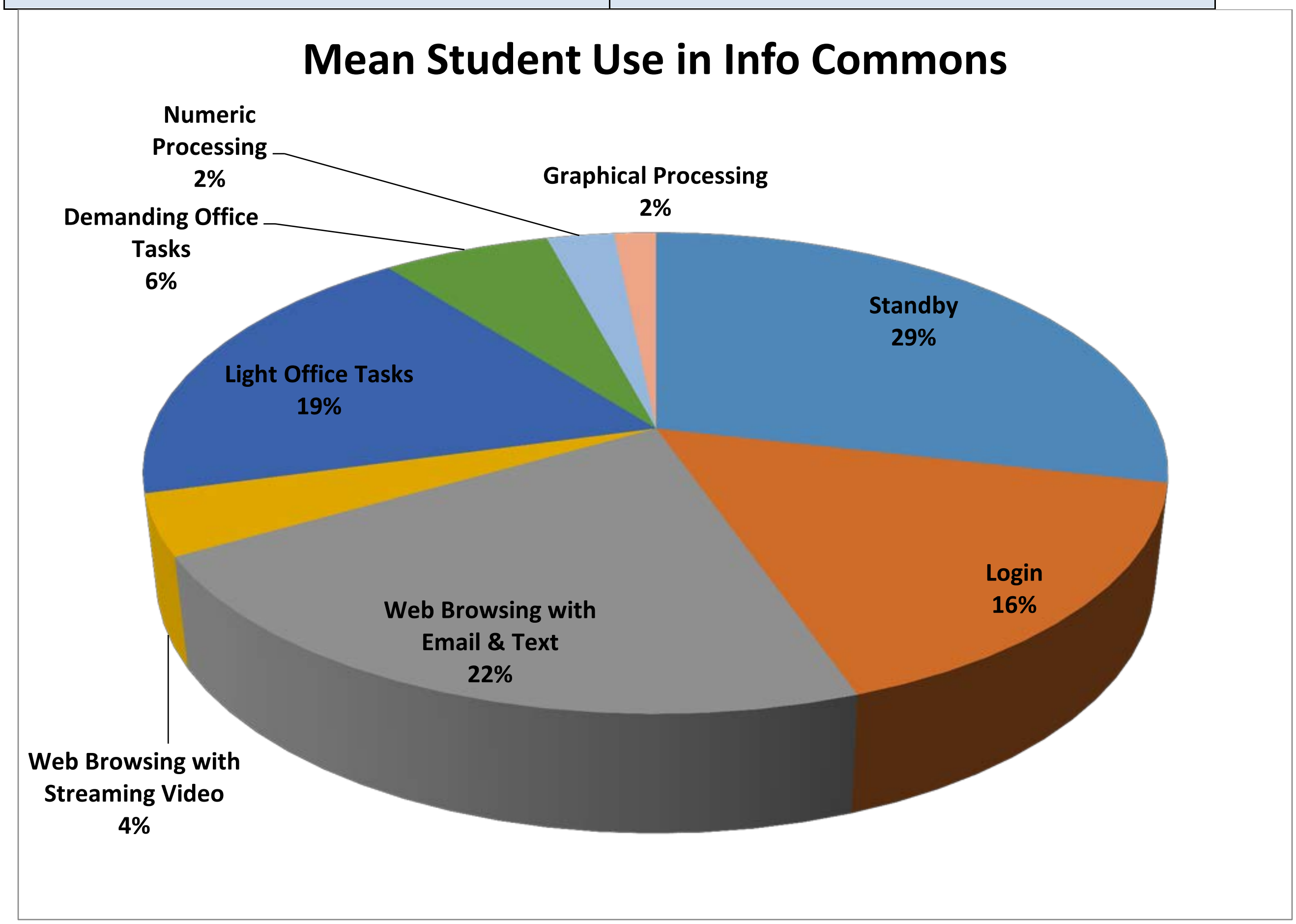
Type of STC Usage	Percentage (%)
Standby	27%
Login	16%
Web Browsing with Email & Text	23%
Web Browsing with Streaming Video	4%
Light Office Tasks	20%

Demanding Office Tasks	7%
Numeric Processing	2%
Graphical Processing	1%
Total	100%

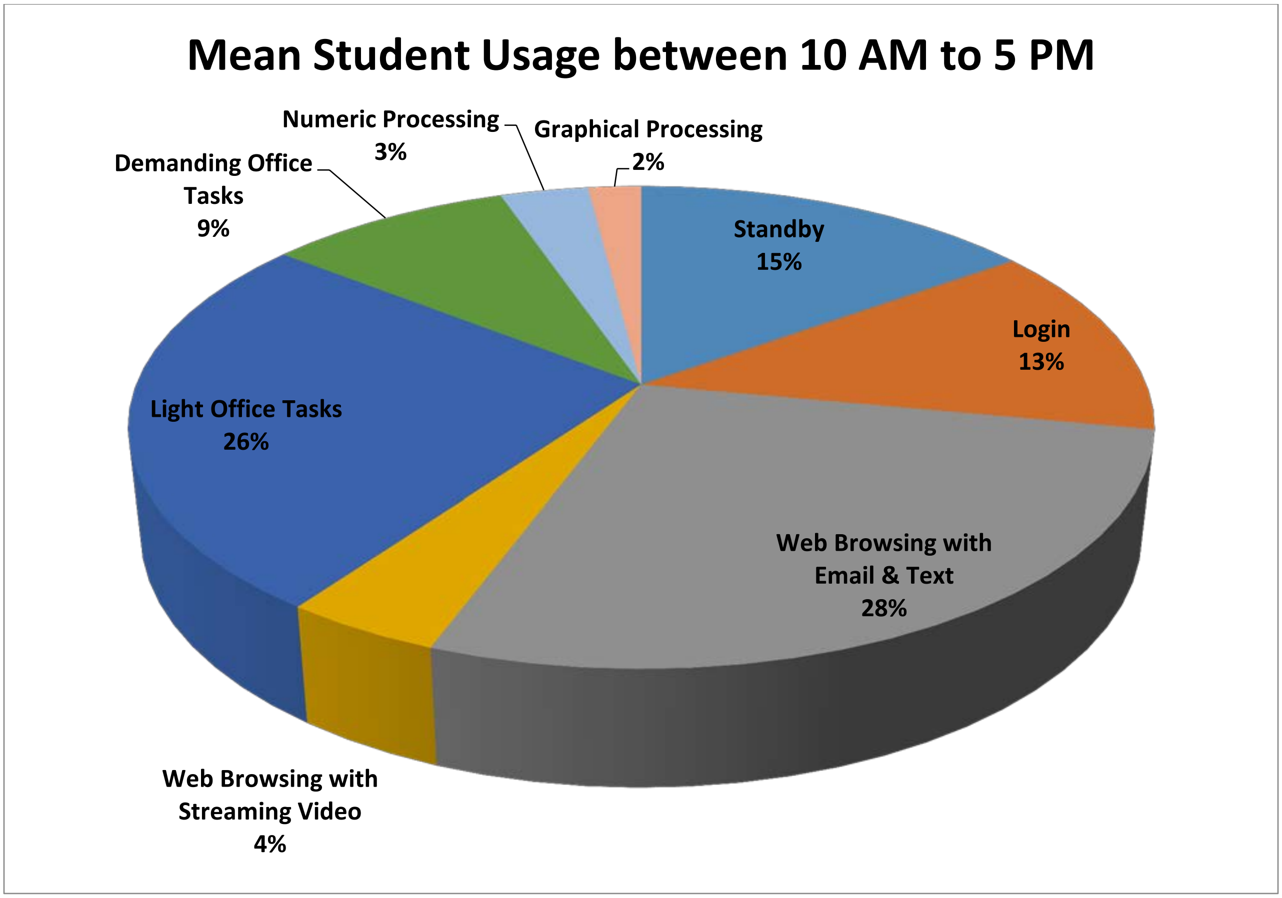


Type of STC Usage	Percentage (%)
Standby	10%
Login	15%

Web Browsing with Email & Text	29%
Web Browsing with Streaming Video	2%
Light Office Tasks	26%
Demanding Office Tasks	15%
Numeric Processing	2%
Graphical Processing	1%
Total	100%

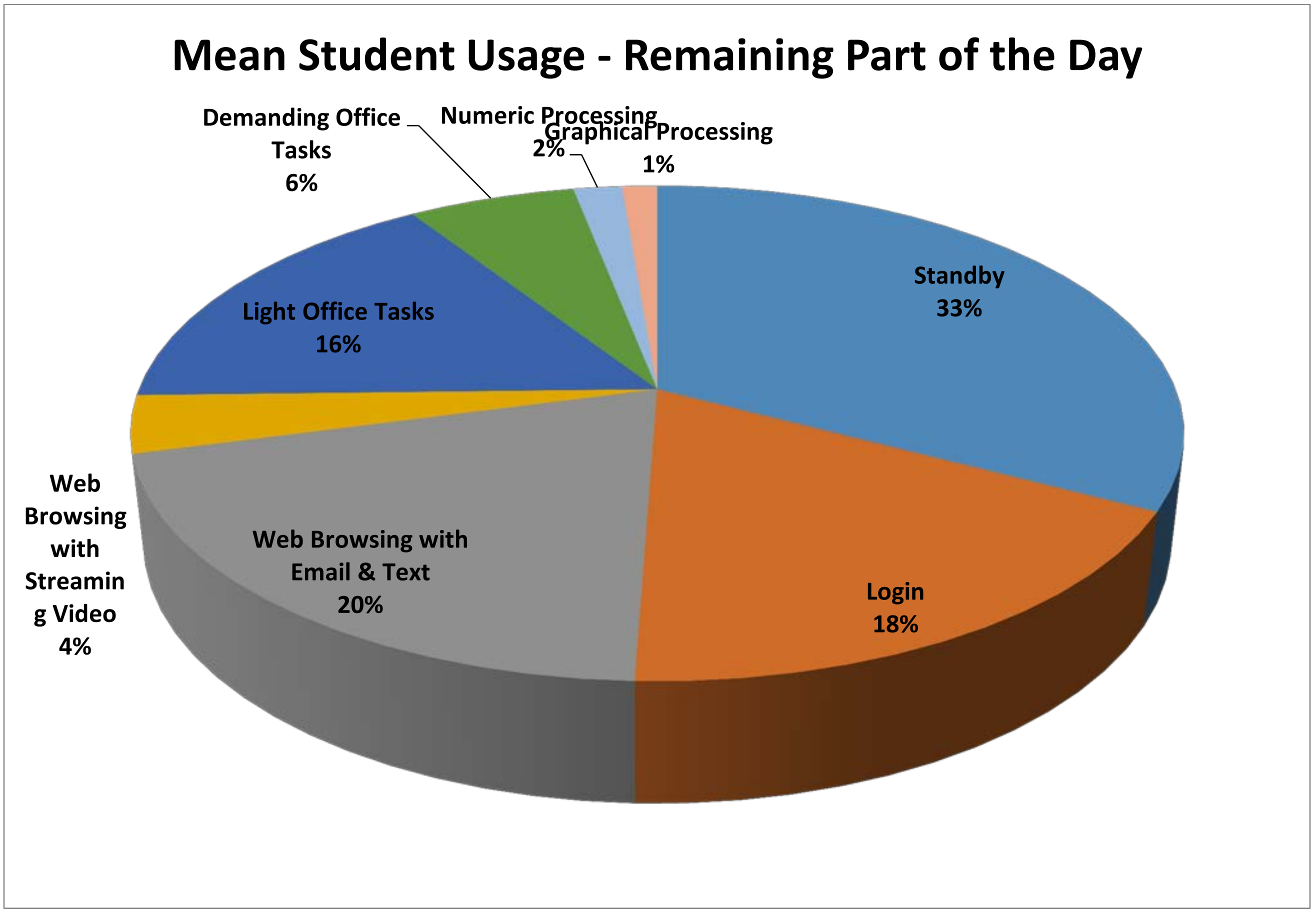


Type of STC Usage	Percentage (%)
Standby	29%
Login	16%
Web Browsing with Email & Text	22%
Web Browsing with Streaming Video	4%
Light Office Tasks	19%
Demanding Office Tasks	6%
Numeric Processing	2%
Graphical Processing	2%
Total	100%



Type of STC Usage	Percentage (%)
Standby	15%
Login	13%
Web Browsing with Email & Text	28%
Web Browsing with Streaming Video	4%
Light Office Tasks	26%
Demanding Office Tasks	9%
Numeric Processing	3%

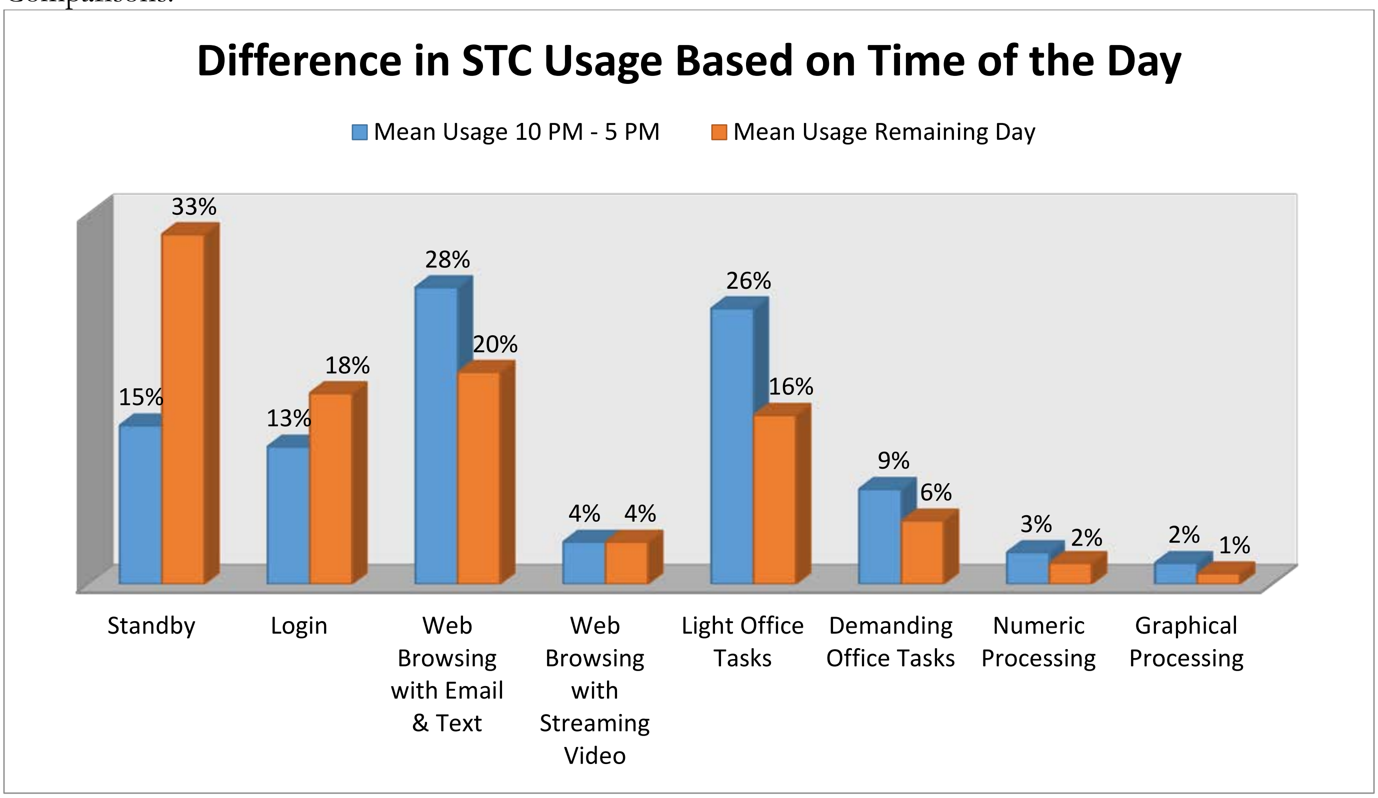
Graphical Processing	2%
Total	100%

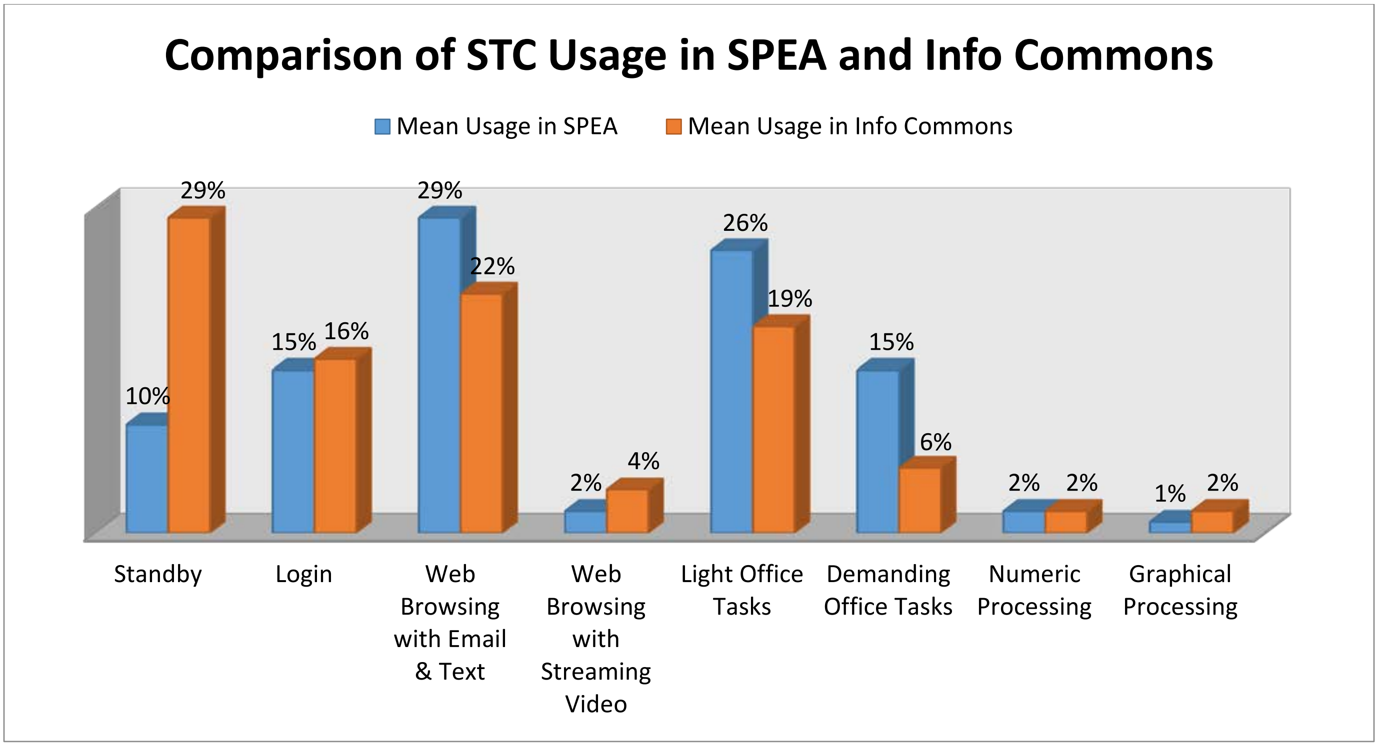


Type of STC Usage	Percentage (%)
Standby	33%
Login	18%
Web Browsing with Email & Text	20%
Web Browsing with Streaming Video	4%

Light Office Tasks	16%
Demanding Office Tasks	6%
Numeric Processing	2%
Graphical Processing	1%
Total	100%

Comparisons:





Comparison of STC Usage in SPEA and Info Commons
Mean Usage in SPEA
Mean Usage in Info Commons
10%
29%
15%
16%
29%
22%
2%
4%
26%
19%
15%
6%
2%
2%
1%
2%
Standby
Login
Web Browsing with Email & Text
Web Browsing with Streaming Video
Light Office Tasks
Demanding Office Tasks
Numeric Processing
Graphical Processing

Appendix L: IT-28 Sample Comprehensive Evaluation

IT28 Comprehensive Evaluation

Unit Name: School of Robotic Arts

Unit Head: Cy Borg, Dean

Submitted By: Grace Turing, IT Director

Submission Date: 5/1/2014

Table of Contents

Executive Summary
Not required, but you can use this section if you wish.
Overview of Unit Mission
The School has six degree programs – four undergraduate and two graduate. Our total undergraduate enrollment (declared majors) is about 960 students, while our graduate enrollment is around 220. We have 41 tenure track faculty, 3 full-time lecturers, 22 full time staff, and 43 graduate students employed in some capacity.
We are a relatively new school, still building our graduate program. We have funding to hire 3 new faculty lines this year, and one of those lines will be in our Applied Robotics department. This will increase the use of the Asimov Robotics Lab in the basement of Albert Hall.
In the Asimov Robotics Lab, there are six federally funded research projects operating at this time. Typically the equipment used in these projects is not networked, but in some cases it is.
Each year we host the Apple STEM Robotics Competition. This is a national event, drawing high school students from all over the U.S. There is a small registration fee that is handled by IU Conferences Office. We also have an online store for selling tee shirts, small robot toys, and other gifts. We run the web server, but the credit card transactions are handled by IU Treasurer.
Overview of IT Services
All faculty and staff office computers are supported by the School IT Group (SITG), which consists of the IT Director, 2 direct reports to her, and 4 other full time support staff. We have 1 part time position to help with desktop support.
In addition to the 125 desktop and laptop computers that SITG supports for faculty, staff, and graduate students, there is a small computer lab of 10 computers that we support. We also provide quite a bit of verbal assistance to graduate students, who often bring their personally-owned laptops to work in the labs.
Our "office support" servers (file, print, web, and database) are in the Intelligent Infrastructure, with one exception. Our CAD/CAM application license server is a physical server in the basement of Albert Hall. Our "research servers", of which there are 6, are located in the Asimov Robotics Lab. The lab has 2 surveillance cameras (maintained by IUPD) and strict ingress/egress practices. A key card system controls the doors, and all employees are supposed to log their in/out times. The lab is basically one gigantic open space, with some soft partitions. Once inside the lab, a person can physically access any of the servers. With one exception, the principle investigator who purchased his/her servers also maintains them without any support from SITG.
Risk Assessment
We run a pretty tight ship. With the exception of the five lab servers noted above, the following best practices are observed on all School servers and workstations/laptops.

Best Practices, Recommendations, and Requirements	Governing IT Policy or Standard	Currently Practiced or Planned
Authentication		
Admin accounts not used for day-to-day activities	IT-12	Planned

Users are not allowed to run systems as administrators	IT-12	Planned
Admin accounts not shared among individuals - unique admin accounts/passwords for each	IT-12	Current
Employ strong authentication requirements	IT-12	Current
Provide access to IU systems and services only to those authorized to access such services	IT-12	Current
Secure management of passwords	IT-12	Current
All mobile devices require at least a 4-digit PIN	IT-12.1	Planned
Backups		
All institutional data are backed-up; tests of backups routinely conducted	DM-01	Current
Maintain off-site backups	COBIT 4.1 DS4.9	Planned
Documentation		
Data stored or shared with third party is appropriately documented	DM-02	N/A
Data stored or shared with third party is approved by Data Stewards	DM-02	N/A
Up-to-date risk mitigation plan	IT-28	Current
Business continuity plan up-to-date	COBIT 4.1 DS4	Current
DRP formally tested	COBIT 4.1 DS4	Planned
Inventory of IT assets, with data classifications, and data analysis	IT-28	Current
Written incident response procedure	IT-12	Current
DRP maintained and routinely updated	COBIT 4.1 DS4	Current
Formally assign roles of security and privacy	ISPP-25 Standard	Planned
Physical infrastructure/hardware		
Offsite backups with critical data properly secured	IT-12	Current
Server room environmental controls are sufficient	DM-01-s	Planned
Server room physical controls are sufficient	DM-01-s	Planned
Procedure for equipment decommissioning (i.e. hard drive-wiping, shredding)	FIN-PUR-14.0	Planned
Scans and log monitoring		
Regular (at least monthly) vulnerability scans on all servers	IT-12	Current
System logs regularly reviewed	IT-12	Planned
System logs archived securely, and for the appropriate duration	UISO Recommended	Planned
Identify Finder scans routinely occurring on servers	DM-01	Current
Identify Finder scans routinely occurring on workstations	DM-01	Current

Patch management, software, system builds		
Routine and consistent procedures for patch management	IT-12	Planned
Servers on supported operating systems	IT-12	Current
Run systems with only necessary software, services and port openings	IT-12	Current
Identify and patch third-party software on systems	IT-12	Current
Mobile devices on IU's network secured and managed	IT-12.1	Planned
Maintain updated OS builds for efficient recovery	IT-12	Current
Firewall, antivirus, encryption, network		
All servers behind physical firewall	DM-01	Current
Antivirus scans taking place on all systems	IT-12	Current
Critical/Sensitive data encrypted in transmission	IT-12	Current
Critical/Sensitive data encrypted at rest on servers	IT-12	Current
Encrypt communications to systems accessed through elevated privileges	IT-12	Current
Avoid whenever possible passing password over the network in clear-text	IT-12	Current
Antivirus software installed on all computers and servers	IT-12	Current
Maintain antivirus definitions	IT-12	Current
All laptops employ whole disk encryption	IT-12.1	Planned
Backup media on servers encrypted	IT-12	Current
All servers on private IPs (unless documented operational necessity)	IT-12, DM-01	Current
All printers on private IPs	IT-12, DM-01	Current
Disable or secure remote access	IT-12	Current
Certifications / training / handling of sensitive data and security		
Hire technicians with the expertise necessary to maintain systems and hardware	IT-12	Current
Identify types data in your unit	DM-01	Current
All employees participate in security/privacy awareness (HIPAA/FERPA certs)	Health Insurance Portability and Accountability Act; Family Educational Rights and Privacy Act	HIPAA – N/A FERPA - Current
PCI DSS compliance	FIN-TRE-VI-110	N/A
Sensitive data managed on secure systems, by appropriate procedures and personnel	DM-01	Current
Training procedures in place for appropriate use and access to electronic information	IT-07, IT-12	Planned

Subscribe to vendor advisory services	IT-12	Current
Keep abreast of IU security advisories, Policy and best practice updates through Secure IU	IT-12	Current
For users, identify appropriate server locations of data extracted or derived from central sources	DM-01, section 10.e	Current

Risk Mitigation Plan

As you can see from the table above, we practice the majority (72%) of the best practices prescribed in the table above. Over the last two years, we've spent a lot of effort documenting our procedures and working to improve our overall security posture. We currently have plans to continue improving security. Our top priority is to move our CAD/CAM licensing server to II, which will be accomplished by June 30, 2013. We are already in the process of implementing TripWire Log Center to help with security log review, and we are on track to complete that in March of 2014. We have a number of other security-related improvements listed below.

The research lab servers, with one exception, are fully managed by the principal investigator and his or her graduate assistants. As noted in our IT-28 Planner inventory, these servers are all running some version of Linux. I have provided each PI, as well as Dean Borg, with a copy of the "Best Practices" table in the section above. All of the PI's have agreed to implement all changes necessary to comply with those best practices, and one of the PI's is now interested in SITG taking over support of their server. Two of the servers (neither managed by SITG) are connected to the campus network 24/7. I am told they have a host-based firewall on each. The two PI's for these servers have agreed to allow us to look at the firewall settings, and to begin using the UISO vulnerability scanner right away.

	Risk	Response Action	Current Responsibility	Future Responsibility	Target Date
1a.	Exposure or loss of university data (all classifications) due to hacking	Servers: Plan to begin regular review of server logs utilizing log mgmt. software; Plan to implement training schedule for all IT staff	IT Systems Manager (currently held by John Smith)	IT Systems Manager (currently held by John Smith)	March, 2014 September 1, 2014
1b.	Exposure or loss of university data (all classifications) due to hacking	Workstations: Will implement central patch management	IT Systems Manager	IT Systems Manager	October 15, 2014
2a.	Exposure or loss of university data (all classifications) due to theft	Servers: Remaining physical servers in Albert Hall will be moved to II, with the exceptions noted in IT-28 Planner	IT Systems Manager	UITS	June 30, 2014
2b.	Exposure or loss of university data (all classifications) due to theft	Workstations/laptops: Will ensure all laptops use full disk encryption	IT Systems Manager	IT Systems Manager	June 1, 2014
3a.	Exposure or loss of university data (all classifications) due to human accident or error	Research Data: will ensure all research data is protected by training researchers to keep 3	IT Systems Manager / Principal Investigators	IT Systems Manager / Principal Investigators	July 30, 2014

		copies of their data utilizing SDA, RFS, and/or local copies			
3b.	Exposure or loss of university data (all classifications) due to human accident or error	Servers/Workstations: Will create a procedure for decommissioning old hard drives	IT Support Coordinator	IT Support Coordinator	March 31, 2014
3c.	Exposure or loss of university data (all classifications) due to human accident or error	Web Content: content providers will be properly and regularly trained	IT Support Coordinator	IT Support Coordinator	September 1, 2014
4a.	Exposure or loss of university data (all classifications) due to physical cause or accident	Servers: Remaining physical servers in Albert Hall will be moved to II, with the exceptions noted in IT-28 Planner	IT Systems Manager	UITS	June 30, 2014
4b.	Exposure or loss of university data (all classifications) due to physical cause or accident	Users are trained to store files on server, RFS, and/or backup to SDA	IT Systems Manager and IT Support Coordinator	IT Systems Manager and IT Support Coordinator	July 30, 2014
5.	Interruption of mission-critical IT services or campus infrastructure due to hacking or malicious action	Servers: Plan to begin regular review of server logs utilizing log mgmt. software; Plan to implement training schedule for all IT staff	IT Systems Manager	IT Systems Manager	March, 2014 September 1, 2014
6.	Interruption of mission-critical IT services or campus infrastructure due to physical cause or accident	Servers: Remaining physical servers in Albert Hall will be moved to II, with the exceptions noted in IT-28 Planner	IT Systems Manager	IT Systems Manager	June 30, 2014
7.	Loss of employee productivity due to	Workstations: Will implement	IT Systems Manager	IT Systems Manager	May 15, 2014

	malware or hacking event	central patch management			
8.	All of the above	Research Servers: The 5 servers not managed by SITG will implement recommended best practices	Principal Investigators	Principal Investigators / SITG group will consult	January 31, 2015

Risk Mitigation Timeline
The timeline for risk mitigation plans under SITG's control run from March, 2014 through October 2014. While aggressive, we believe we can accomplish the plans set forth in this document. The more difficult items to manage will be the plans for the research labs.
Risk Acceptance – Brief Narrative
We have not identified any risk for which no mitigation is possible.

Concluding Remarks
We underwent an Internal Audit in 2011, and our IT controls were described as adequate. Most of the findings have been corrected since then.

Signatures

Unit Head (signature) Printed

Date

IT Manager, Director, or Delegate (signature) Printed

Date

Appendix M: IT-28 Copy of Planner

This Microsoft Excel Template is available in the Spring 2014 Capstone Box folder. Please use this link or contact Dr. Diane Henshel dhenshel@indiana.edu to obtain a copy.

Direct link (required IU Box account):
https://iu.app.box.com/files/1/f/1800329001/1/f_15980752867.

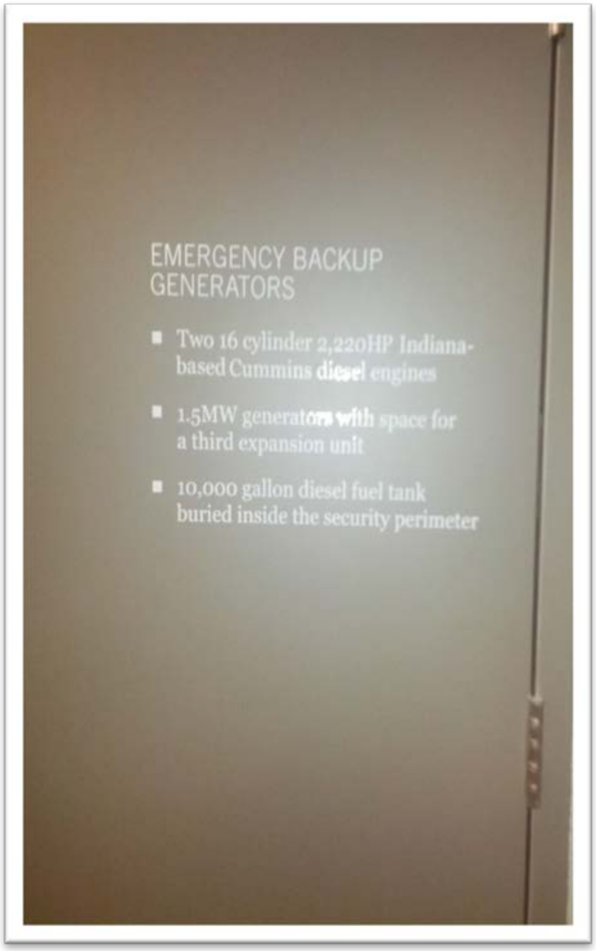
Appendix N: IT-28 Data Center Pictures

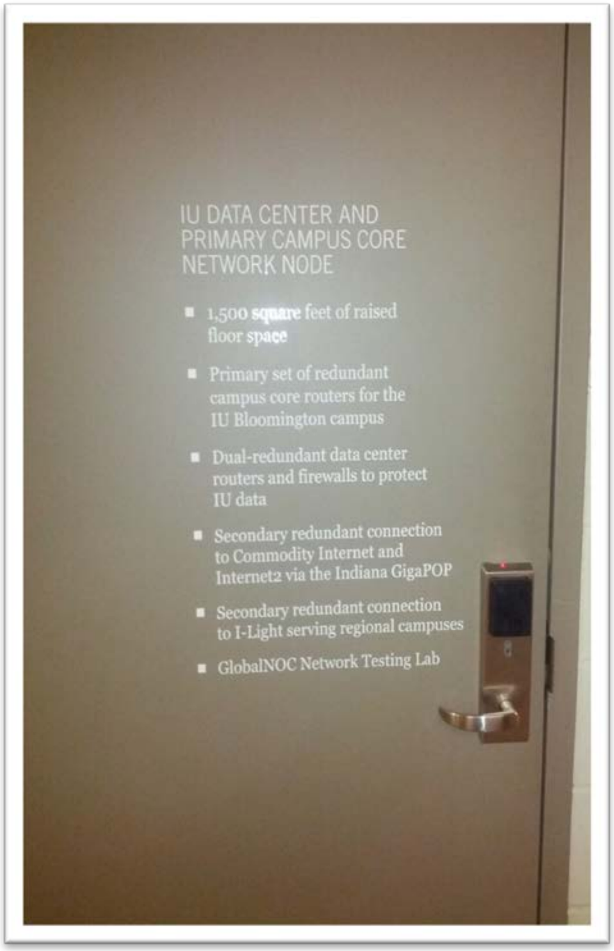
The backs of server racks face each other in this aisle. The cooling features from the floor are located in this aisle, because this is where the hot air is located.


The server rack on the left has no cooling jacket; the server racks to the right have cooling jackets. These coils are chilled by water from the cooling towers. As the hot air blows out of the servers, it goes through the coils, which cools the air before it mixes with the ambient air.

Part of the DC power plant working on batteries

Part of an Air Economizer


EMERGENCY BACKUP
GENERATORS
Two 16 cylinder 2,220HP Indiana-based Cummins diesel engines
1.5MW generators with space for a third expansion unit
10,000 gallon diesel fuel tank buried inside the security perimeter


IU DATA CENTER AND
PRIMARY CAMPUS CORE
NETWORK NODE
1,500 square feet of raised floor space
Primary set of redundant campus core routers for the IU Bloomington campus
Dual-redundant data center routers and firewalls to protect IU data
Secondary redundant connection to Commodity Internet and Internet2 via the Indiana GigaPOP
Secondary redundant connection to I-Light serving regional campuses
GlobalNOC Network Testing Lab

Three doors explaining functions of some rooms in Data Center

Appendix O: Audited Percentage of Total Office Area Square Footage

Audited Percentage of Total Office Area Square Footage				
Building	**Office Area**	**Audited Square Footage**	**Total Office Square Footage**	**Percentage of Total Square Footage**
Ballantine Hall	Office & Reception	4,678	58,764	8.0%
	Kitchen/Copy/Break Rooms	1455	5531	26.3%
	Conference Rooms	164	2517	6.5%
	Total	**6297**	**66812**	**9.4%**
Kelley	Office & Reception	4,359	25,226	17.3%
	Kitchen/Copy/Break Rooms	335	7202	4.7%
	Conference Rooms	501	6578	7.6%
	Total	**5195**	**39006**	**13.3%**
CIB	Office & Reception	1,897.00	33,704.00	5.6%
	Kitchen/Copy/Break Rooms	366	37298	1.0%

	Conference Rooms	1128	8806	12.8%
	Total	**2191**	**79808**	**2.7%**
SPEA	Office & Reception	7,711.00	25,616.00	30.1%
	Kitchen/Copy/Break Rooms	633	6221	10.2%
	Conference Rooms	548	1689	32.4%
	Total	**8892**	**33526**	**26.5%**
Swain West	Individual Offices	6365	17056	37.3%
	Reception Areas	0	3594	
	Kitchen/Copy/Break Rooms	0	2909	
	Conference Rooms	0	1834	
	Total	**6365**	**25393**	**25.1%**