IPRO It takes a team!

INTERPROFESSIONAL PROJECTS PROGRAM

IPRO 358

ZeroComunIITy

Alec Weege Anthony Scatchell Antonio Gutierrez

Iryna Yanyshyn John Allen Joshua Hasbrouck Samantha Leach

Sarah Czapla Se Yen Lai Sukmin Lee Ying Xiao

I. TEAM CHARTER

1. Team Information

A.

Team Member Roster		
Name	Major	Contact Information
Alec Weege	Architecture	aweege@iit.edu
Anthony Scatchell	Business Administration with Applied Science	scatant@iit.edu 773-505-8889
Antonio Gutierrez	Architecture	agutier3@iit.edu 773-803-0810
Iryna Yanyshyn	Architecture	iyanyshy@iit.edu 847-347-2947
John Allen	Architectural Engineering	jallen8@iit.edu 847-571-8995
Joshua Hasbrouck	Civil Engineering	jhasbrou@iit.edu 207-347-9799
Samantha Leach	Architecture	sleach@iit.edu 847-553-7010
Sarah Czapla	Electrical/Computer Engineering	sczapla@iit.edu 815-531-2858
Se Yen Lai	Architectural Engineering	slai1@iit.edu 920-277-1712
Sukmin Lee	Architectural Engineering	slee22@iit.edu 773-968-5593
Ying Xiao	Civil Engineering	yxiao4@iit.edu 773-706-0648

B. Team member strengths, needs and expectations

- **Alec Weege**
  Strengths: Detail orientated, architectural software proficiency.
  Needs: To gain experience with an architecture related business model.
  Expectations: Create a product that the market and municipalities are interested in.

- **Anthony Scatchell**
  Strengths: Good communication skills, customer research, finance, public speaking.
  Needs: Real-world experience.
  Expectations: Figure out what people wants in a specific area of homes and to market it.

- **Antonio Gutierrez**
  Strengths: Experience designing single family house, high quality presentation skills, efficient using software such as Autocad, Illustrator and Photoshop as well as 3D model software.
  Needs: Business planning.
  Expectations: Team work effort and to learn about the real world development of a construction project.

- **Iryna Yanyshyn**
  Strengths: Architectural design, experience with single-family houses, landscape design.
  Needs: Become more knowledgeable about HVAC systems.
  Expectations: Team organization.

- **John Allen**
  Strengths: Good sense of humor/design, architectural application, drafting software, HVAC/lighting/acoustic design, structural analysis.
  Needs: Marketing and business capabilities, basic site design and landscaping.
  Expectations: To implement current knowledge of architectural engineering and improve general business and architecture knowledge while striving to achieve group objectives.

- **Joshua Hasbrouck**
  Strengths: Detail orientated, good grasp of general building techniques.
  Needs: Business planning, digital interfaces.
  Expectations: Develop a workable, integrated design system.

- **Samantha Leach**
  Strengths: Building design, landscape design, technical drawings, good with design software.
  Needs: Learn about marketing techniques.
  Expectations: Design, engineer, and market simultaneously to produce a profitable, sell-able, and pleasing home.

- **Sarah Czapla**
  Strengths: Knowledge of new technologies such as 4G and LTE emerging and how they can be utilized for this project, a working knowledge of HVAC applications, and a general business sense obtained from actual work experience.
  Needs: Construction process and effect on energy efficiency of a home.
  Expectations: Commercialize an already well-developed project.

- **Se Yen Lai**
  Strengths: Technical drawings in Engineering graphics, HVAC systems.
  Needs: Business and marketing planning.
  Expectations: Able to work well as a team despite coming from different areas.

- **Sukmin Lee**
  Strengths: HVAC systems, Energy Estimation.
  Needs: Learn computer program related to energy estimation.
  Expectations: Team work effort and design energy efficient HVAC systems.

- **Ying Xiao**
  Strengths: Structural analysis and design. Familiar with HVAC, plumbing and room ventilation.
  Needs: Business and marketing.
  Expectations: Team cooperation and project output.

2. Team Purpose and Objectives

A. Team Purpose

Our team desires to create a plan that enables living in a sustainable manner at an affordable price. To do that, we are using a site in Evanston as the basis for a design that minimizes energy consumption while still being an attractive marketable solution to current home buyers within the city. Ideally we will design a model community which will challenge conventions within the fields of design, planning, engineering, and everyday living and also serve as an example to Chicago-area municipalities about the benefits of affordable sustainable planning and design.

B. Team Objectives:

- Research today's most sustainable methods for fulfilling the energy needs of a home near Chicago.
- Build on the work of past semesters by developing an integrated energy management system.
- Implement the most effective and affordable methods in design model(s).
- Test our solution by comparing its energy consumption/costs with the average home of today.
- Create a master plan for the site to integrate the building models with the community.
- Present our solution clearly and truthfully as a housing solution that is both ecologically and economically benefiting.

3. Background

A. Customer/ sponsor involved

This IPRO is a continuation of IPRO 358 (Zero CommunIITy) from Fall 2010. Currently we do not have an official sponsor, but we are working with a site suggested by the City of Evanston and plan on presenting our research and ideas to individuals in the Planning Department of Evanston. We hope to influence their approach to community planning and development by highlighting the superiority of our design through its cost, efficiency and overall aesthetics.

B. User problem(s) the project is facing

A large part of the struggle in the design of this model community will be trying to reduce the amount of energy and resources consumed not only in the construction of the community, but also in the daily life of the future residents. As a result, our design must both be passively efficient and actively encourage better energy choices in its residents. The major issues will be minimizing the cost of the residences while maximizing their efficiency and integrating this into a design that is aesthetically appealing. This may require pushing the envelope of commonly accepted ideas about the way communities are planned and inhabited, as well as challenging common ideas about life in an American suburban home.

C. Technology or Science involved

Energy efficient design involves a combination of passive systems, such as proper solar orientation and insulation, and active systems, like geothermal heat and low-energy appliances. In addition to the work done in these areas by past IPROs, we plan on integrating all the active systems so that control is centralized and energy usage can be tracked more easily.

D. Historical precedents

The technology required for energy efficient design has been available for quite some time, but in recent years it has gained new attention and economies of scale. The previous IPRO 323 created a model that worked very well to create a net zero community but, being theoretical, did not delve deep enough into the financial aspect of today's housing market. Last fall, IPRO 358 expanded that project and created a more economically viable version, but did not develop a design that had proved marketability. Several communities in other areas, such as Geos Neighborhood between Denver and Boulder, CO,[1] have been designed to be environmentally friendly and are a source of ideas. In addition, energy efficient residential design has been researched and practice in some areas of Europe for years.[2]

[1] http://discovergeos.com/index.php

[2] http://www.passiv.de/07_eng/index_e.html

E. Ethical Issues

By designing a community, which is not dependent on the grid/conventional systems for its energy and comfort needs, the dynamic changes between the private community and the civil government. The design should not be a self-contained microcosm, but be integrated into and support the broader existing community. It also needs to strike the proper balance between public and private use of space as we seek to utilize a more dense housing model.

F. Business or societal costs

If our solution for an energy-conscious community were to be built, its members might have to spend more money initial in costs for the systems it will be using. The government has been able to provide credits to homeowners willing to go green and this is an added incentive to the buyer we are targeting. Still, it can be a considerable investment, but this will pay off in the long run and the customers can expect to be compensated by the money they save as they opt for these systems over traditional ones.

G. Implementation outline for solutions

Our findings and conclusions will be presented to village of Evanston in hopes that they will be influenced to implement our community or change some of their design and planning practices for the betterment of the environment, both built and natural.

4. Team Values Statement

A. Desired Behaviors:

- All members of the IPRO group should be dedicated to the progress of the project and the part they play within the team. This means all team members should respect the need for punctuality, attendance, cooperation, and meeting deadlines. Innovation will also be required to solve the proposed problems.
- All requests, questions, or complaints should be directed properly through the hierarchy of the group's organizational system. That is to say beginning with sub-group leaders, when need be to multiple sub-groups leaders, and finally to the group leader.
- All research should be thoroughly documented and available for all members of the team.
- Sub-groups should regularly share information and act as 'consultants' for other sub-groups when needed; particularly the Planning sub-group.
- When information is needed a formal request should be made to the leader of the appropriate sub-group. The sub-group leader should then provide this information and/or assign this topic of research to one of his/her group-mates who will then provide this information when it is available.
- Sub-group leaders should be responsible for assigning tasks to its members, collecting and organizing data, making this data available to other groups, and coordinating their sub-groups efforts with the needs of the overall group. The team leader will facilitate this process.
- The team leader should remain informed about the actions of all sub-groups and regularly communicate with sub-group leaders. The group leader will insure all sub-groups remain focused to the overall goals of the group and assist one another as much as possible.

B. How problems will be addressed:

- Any concerns within a sub-group should be addressed with the sub-group leader.
- Any concerns involving multiple sub-groups should be addressed to the group leader.
- Any concerns involving the group leader should be addressed to the group leader directly, or if necessary to the Professor, who will then approach the group leader.
- Any personal conflicts should be kept as confidential as possible and should be mitigated by the appropriate party within the group hierarchy.
- Any concerns about the overall progress or function of the group (especially those involving members of multiple sub-groups) should be addressed in a meeting of all sub-group leaders, the group leader, and the Professor.

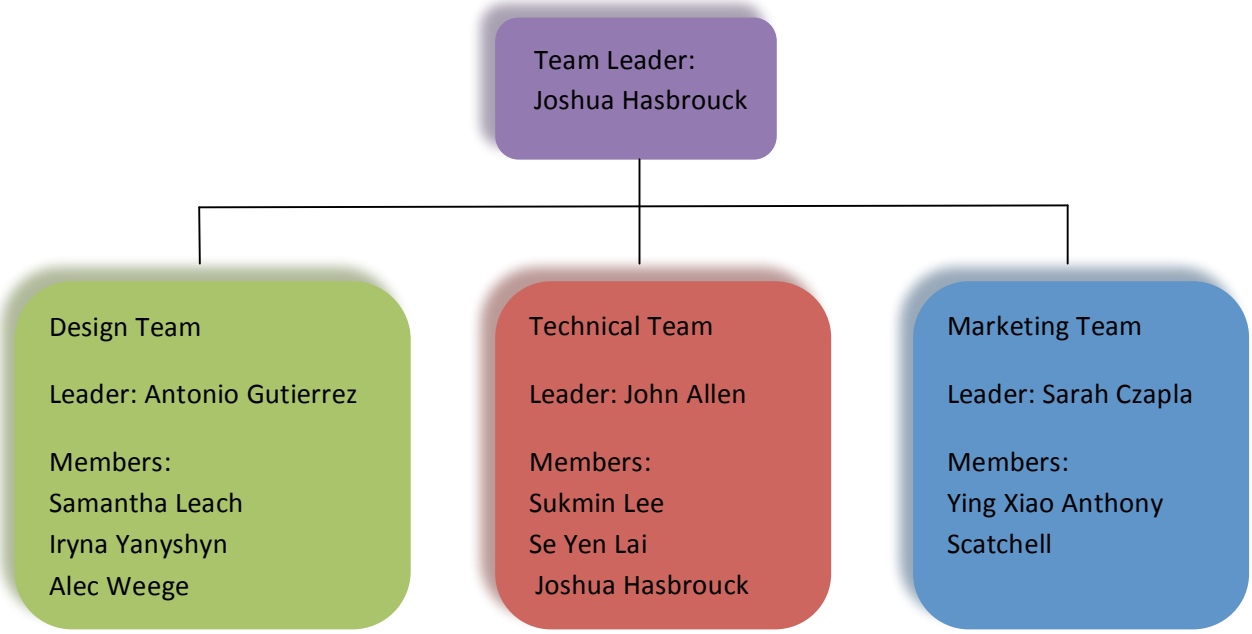
II. PROJECT METHODOLOGY

1. Work Breakdown Structure

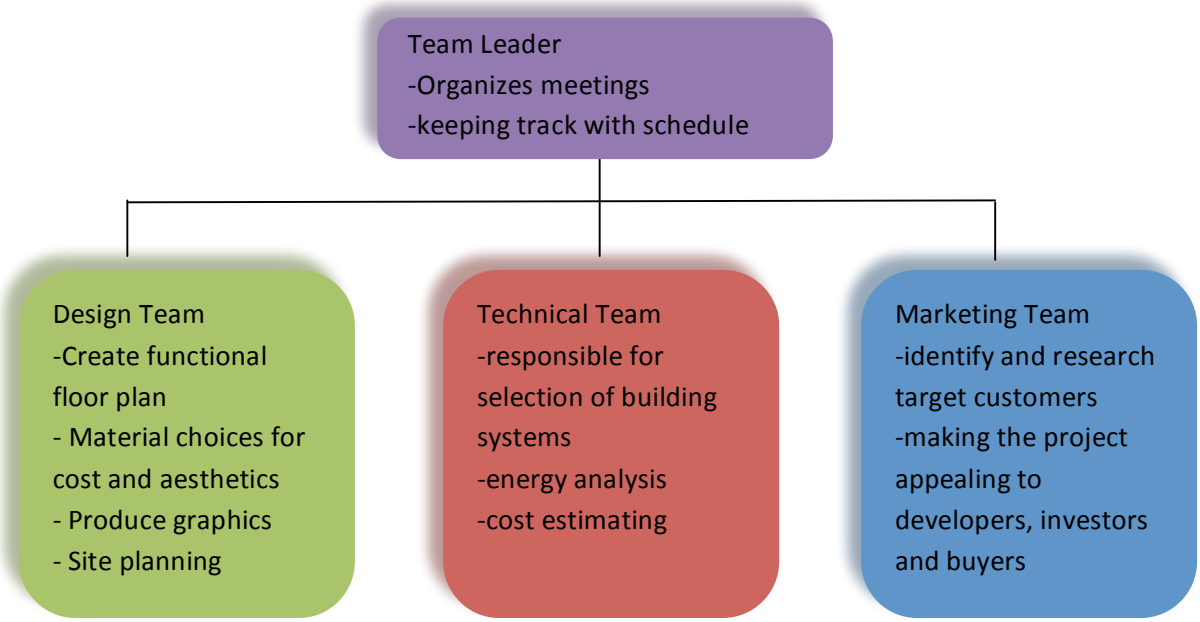
A. Problem Solving

- We will begin by studying the previous semester's work and existing sustainable communities and applying methods and technologies that have been proven successful. This will serve as a guideline for our own research and an example for available strategies.
- A data pool will be collected and analyzed about the average Evanston household based on demographic information. This pool will establish the baseline from which we will determine where improvements can be made. We intend to determine and catalogue the needs of an average household, not only in resources and energy, but also space and comfort.
- Using this baseline data pool we will research technologies and methods to reduce the consumption of resources without infringing on the needs of future inhabitants. For example, calculating much energy can be saved on heating bills/natural gas consumed by using a better insulation.
- After gathering information on effective technologies and methods we will determine which technologies are most effective and affordable by analyzing things such as the cost of the product, its life-span, the expected payback period (money saved over time), etc. This information will be catalogued and the best materials, methods, and technologies will be selected.
- Potential solutions should be analyzed for viability in regards to budget, environmental impact, marketability, and legality (or conformation to codes and regulations).
- Solutions will be implemented in the design of a cost effective, energy efficient community.
- A minute-keeper will document all items of discussion throughout the project so we can look back and study the exact path of logic.

B. Team Structure



C. Work Breakdown Structure



2. Expected Results

A. Expected Activities

- The project will require a great deal of research from all of the subgroups.
- Individual team members and sub-groups will collaborate in sharing data and creating and integrated design plan.
- Prior to design, the team will meet with technical experts and others to learn and ask questions about energy efficient design.

B. Expected Data

- We will catalogue the costs and benefits of all technologies, methods, and materials we research.
- Using our data, we will develop and analyze a building model and compare it to the average household.

C. Potential Products

- We will be employing already existing technologies such as, but not limited to, solar arrays, geothermal heat pumps, and advanced building materials, however, we hope to implement these in novel ways.

D. Potential Outputs

- A large array of highly useful data comparing existing sustainable .
- A marketable and sustainable solution to medium density housing.

E. Deliverables

- A series of prototype housing units to compose a small community.
- Feedback from interested clients in Evanston, IL.
- CAD drawing of the living space and any systems implemented in the project.
- Detailed design drawings of an energy-efficient building envelope.
- Construction cost estimate of the project and a marketing guide for the future.
- A small-scale model of the community.

F. Challenges, Risks, and Assumptions

- The primary challenge of this project will be to assemble enough useful data on existing sustainable technologies, methods, and materials to make informed decisions on which ones to implement and how. It will be extremely difficult to accurately calculate the impact of implementing our solutions. However we aim to create a solution that will be feasible and economically viable. If we can achieve this goal we will then be challenged with convincing Chicago-area municipalities to potentially re-consider some of their existing (often arbitrary) regulations and their ideas about what a housing community ought to be. In addition, marketing will also be a big challenge for us, since the majority of people are not familiar with sustainable technologies and will raise questions such as how to operate and maintain for long-term consideration. The marketing challenge will be to convince the buyers that our sustainable building is worthwhile to own and it saves both energy and money.

- There is a substantial risk of the research phase being an incredibly involved and weighty experience. We must find ways to make progress while research is underway and to incorporate new research into our scheme without returning to the drawing board entirely. We must also discern when to use the research created by previous IPROs and when we must recreate our own with new data. We also run the risk of making a scheme that is to challenging or daunting to our potential clients, so we must continually consult with potential clients to ensure we are not going so far as to alienate them. In addition, the damages to the mechanical system caused by misuse will result in a relatively high maintenance cost and should be considered as a risk. The system should be designed to be as straightforward as possible to use.
- We assume that there is a better way for homes to be built and for communities to be structured. We believe we can create a community of homes that will be attractive and economically viable for potential consumers while pushing the envelope of existing sustainable practices to a new level. We believe there is room for many improvements in the way average communities are developed and that we can challenge the preconceptions of Chicago-area municipalities. We believe most of the people would love to live a sustainable life to save energy and money in a long-term consideration. These communities will, in turn, impose more informed and rigorous standards on future communities, and therefore cause a real change in the way we live.

3. Project Budget

Our estimated budget is $500. With this money we hope to be able to continue our research on green technologies at the Chicago Center for Green Technology, also continue our correspondence with the village of Evanston both in telecommunication and physical visits. The majority of our proposed funds will be used on construction of models both of our individual solutions, the community as a whole and some of the more complex systems incorporated into our project.

4. Designation of Roles

- **Minute Taker:** Sarah Czapla
- **Time Keeper:** Antonio Gutierrez
- **iGroups Moderator:** Joshua Hasbrouck