



# EnPro 353: Crop to Truck

Illinois Institute of Technology



Project Sponsor: Jacob Elster

Faculty Advisor: Limia Shunia

Naguib Azab

Kevin Kamer

Nicholas Pierce

Kevin Brenner

Aaran McEnef

Nicolas Sanchez

Mihee Choe

Hee-Jong Min

Andrea Velazquez

Daria Haznar

Josepch Muchna

Wesley Klockowski

Marina Horchin

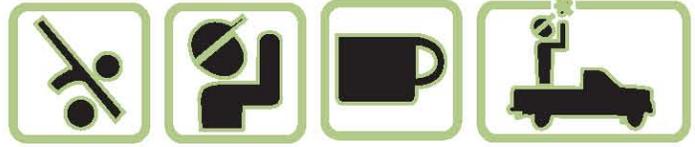
Mariana Palau

Nikola Zistakis

# TABLE OF CONTENTS



|  |           |
|--|-----------|
| <b>EXECUTIVE SUMMARY</b>               | <b>3</b>  |
| <b>PURPOSE</b>                         | <b>3</b>  |
| <b>OBJECTIVES</b>                      | <b>4</b>  |
| <b>ORGANIZATION AND APPROACH</b>       | <b>4</b>  |
| <b>ANALYSIS AND FINDINGS</b>           | <b>5</b>  |
| INTERIOR GROUP                         | 5         |
| EXTERIOR GROUP                         | 6         |
| URBAN GROUP                            | 8         |
| <b>CONCLUSIONS AND RECOMMENDATIONS</b> | <b>9</b>  |
| <b>ACKNOWLEDGEMENTS</b>                | <b>10</b> |
| <b>APPENDICES</b>                      | <b>11</b> |
| APPENDIX A: PROFILES                   | 11        |
| APPENDIX B: BUDGET                     | 15        |



## **Executive Summary**

EnPro 353 was responsible for designing an eco-friendly mobile barista for the Crop-to-Cup coffee company. Crop-to-Cup was founded in 2007 with the mission of importing “relationship coffees,” which is coffee that comes with a connection to the farmer. The principle objective of the mobile barista is to allow crop-to-cup to reach their customers wherever they may be. The team was responsible for designing a mobile barista that will serve as the standard design for future franchises, proposing a beta route for the truck as well as a proposed menu. In order to tackle the objectives, the EnPro team divided into three sub groups; interior, envelope, and route.

The interior group was responsible for researching the required equipment necessities, interior truck space, and the codes concerning food preparation, the aesthetics and the form and function of the vehicle.

The envelope group conducted exterior spatial design; the group also researched aesthetics and form, materiality, and the codes concerning truck size. The urban group addressed the issue of route feasibility, zoning, site context, and codes concerning urban implementation.

In addition, the business students from the group also conducted an opportunity assessment for the mobile barista. The opportunity assessment addresses a plethora of issues including the proposed problem the mobile barista is going to address, the proposed advantage of our product, the competition and our target customer. It also includes market research and a financial analysis of the proposed market.

## **Purpose**

Crop to Cup’s business mantra is “Pride to crop, quality, and cup”. EnPRO 353, Crop to Truck, will embody this statement through investigation into mobile coffee baristas. Our design and business models will present a world-conscious, attractive truck space that improves customer experience and ease of access to the best quality, responsibly sourced coffee available. We will complete the cycle that Crop to Cup has set forward in a sustainable manner that benefits consumer, producer, and barista alike.



## Objectives

- Design a 'mobile franchise' that will effectively represent Crop to Cup and their values.
- Propose feasible design solutions that include utilizing new and repurposed trucks for the mobile coffee barista.
- Create an ideal space for efficient coffee production and optimal consumer experience.
- Review IPRO 333's involvement with Crop to Cup and explore opportunities of collaboration to better serve our mutual sponsor.
- Communicate with existing food truck owners who are already part of Chicago Food Truck Movement.
- Create an attractive business plan for potential investors.
- Follow city codes pertaining to all aspects of the mobile coffee barista including: fire safety, food processing, transportation, water management, etc.
- Review design and feasibility of the truck with working professionals in the fields of business architecture, engineering, and technology.

## Organization and Approach

In order to tackle the various scales of the project we will split into three groups. Group 1, Interior, will look at equipment necessities, interior truck space, and codes concerning food preparation, aesthetics, form, and function of the vehicle. Group 2, Envelope, will look at exterior spatial design, aesthetic & form, materiality, and codes concerning truck size. Group 3, Urban, will look at route feasibility, zoning, site context, and codes concerning urban implementation. All three groups have a user centered mind-set driving the solutions.

Crop to Truck, a team of 15, is composed of three groups of five. There will be a full group meeting once a week, every Tuesday, to review work, production flow, and process. The full group meetings will be led by Nico Sanchez, Nick Pierce and Joseph Muchna who represent the three major disciplines: Architecture, Business, and Engineering, respectively. Also, each sub-group will have a team leader which will be responsible for outlining the required tasks each week and distributing the tasks evenly between group members. Sub-groups will be led by Joseph Muchna, Nico Sanchez, and Marian Palau. The



team leaders will meet together with the Minute Taker and Agenda Maker weekly to synthesize the week's tasks effectively and review accomplished tasks.

## **Analysis and Findings**

### ***Interior Group***

For the interior section of the project team we broke it up into research, approach, and solutions. When we first started we tried to consider all of the obstacles we might need to overcome in our objective of creating a mobile food truck. We researched all the different options for equipment to equip the truck, current/future codes in the city of Chicago, energy solutions, and water management. When researching all of these topics we wanted to consider a truck that would be versatile to account current and future codes in the city, as well as a possible option to go "Green" towards an environmental friendly truck as well. We used our major resource, our sponsor Jake Elster, where we took into account his needs and wants of the overall coffee experience desired. We also did site studies where we took a look at Amanda Cavazos, from Happy Bodega, to see some of the challenges she has.

Some of the innovative approaches the interior group took were in the forming of the energy solutions of the truck. Here we decided to use multiple applications to power the equipment in the truck. We chose to use solar panels, an upgraded alternator, generator, and a central battery supply. All of these solutions work together as a whole to be sufficient in the powering equipment and the recharging of the battery supply. We used step up inverters to convert the 12V DC voltage of the battery supply to a source of 110V AC voltage to run the equipment. The alternator runs off of the engine where the voltage flows into the battery supply, recharging them. The use of this upgraded alternator will throw out more amps than your standard one will and in turn take the extra amps and store them into the deep cycle batteries supply. The alternator will recharge the batteries when the truck is running and driving along our route. We are using the generator as a backup power source, as well as an energy source to recharge the batteries. In electricity generation, an electric generator is a device that converts mechanical energy to electrical energy. Our battery supply will be composed of three deep cycle batteries. They are

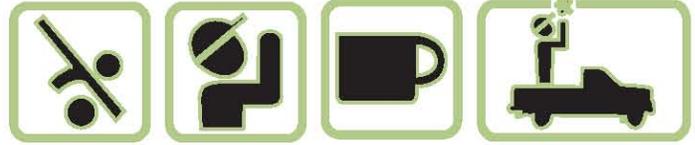


designed to be discharged down as much as 80% time after time, and have much thicker plates. The major difference between a true deep cycle battery and others is that the plates are SOLID Lead plates - not sponge. This gives less surface area, thus less "instant" power like starting batteries need. Although these can be cycled down to 20% charge, the best lifespan vs. cost method is to keep the average cycle at about 50% discharge. All in all, the solar panels are charging and collecting energy all day and night to account for approx. 30% of recharging of a daily usage of battery supply. The Alternator figures come to be with 2 hours of running of the truck engine, which accounts for approx. 50% of the recharging of a daily usage of battery supply. The generator will need to be run for 2 hours of time to account for approx. 20% of the recharging of a daily usage.

The interior group accomplished many accomplishments over the semester that led to a successful experience. The group communicated well with each other and did the work that was asked of them. The team as a whole came up with the equipment list, equipment layout, menu, environmentally friendly energy sources, make and model of truck, and overall costs of our overall position of the truck.

### ***Exterior Group***

When the design of the actual mobile barista truck began, many of the decisions we made were based on earlier case study research. For this we completed a very basic overview on what seemed to be the 30 most well-known food trucks in the country across numerous cities. Included was the type of food sold, location of truck, average price (low/medium/high), number of items offered, as well as a brief description of the company and an image of the truck. Once the list had been compiled, it was reviewed together as an entire class and there was a discussion of what we thought worked well with some trucks and what did not work well with others. In addition to case studies, we also had the opportunity to meet with Amanda Cavazos of the food truck Happy Bodega. This was very helpful in shaping the design of the truck because the class as a whole was able to see first-hand what it is like to engage a food truck. After students had ordered and had a chance to observe other people visiting the truck, some of us were able to talk to Amanda and hear some things that she would like changed for her truck.



Based on the case study research and our meeting with Amanda it was concluded that there were way too many standard box truck food trucks. We wanted to pursue a more sustainable and energy conscious design so the box truck was discarded early on and we set our sights on a "greener" truck solution like the Ford Transit or Modec chassis cab models. It was also decided that lighting was very poor on almost every truck. The customer could barely see how and where their food was being prepared. With food trucks being a fairly new concept in Chicago we felt that allowing the customer to see as much as possible not only educates them on the food truck culture but also helps them to feel more at ease ordering food from a truck in the street. In general our group wanted to recreate the image of a food/beverage truck and provide a unique and memorable customer experience.

The overall design concept of adaptation came to us at the beginning of our design process. The idea behind this was to create a truck that looks fairly traditional on the road and then after it was parked it would be able to fully blossom or open up into a larger more visually prominent object in a repetitive row of parked cars. This idea also worked very well in conjunction with our previously discussed concepts. Opening up obviously allows for increased light throughout the truck, as well as reduces interior lighting costs to create a more sustainable truck. The concept also allows for increased visibility into the truck as well as creates a very interesting look for the truck that customers would hopefully talk about long after their purchase thus further promoting the Crop to Cup brand.

One innovative solution we had was to drop the counter top and floor heights within the truck as much as possible. By bringing the servers closer to the customers and allowing them to see nearly eye to eye, it will give the entire customer journey a more personal feel than many other trucks. Also by having exterior panels of the truck slide up and down they were able to help the appearance of the truck in more ways than one. Lower panels sliding down allowed us to cover the less attractive underworking and wheels of the truck. The upper panels that slide up give the truck, as a whole, a larger presence on the street and provide advertising space that can be seen from multiple blocks away. We also moved the cab's door from the back of the truck to left side just behind the driver's seat. By doing this the door now opens into more of the cleaning and prep space of the truck and allows the



baristas to move in and out of the truck without interrupting other workers. Also by not having the door in the rear, it gives the customers more space to stand and talk after receiving their coffee by wrapping around the back of the truck.

### ***Urban Group***

We identified a plethora of potential locations to be included in our route for the mobile barista. Our initial locations included a host of transport hubs, for example, CTA stations and Metra stations. We also considered many locations that were situated downtown. In order to decide what downtown locations should be considered further, we measured the density of workers vs. the density of our competitors in a given block. Legal parameters also influenced our decision on what locations should be considered, for example, mobile food trucks are not allowed to set up in a location that is less than 100 feet from existing premises that sell food. This limited the availability of potential locations particularly in the downtown area. In saying that, we then selected a number of sights to be investigated further.

We used a number of sources to conduct our research. We began by using the Census website and in particular the American fact finder tool. This allowed us to conduct some demographic research on zip codes that contained our potential sites. The American fact finder tool was certainly a help but it contains a lot of hard facts on specific zip codes. These facts are quite hard to digest so we used Clarita's prism clusters to help us get a greater understanding of potential sites. Clarita's Prism is a set of geo-demographic clusters for the United States. It was a widely used customer segmentation system for marketing in the United States in the 1990s and continues to be used today. The website helped to help us to discern those consumers' likes, dislikes, lifestyles and purchase behaviors based on their zip codes. We also used the IDEA workshop and their iPads to download the ESRI BAO application. The ESRI business analyst online is an excellent tool that enabled us to visualize complex data about specific locations in the city, For example, the tool showed us exactly how much money on average people in a specific area spent on dining out each month.

Some members of the route group went to some potential locations for the



mobile barista to gauge public opinion on our product. Armed with a clip board and an information leaflet we stood for two and a half hours at potential spots trying to survey potential customers. In the 180 minutes we managed to get the opinion of only 10 people. The responses were mixed as were the demographics of the respondents. All in all, the surveying experience was not as successful as one would have thought. The majority of the public wouldn't acknowledge us and those that did said they had no money.

### **Conclusions and Recommendations**

A good ground has been set in terms of information for the possibility of a Mobile Barista to start running in the city of Chicago. The design of the truck has been carefully created in consideration with the customer's needs and expectations. A further approach towards sustainable design has been taken, as we have carefully considered options such as solar panels, which would help provide 30% of the energy needed inside the truck.

The truck's design is a unique one, as it attempts to engage the customer in an organized and enjoyable way, while providing a comfortable environment for the Barista to work effectively in.

The overall team division into three groups that would research and design solutions in three different scales was a most successful one. This process of organization allowed us to timely coordinate each other's research and designs. Feedback from one team to the other allowed the process and transformation of the designs to be effective.

Based on the judges' review, we believe that more careful consideration should be put towards the adequate pricing of our product. Recommendations included thinking about how competitive our prices should be. This is especially important at the beginning since the truck is a novelty and has to compete with other and more established competitors such as Starbucks and Caribou Coffee.

Although the market research to identify our target customer was carefully considered, it might be a smart move for the next team that inherits this initiative to add another category for the Truck's ideal customer. While it is widely known that the social



conscious customer is not necessarily a wealthy customer, the approach to target the wealthy customer in addition to the socially conscious customer should be taken. As we are taking the initiative in the mobile food truck industry in the city, we need to search for a safe market that will give us a stable platform from where to start.

### **Acknowledgements**

We would like to thank Jake Elster for giving us the opportunity in helping him design a Mobile Coffee Barista. We would also like to thank Limia Shunia for volunteering as an advisor. We would like to thank Jim Breband for taking time and coming in and talking to us about business planning and franchise development. Lastly, we would like to thank Amanda Cavazos from the Happy Bodega for giving us an insight of what's it like to run a food truck.

### **DESCRIPTION OF THE IPRO PROGRAM**

The Interprofessional Projects (IPRO®) Program at Illinois Institute of Technology An emphasis on multidisciplinary education and cross-functional teams has become pervasive in education and the workplace. IIT offers an innovative and comprehensive approach to providing students with a real-world project-based experience—the integration of interprofessional perspectives in a student team environment. Developed at IIT in 1995, the IPRO Program consists of student teams from the sophomore through graduate levels, representing the breadth of the university's disciplines and professional programs. Projects crystallize over a one- or multise­mester period through collaborations with sponsoring corporations, nonprofit groups, government agencies, and entrepreneurs. IPRO team projects reflect a panorama of workplace challenges, encompassing research, design and process improvement, service learning, the international realm, and entrepreneurship. (Refer to <http://ipro.iit.edu> for information.) The Crop to Truck team project represents one of more than 40 IPRO team projects for the fall 2010 semester.



## Appendix A: Profiles



Naguib Azab

Fifth Year Architecture

It is not about what coffee Naguib Azab prefers, it's about the right time and place. Naguib regards drinking coffee as a relaxing experience, or a period of reflection. He is interested in material exploration, technology, and how they influence architectural design. Naguib is skilled in technical drawing, 3D modeling & animation (AutoCad, 3ds Max, Adobe Creative Suite, Microsoft office). He also has experience in code and zoning research. Naguib wants to develop business experience and collaborate with people from different disciplines. He hopes to work effectively with EnPRO 353 in a collaborative environment.



Kevin Brenner

Fourth Year Architectural Engineering

Kevin doesn't drink coffee often, but when he does it is like a little treat that makes the day a little better. He is very efficient with his time and can be flexible when unforeseen events arise. If new ideas are proposed, Kevin is very open to considering them. However, he realizes that he has a lack of knowledge of general business practices. Through EnPRO 353, Kevin hopes to learn to effectively express himself to others. He also hopes to be able to apply the knowledge he has gained during his education to a real-world project and develop a project plan for an investor.



Mihee Choe

Fifth Year Architecture

Mihee loves the taste of coffee but hates its jittery effects. Her skills include creative foresight in planning and detail oriented work and editing. She joined EnPRO 353 with the hopes of learning how to put a professional project together with diverse individual strengths. Mihee is interested in seeing how the Crop-to-Cup business endeavor will affect future consumer-provider relationships. She anticipates significant steps forward in raising awareness for this project.



Daria Haznar

Fourth Year Computer Engineering

When it comes to coffee Daria is extremely picky. There is only one coffee that she would drink everyday, which is the Starbucks Gingerbread latte, but it only comes out during the holiday season. She is knowledgeable in computer related items such as Microsoft Office, creating websites, and programming. She is also good at keeping things organized and being a good listener. Daria would like to develop better public speaking skills through EnPRO 353. She joined EnPRO 353 in hopes of creating something that will actually be used in the real world and to help the Crop to Cup organization fulfill their goals.



Marina Horchin

Fourth Year Architectural Engineering

Marina does not like her latte unless it's made with love, Starbucks doesn't work. She is an organized and responsible student. She is LEED certified and has leadership experience as the vice-president of the American Society of Civil Engineers. She likes to see progress in work and changes made. Marina is very enthusiastic about the fair trade issues as well as the small business enterprise of Chicago, and hopes EnPRO 353 will succeed in developing a great design for the mobile barista Crop-to-Cup business. She believes communication and networking will help solve any problems EnPRO 353 may face.



Kevin Karner

Fifth Year Architecture

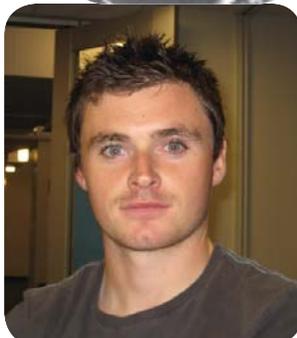
Kevin seldom drinks coffee but will definitely finish off a glass or two before a long night at the drafting table. Kevin is artistic and creative and is skilled in computer modeling and graphic design. He has extensive experience with Photoshop, Illustrator, AutoCAD, 3ds Max, Revit, Powerpoint, and Word. Kevin has a great work ethic and is not afraid to stay awake all night in order to finish what needs to be done on a project. He joined EnPRO 353 because it is a project that is close to home. Chicago based projects give the EnPRO experience a realistic feel and help Kevin better visualize successful solutions to the design of the mobile barista. While in EnPRO 353, Kevin hopes to improve his leadership skills and take a central role to design solutions. He also looks forward to working in an interdisciplinary setting.



Wes Klokowski

Fifth Year Civil Engineering

Wes is definitely a coffee lover. He loves his coffee regular with 2 sugar packets, 2 French vanilla creamers, and 4 ice cubes (to make it drinkable). Wes has skills in the Civil Engineer aspects and also in the Business through his major and minor. Some of his strengths include: working well with others, being open minded, hard working, positive, punctual, and fully committed to his work. Wes also has leadership experience. Wes hopes to improve his public speaking skills. He expects to learn how to effectively and efficiently collaborate between majors to solve problems that EnPRO 353 may face.



Aaran McEneff

Fourth Year Business Administration

Aaran has business experience specializing in marketing. Aaran is a good communicator, team player and motivated hard worker. Through EnPRO 353 he hopes to see the team's hard work come to fruition. Aaran wants to look at the mobile barista when it is completed and be proud that he played a part in making it come to life. Aaran wants to improve his time management skills.



Hee-Jong Min

Fourth Year Business Administration

Hee-Jong needs to gulp down a cup of coffee or two in the morning for that extra jolt before heading off to class. Also, he simply enjoys the taste of this strong, aromatic beverage in his free time. Hee-Jong knows how to share his ideas with co-workers in efficient ways. He hopes his meticulousness will help EnPro 353 achieve their goals. He expects to improve team spirit by working with EnPRO353. In addition, he hopes to gain knowledge of how to approach customers with innovative contents.



Joseph Muchna

Fourth Year Material Science & Engineering

Joe likes his coffee black with extra sugar. Joe is captain of the swim team at IIT and an active member of the Phi Kappa Sigma Fraternity. He interns at A. Finkl & Sons steel forge for their Metallurgy lab in Lincoln Park. He brings leadership experience, financial management and budgeting experience, and an engineering mindset to the team. Joe joined EnPRO 353 to learn about entrepreneurship and gain hands-on experience in some of the start-up functions of a small business.



Mariana Palau

Fifth Year Architecture

More than drinking it, what Mariana most likes about coffee is the act of growing it. Born in Colombia, she grew up in a country where coffee is extremely present and was fortunate enough to enjoy, throughout her life, the smell of coffee plantations and their beautiful sight. Having witnessed the process by which farmers abide to provide us with excellent tasting coffee has greatly impacted her life. All this has created within her sympathy towards coffee growers, which makes her proud to represent a company that is so strongly committed to their aid.



Nick Pierce

Fourth Year Business Administration

Nick does not drink coffee but loves the smell of it in the morning or anytime of day for that matter. He has knowledge in the fields of physics and business. He is skilled in Microsoft Office (Excel, PowerPoint, Word). He is also experienced in leading an organization of students. He will use his skills and knowledge to assist EnPRO 353 where they are needed. Nick joined EnPRO 353 to gain experience in the entrepreneurship field as well as developing a marketing strategy for a new business to enter a niche market. Nick is also excited to be part of major change to the city of Chicago with the new food truck ordinance. He also wants to further develop his team building skills and leadership skills by working together with his peers in EnPRO 353.



Nico Sanchez  
Fifth Year Architecture

Coffee! Coffee! Coffee! Nico believes in the power of beans: chocolate, refritos, and coffee. Nico has 16 years of experience in renovation, design, and landscape. Design has inspired him to bridge the gaps of home, heritage and the bustling metropolis. He is also experienced with computer drafting, modeling, physical models, and rendering. Nico is a practical designer, though he does recognize the importance of the occasional impracticality for beauty's sake. He is looking forward to designing an attractive and effective service space through EnPRO 353.



Andrea Velasquez  
Third Year Technical Communications

Andrea loves a blended mocha frap with soymilk and no whip cream in the summer. In the winter she likes her coffee sweet and warm with a little French vanilla. Being a part of EnPRO 353 means she gets to share her passion for coffee with others who feel the same. She hopes to help develop the idea of the mobile barista by providing as much feedback and creativity to the group. Andrea hopes that her experience as a barista will assist EnPRO 353. She is great at planning and writing. Andrea thrives from a structured environment where the team plans ahead and sets goals. She hopes to provide the best of her strengths to the team and be part of an innovative idea that will reshape the way people think of coffee.



Nikola Zistakis  
Fifth Year Architecture

Niko likes his coffee cold, a frappe. With architecture as his main focus, Niko also has a strong passion for business and psychology. He joined an IPRO that gave both positive and negative feedback about general aspects of IIT culture to help improve the way students, alumni, faculty and staff perceive their institution. Niko is excited to join another IPRO that can have a profound effect on how business is conducted in the City of Chicago. He hopes to influence the design of this project to incorporate a friendly and revolutionary experience to give Crop to Cup a profitable and well-designed project. This includes changing the general image of food and coffee trucks, and providing the user with an extremely enjoyable experience.



### Appendix B: Budget

|  |          |
|--|----------|
| 3D representations of the vehicle and appliances | \$105.00 |
| Printing (Posters and Post cards)                | \$200.00 |
| Pins   | \$40.00  |
| Total  | \$345.00 |