IPRO-312 Final Report

1. Abstract

This semester, the purpose of IPRO-312 (the Rotten IPRO) was to determine the best method on how to recycle organic waste generated by the IIT community in order to help our campus become more sustainable. In order to achieve this task, our team was divided into four sub-groups according to the four main components needed for the task to be completed; researching composting and its methods, researching other universities' approach to composting and city regulations, collaborating with IIT's offices that are connected to the topic of composting, and finally documenting all the work done and preparing presentation materials.

, the teams created a database of research and inclusive case studies on composting, collaborated with Sodexo, IIT Facilities, and members of IIT administrative body in order to identify contributors to the composting effort, and finally, through extensive investigation and analysis, a proposal for IIT has been developed based on municipal regulations, projected waste stream, and available technology. Without the aid of a waste audit, the team's analysis has been working with estimates from Sodexo, IIT Facilities, and other universities of similar size.

The final conclusion of the team's work is that an in-vessel composting unit would be ideal for our campus and meets composting standards set forth by the city of Chicago. The team calculated that this solution would be able to pay for itself in five years and after that any money made or saved would be pure profit for IIT.

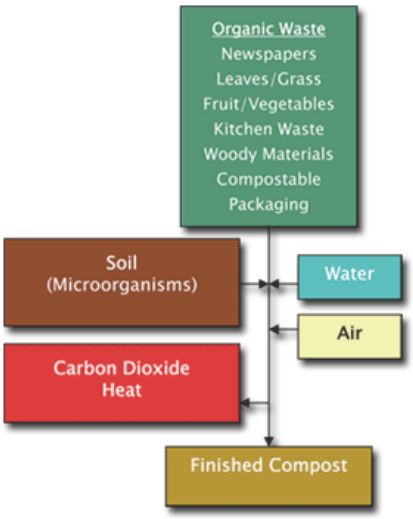
2. Background

a. Sponsors and Customer involved:
   i. IPRO-312 was sponsored by the IIT- Office of Campus Energy and Sustainability and has constantly collaborated with this office in the efforts toward organic recycling. Other on campus entities involved in the effort have been Sodexo and Premiere Waste Management. the IPRO has also collaborated with the Chicago Resource Center as well as multiple in-vessel compost manufacturing companies for comparison of models and in order to find the required information for the best model for IIT.

b. Problems addressing:
   i. Minimize the impact that IIT's organic waste has on the environment and community
   ii. Evaluate existing composting systems
   iii. Evaluate possibilities for organic waste control and composting
   iv. Determine the exact way composting needs to be managed so as not to disturb the everyday life on campus as well as residences around it
   v. Design cost efficient composting
   vi. Find a location on campus to place composting vessel and store the finished compost

c. What is composting
   i. A compostable material biodegrades under the appropriate conditions, into carbon dioxide, methane, water, and compost biomass. The most efficient composting occurs by obtaining an initial carbon: nitrogen mix of 25-30 to

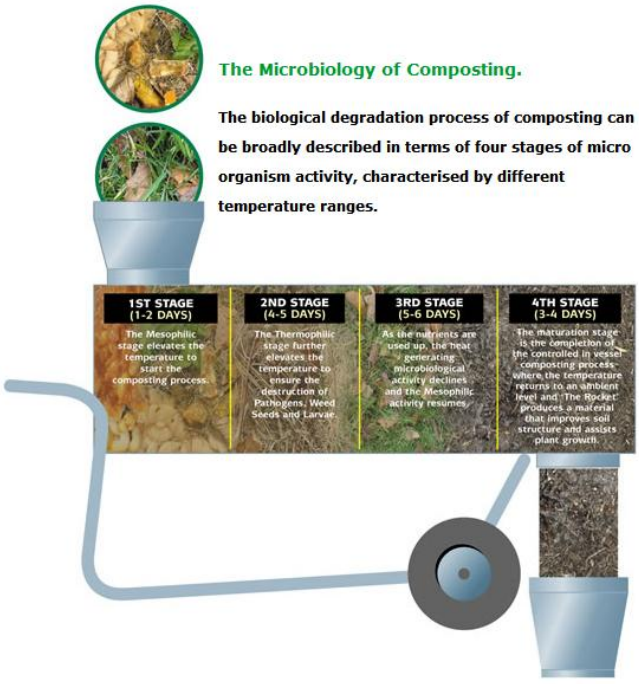
1 by dry chemical weight. A key to making quality compost is to keep it aerobic, and that involves using forced aeration. If the pile is deeper than 24" the microbes may be deprived of adequate oxygen. There are three main different types of composting: compost piles, vermi-composting



(done with earthworms), and in-vessel composting.

ii. Technology involved:

1. One approach to composting is a home made wood container that is easy to keep full, placed in a convenient location, and it is easy to monitor the mix. However, it would be hard to stir and more susceptible to heat loss.
2. A compost bin is easier to mix, the ventilation and the regulations are built in. However. it is not used for large scale applications.
3. The compost vessel is ideal for large scale applications such is in schools, hospitals, communities. It speeds the processing of waste into usable soil, is good for controlling odors, good at preventing vectors, and it minimizes staff time needed for operation.



d. First-time IPRO

e. Ethical, moral, cultural or scientific issues that may be involved to investigate the problem(s)
   i. Not wasting good food just to make compost
   ii. Making sure all waste audit data has correct numbers and we are not wasting resources
   iii. Using the compost only on IIT campus as regulations require and not making a profit by selling it somewhere else
   iv. Not using bad compost, making sure the mix is good for plants and to grow food
      1. By making sure the compost mix does not smell
      2. And making sure the temperature of the compost mix is right
      3. Ensuring that the final compost has proper pH and nutrient levels

f. Relevant documents:
   i. See links in part 13 and last page

3. Objectives (goals and explanations)

a. PHASE 1: research different composting options
   i. Research and determine how composting is achieved
      1. How does in-vessel composting work
      2. How does vermi-composting work
      3. How does a compost pile work
      4. Which one of these methods fits IIT's campus the best
   ii. Visit large scale composting facilities
      1. **Brookfield Zoo** composts all elephant feces and landscape waste. They have a large "greenhouse" equipped with appropriate tools for ventilation and irrigation. This process requires several people to control large machines to turn the compost and move it from the composting area to site use
      2. **Pacific Garden Mission** a large homeless shelter in Chicago who composts all organic waste and use it on their community garden. Their method of composting is labor intensive and requires several people to keep the process going
   iii. Examine municipal regulations regarding organic waste recycling
      1. City wide: Compost cannot be sold to other sites – site transfer laws for garbage
      2. University wide: The university must compost only its own waste and use it on its own site
      3. Ward wide: The ward is in charge of giving permits to different facilities
   iv. Investigate the amount of organic waste that IIT produces on a daily basis
      1. Get approximate numbers from Sodexo and the cafeterias on campus
      2. Get information from Premiere that is in charge of conducting waste audits

v. Decide which method would be the best for IIT to adopt in order to use organic recycling and be more sustainable

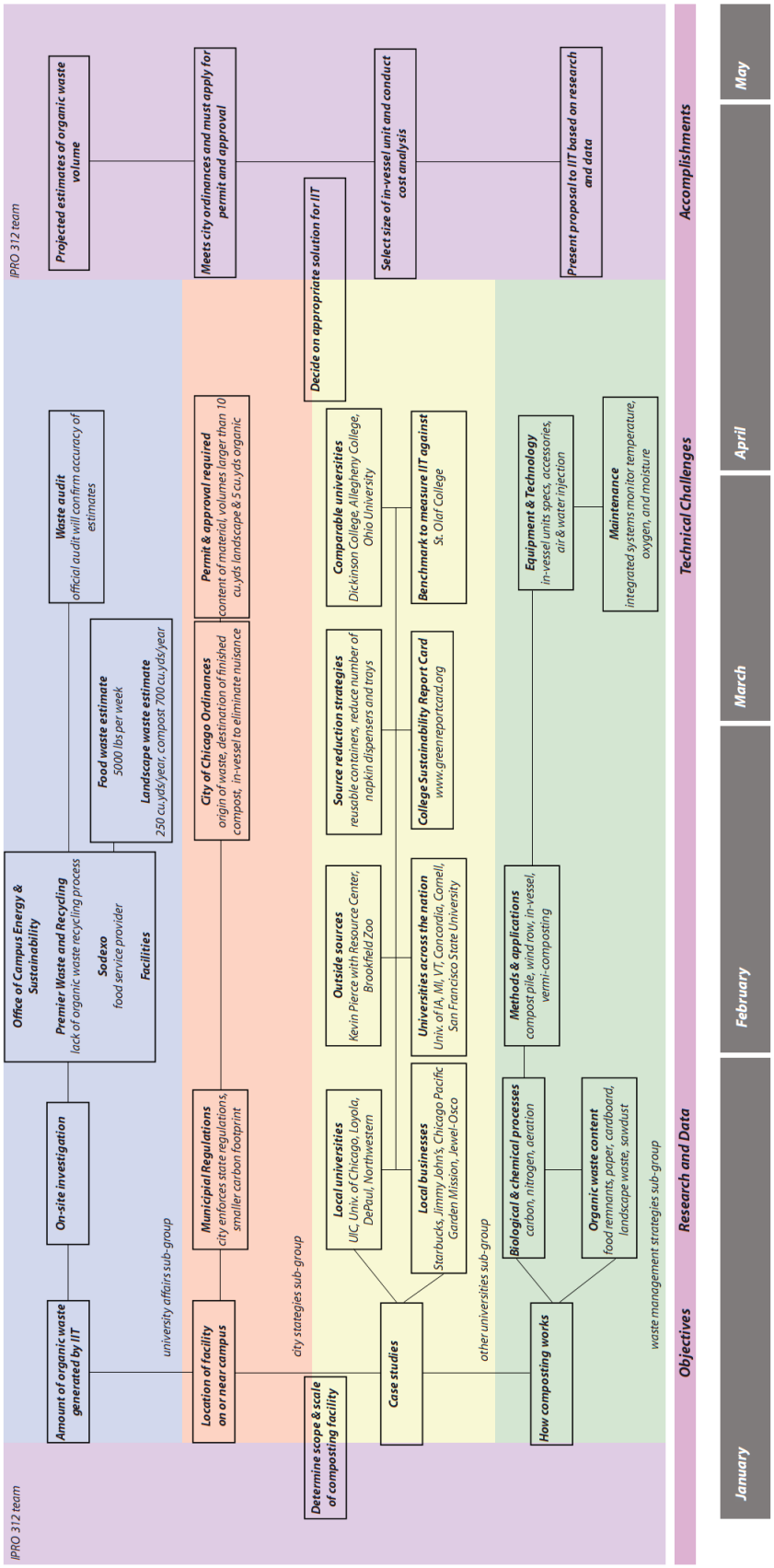
b. PHASE 2: Research how the composting method the group agreed on from PHASE 1 can be best put in use
    i. Research case studies of composting facilities operated by other universities and their approach to the organic waste recycling problem
        1. Ohio University
        2. University of Iowa
        3. University of Illinois
        4. St. Olaf College
        5. Allegheny College
        6. Dickinson University
    ii. Research composting companies that could provide IIT with a vessel to compost
        1. Wright Environmental Management Inc. – main composting company operating in the US
        2. Accelerated Rocket Composting Ltd. – company based in the UK and operating in Europe but soon coming to the US. Rocket composting is much more affordable, efficient, and compact than Wright Environmental Management Inc..
        3. Earthtub
c. PHASE 3: Collaborate with IIT entities and present a feasible organic recycling plan
    i. Attend Sustainability plan forums held by the Office of Campus Energy and Sustainability
    ii. Contact IIT leaders and inform them on our efforts and integrate their suggestions and inquires into our research
    iii. Prepare a presentation booklet with all research material necessary to make a decision on whether composting is a valid option for IIT or not

4. Methodology

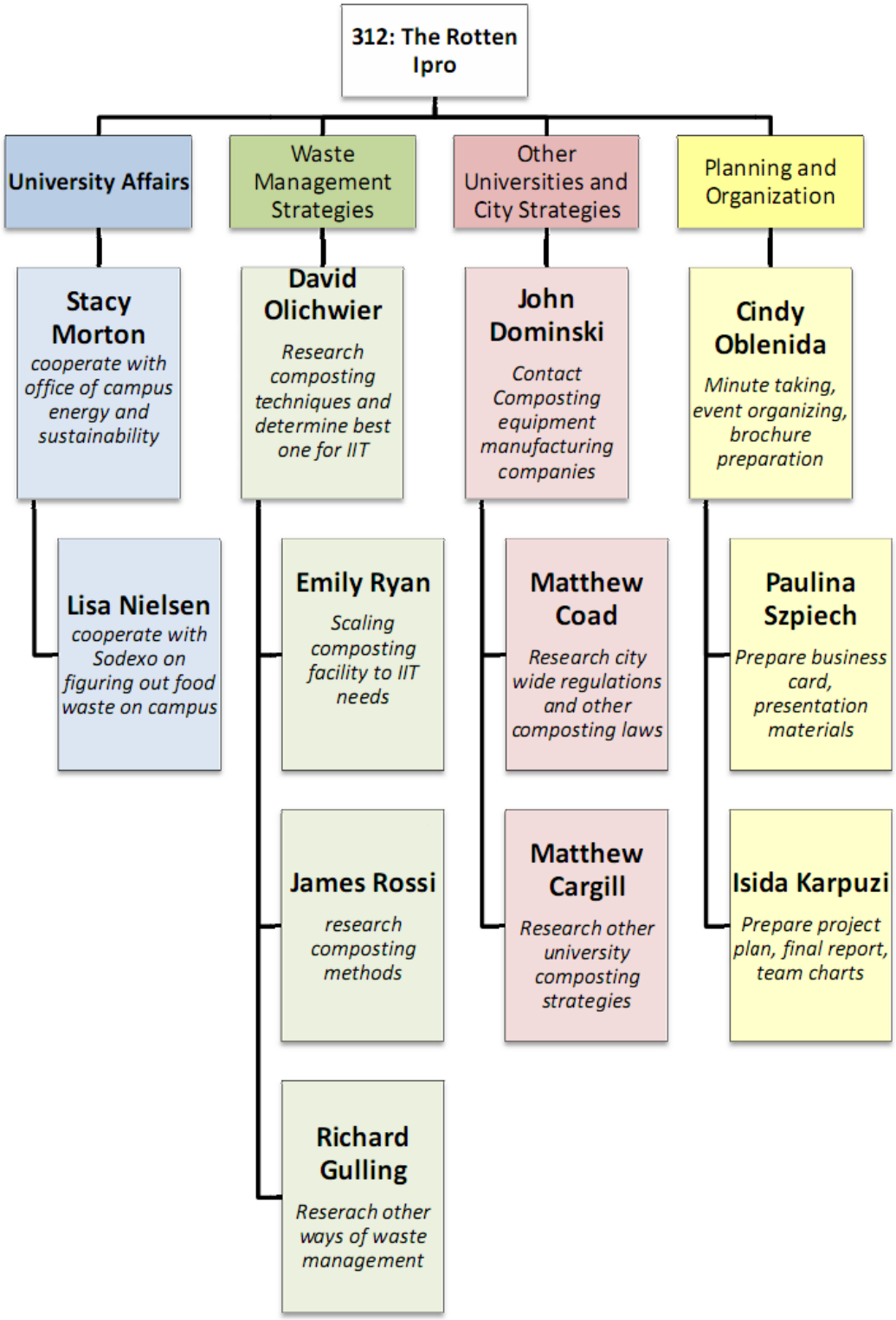
a. Gantt Chart

Name	Begin date	End date	Coordinator
University Affairs Team	1/26/09	5/8/09	Stacy Morton
Work with Sodexo to figure out food waste	1/26/09	2/28/09	Lisa Nielsen
How much organic waste there is on campus	1/26/09	2/28/09	Stacy Morton
Work with energy and sustainability committee	1/26/09	5/8/09	Stacy Morton
Work with surrounding community in composting efforts	3/2/09	4/3/09	Lisa Nielsen
Visit the Pacific Garden Mission	4/15/09	4/16/09	Lisa Nielsen
Other universities and city strategies Team	1/26/09	5/8/09	John Dominski
Reserach city of Chicago regulations on composting	1/26/09	2/20/09	Matthew Coad
Research other university strategies	1/26/09	2/20/09	Matthew Cargill
Research organic waste in Chicago area	2/20/09	3/25/09	John Dominski
Reserach who issues permits for operating composting facility	2/16/09	5/8/09	Matthew Coad
Contact Wright Environmental Composting	3/26/09	4/25/09	John Dominski
Contact Accelerated Composting	3/26/09	5/2/09	John Dominski
Waste management strategies Team	1/26/09	5/8/09	David Olichwier
Research composting methods	1/26/09	2/28/09	James Rossi
Scaling compost facility to needs	2/26/09	5/8/09	Emily Ryan
Other possible methods of waste management	3/2/09	3/14/09	Richard Gulling
Other sources of material to compost	2/10/09	2/28/09	David Olichwier
Rocket Composting vessel	3/19/09	5/8/09	David Olichwier ...
Compile ethics statement	5/4/09	5/5/09	Emily Ryan
Planning and organization Team	1/26/09	5/8/09	Cindy Oblenida
Project plan	1/26/09	2/6/09	Isida Karpuzi
PowerPoint presentation	2/19/09	5/8/09	Paulina Szpiech
Create logo and branding	1/26/09	2/6/09	Isida Karpuzi
Presentation Booklet	2/6/09	5/8/09	Paulina Szpiech
Brochure	2/19/09	5/8/09	Cindy Oblenida
Minutes	1/26/09	4/18/09	Cindy Oblenida
Final Report	4/15/09	5/8/09	Isida Karpuzi

b. Work break down structure



5. Team structure and assignments



6. **Updated Budget**

Category	Requested	Approved	Explanation
Supplies	$300	$150	Presentation booklets for campus representatives that will decide if IIT can implement composting or not
Equipment	$225	$200	Team t-shirts with composting at IIT logo to advertise our mission and team purpose
Services	$75	$50	Business cards to give out at events on efforts about sustainability and recycling
Travel	$100	$100	Fieldtrip to composting facility in the suburbs and Brookfield Zoo
TOTAL	$700	$500	

7. **Code of ethics**
   a. **Overarching Team Principle:**
      i. TO EDUCATE SOCIETY OF THE IMPORTANCE TO RECONNECT AND IMPLEMENT NATURE'S CONTINUOUS REUSABLE RESOURCE LIFE CYCLE INTO THEIR DAILY LIVES AND THEIR WASTE PRODUCTION.

   b. **Law and Regulation**

      i. Pressure: We want to include surrounding schools, businesses and neighborhood organic waste for the production of compost.
      ii. Risk: We lie and say there is no possibility of compost producing odor to make it more attractive for the society.

      iii. Pressure: Our deadline to submit a budget plan is too short for accurate numbers.
      iv. Risk: We assume and present low cost analysis to make composting more attractive.

      v. Canon: We will uphold the utmost truth and facts for correct and thorough education of society.

   c. **Community (IIT Community)**

      i. Pressure: We want the students, faculty and visitors of IIT to comply with the sorting of their waste in the appropriate receptacles in the cafeteria and around campus for easier composting procedures.
      ii. Risk: We don't provide enough receptacles or proper explanation into the sorting of waste.

iii. Pressure: We want the IIT campus to learn and understand the importance and benefits with composting.
iv. Risk: We don't educate thorough enough which has the campus questioning the importance and benefits.

v. Canon: We will put all efforts into thorough education and awareness for composting and its benefits for society and the world.

d. Personal Relations

i. Pressure: We want all outside communities to comply and contribute with eliminating needless landfill waste.
ii. Risk: We overwhelm the community with how awful landfill waste is and tell how much more beneficial composting is and will be.

iii. Pressure: We want the communities to comply with little hesitation and as quickly as possible.
iv. Risk: We tell them that there will be no obstacles to overcome, when in reality composting is a lifestyle change.

v. Canon: We will put all efforts into helping make the communities' lifestyle changes as easy and efficient as possible.

8. Results

a. Research findings and resources used
   i. IIT cannot collaborate with city of Chicago or the surrounding communities due to restrictions in the regulations and therefore IIT has to handle its own organic waste and use it on its own site.
   ii. In vessel composting best solution for IIT's campus
      1. Odor, temperature, and mix controls come with the vessel
      2. Resistance to weather factors
      3. Handles IIT's organic waste needs
      4. Easy to use, needs little or no training for employees
      5. Industrial look
   iii. Rocket Accelerated Composting Ltd.'s Rocket Composter is best suited for IIT
      1. Most economical solution compared to others like Wright Environmental Management Inc.
      2. Due to the vessel being economical and the fact that it will save IIT about $12,000 in composting costs, the composter will end up paying for itself in about five years
b. Major accomplishments

i. Choosing the right method that suits our school's campus in order to properly handle organic recycling so that it does not change the lives of students and staff and it also gives back to IIT in the long term
ii. Found solution that impacts environment the least and fits the lifestyle of our campus
iii. Contacted officials and had exciting and welcomed comments about our research

c. Objectives that were:
    i. Met
        1. Propose best composting solution for IIT (in-vessel composting)
        2. Find company that offers best in-vessel equipment (Rocket Accelerated Composting Ltd.)
        3. Visit large composting facilities and observe methods and regulations
        4. Investigate other universities' solutions to organic recycling issue
        5. Cooperate with campus entities and inform them of our proposed solution for composting at IIT
    ii. Not met
        1. Waste audit, due to unforeseen difficulties collaborating with IIT staff and new waste hauler, Premiere
        2. Collaborative effort with city, due to constrictions in regulations
d. One ethical issue discussed while investing the best method to compost at IIT is that of using overcomplicated technology for a process (composting) that can be done naturally without any expenses or use of non-renewable resources (electricity) involved. However, the team found that it is for IIT's best interest to consume a minimum amount of electrical energy, which could be substituted for solar energy very easily, and maintain a clean composting area in an enclosed vessel that can be hardly damaged by weather, misuse, or any accidents. The in-vessel composting is the best solution for an educational facility.

9. Obstacles

a. What were they:
    i. One of the main obstacles we encountered was the people we were contacting responding on time
        1. Composting companies
        2. Other universities
    ii. University did not cooperate on time
        1. Staff were on vacation
        2. Busy schedules
    iii. Law
        1. Regulates for specific facilities and solutions that are not necessarily the best for the type of problem trying to resolve
b. How we dealt with them:
    i. We showed patience and persistence and collaborating with other entities and getting the information we needed

ii. We tried more than one ways of communicating such as phone calls, e-mails, and personal visits
iii. We decided to respect the law and therefore look only at methods now permitted and how those could apply to IIT

c. One step still unsolved is conducting a proper waste audit by the waste hauler company and that is one thing we strongly recommend for the future.

10. Recommendations

a. Communicate with Sodexo about what the cafeteria needs in order to recycle
   i. More room to put recycling bins
   ii. Actual bins
b. Educate all students on the importance of organic recycling
   i. 40% of waste stream
   ii. Adds value to plain garbage
c. Waste audit
   i. Get accurate numbers to calculate exact size of a composting unit

11. Important Resources

a. People
   i. John Collins - VP of Business & Administration IIT
      1. Assistant Meg Mattson- mattmeg@iit.edu
   ii. Joseph Clair - Director of Office of Campus Energy & Sustainability IIT claijos@iit.edu
   iii. John Rowe - IIT Board of Trustee Chair; Chief Executive Officer Exelon Corporation
   iv. Alan Cramb – Provost and Senior VP for Academic Affairs IIT cramb@iit.edu
   v. Leroy Kennedy - Associate VP for Community Affairs IIT kennedy@iit.edu
   vi. David Baker - Vice President of External Affairs IIT bakerd@iit.edu
   vii. John Sebby - Recycling Coordinator sebby@iit.edu
   viii. Kevin Pierce - Resource Center in Chicago kevin@emergencypicnic.net
   ix. John Krickl- Northwestern University (pulper machine) john.krickl@sodexo.com
   x. Debra Dobler – Northwestern University (pulper machine) Debra.Dobler@sodexo.com
   xi. Wendy Surak – IIT cafeteria manager wendy.surak@sodexo.com
b. Useful links
   i. http://www.pgm.org/
      1. Pacific Garden Mission, example of medium scale composting in Chicago
   ii. http://recyclingservices.com/
      1. Premiere Waste and Recycling, IIT's current waste hauler
   iii. http://www.quickcompost.co.uk/
      1. Rocket Accelerated Composting Ltd.

12. Resources

a. Timekeeping was not required by the professor

13. Acknowledgements

a. Many thanks to (in alphabetical order):
   i. **Kelly Boulton** from Allegheny University who told us how great the Wright Environmental machine was, they have had it for about eight years and have done little maintenance overall.
   ii. **Joe Clair** from the IIT Office of Campus Energy and Sustainability for all the insightful feedback on our research and the practical views and everyday problems that composting could face
   iii. **Alan Cramb** the Illinois Institute of Technology Provost that gladly heard our ideas and showed so much interest in the project and was very helpful when we needed administrational support
   iv. **Jennifer Haplin** from Dickinson College that is almost the same size as IIT and uses a composting program.
   v. **Jo-Elle Mogerman** VP of Planning and Community Relations, Chicago Zoological Society, from the Brookfield Zoo who gave us a wonderful tour of their composting facility and made our visit fun and productive
   vi. **Kevin Pierce** from the Chicago Resource Center who gave us valuable information about how composting works and how the city of Chicago regulates it.
   vii. **Peter Sanburg** from St. Olaf University where they also use a Wright Environmental unit, and they are very happy with the results.
   viii. **Wendy Surak** from Sodexo at IIT for very politely cooperated with us in estimating as much as possible the waste from the food facilities and showed her interest in collaborating with us and supporting our efforts
   ix. **Gerald Tibbo** from Accelerated Compost Ltd. who helped us tremendously in figuring out what kind of machine might be best for IIT.
   x. **Steven Wright** from Wright Environmental Management Inc. for being very helpful in showing us some specifications of the equipment and how they build it to order based upon a waste audit.