

IPRO 303:

Innovative Mapping

Project Plan Fall 2009

Sponsor: NAVTEQ

Faculty Advisors: James Burstein, Limia Shunia

Innovative Mapping: Project Plan

Table of Contents

TEAM CHARTER

Project Plan Fall 2009	1
Team Information	3
Team Roster	3
Team Identity	5
Team Purpose.....	6
Team Vision.....	6
Team Goals	6
Team Objectives	6
Background Information.....	7
Company History	7
Company Challenges	7
Technology and the Solutions.....	7
Previous Work	8
Ethical Dilemmas in Research	8
Sociological Effects and Costs.....	8
Proposed Implementations.....	8
Previous Research.....	8
How Mobile Marketing for Radio Works:.....	9
Team Values	10
Team Ethics	10
Conflict Resolution	10

TEAM METHODOLOGY

Work Breakdown Structure	10
Problem solving process	10
Team Structure.....	11
Work Breakdown Chart	13
Expected Results.....	14
Expected Activities	14
Research and Testing Results	14
Products of Research and Testing.....	15
Potential Project Tasks' Outputs	15
The Deliverables	15
Project Challenges and Constraints	16
Results as a Solution	16
Project Budgets	16
Designation of Roles.....	17
Works Cited	18
Appendix.....	19

Team Information

Team Roster



Aaron Komoroski

Year: Third Year

Major: Computer Science

Description: Skill set includes design and analysis, as well as experience in working with group dynamics. He wishes to develop his conceptual design experience along with presentation skills.



Andres Mora

Year: Fourth Year

Major: Computer Engineering

Description: Experienced in industrial design concepts with a strong background in technical problem solving. He wishes to improve his ability to innovatively enhance already existing products.



Basel Sarraf

Year: Fourth Year

Major: Computer Science

Description: Basel is a senior year undergraduate majoring in Computer Science. He finds maps on mobile devices interesting as well as challenging from his fields point of view; therefore, he has joined this IPRO program to learn about this technology. Basel is going to use his analytical, programming, and designing skills to deliver a solution for this program's sponsor, NAVTEQ. Also, he is looking forward to work with other team members to learn how to manage big projects with a diverse team structure.



Brandon Kemp

Year: Fourth Year

Major: Architecture

Description: Brandon's experience consists of four years as a draftsman at a small California architecture firm completing construction documents, two dimensional, three dimensional building representations, building information modeling, modern construction methods, and architectural history. He wishes to develop his skills of working with others in unrelated fields of study. Brandon hopes to learn more about NAVTEQ's field, hopefully fulfilling their expectations of this project.

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Cindy Duong

Year: Fifth Year

Major: Architecture

Description: Cindy P. Duong is a 5th year undergraduate architecture student. Her focus on this project is to incorporate her graphic design ability in development of the project. She is familiar with Photoshop and Illustrator. She is hoping learn about partnership as much as the technology aspect of the project.



Frank Woodward

Year: Fourth Year

Major: Business; Entrepreneurship

Description: The major contributions Frank will bring to the IPRO are his innovative mindset, market research skills, and technical comprehension. As far as NAVTEQ, he is interested in all of their objectives and has already brainstormed improvements to their application. He is interested in conducting market research in the pedestrian area, but is also interested in uncovering those technical bugs that need to be improved.



Jerry Suwada

Year: Fifth Year

Major: Computer and Electrical Engineering

Description: Jerry possesses a strong background in circuit and software design, which will be beneficial to development of the project. His focus is to improve on his presentation skills and become a better team player. He hopes to develop, with the aid of his team members, a feasible solution for our sponsor NAVTEQ.



Mark Michael

Year: Third Year

Major: Computer Information Systems

Description: Mark has a strong background with technology in general. He has previous experiences with programming languages C++, C#, Java, ASP.NET, and SharePoint development. He also has extensive experience working on several different web apps and is very keen and using newer technology.



Piyush Sinha

Year: Third Year

Major: Computer Engineering

Description: Piyush has a strong background with technology. He has good analytical and design abilities. He finds GPS mapping technology quite interesting and has experience using products that use NAVTEQ map technologies. In addition to contributing to this IPRO, He is interested in developing his team skills.

Innovative Mapping: Project Plan



Richard Glover

Year: Fifth Year

Major: Humanities

Description: Richard's interest in this IPRO comes from his background in navigation and desire to learn and help advise the art and science of navigation. Much of his experience comes in the less technical side involving map and compass but also has a decent amount with several of the products that NAVTEQ supplies information too. His background isn't as technical as some of the other member but because of this he offers a good link between the average user and the creator.



Urba Mandrekar

Year: Second Year

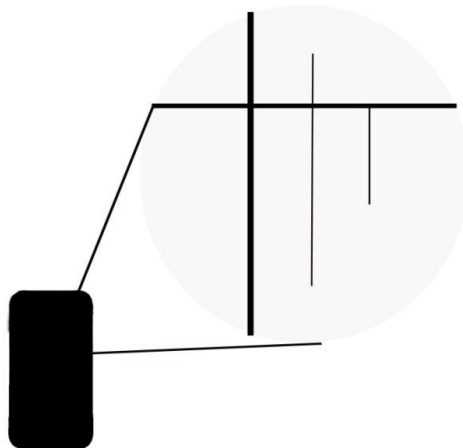
Major: Psychology

Description: Armed with prior experience in Industrial Psychology, she aims to be involved in the primary phase of the precedent and market research. In addition to contributing to this IPRO, she also hopes to broaden her knowledge of GPS Technology and mapping software.

Team Identity

Name: Innovative Mapping

Motto: Solution through CoalITtion.



Logo:

Team Purpose

Team Vision

To come together, synergize and construct a practical, innovative and simple solution to the problem at hand.

Team Goals

NAVTEQ, the sponsor of this project, is one of the largest digital mapping companies in the world. They are in a constant phase of self-improvement. Right now, NAVTEQ's focus is on how to make their technology more pedestrian and community friendly. Our project has two main sections –

1. Target the majority of mobile device users, and give them an outlet to report any changes, mistakes or developments that have been overlooked by NAVTEQ.
2. Come up with a solution which enables the average map user – men and women ages 18-35, students and tourists – to address these alterations in a simple, hassle free way.

Each member in the team is representative of the target market, and hence will be able to provide valuable insight in terms of the everyday NAVTEQ user. In addition to this, we plan to procure feedback from the users about changes and new features they would like to see, as well as methods of feedback they would consider hassle free and easy to use. After we have gathered the required information, we plan on the design and development of a solution to this problem, with the help of our technical team. The proposed solution will then pass through a Quality Control section, testing it to make sure that it is user friendly, and is in accordance with the team goals and vision.

Team Objectives

- Deliver feedback from current mobile handset users to NAVTEQ
- Design a dynamic and hassle free solution which enables users to suggest modifications to the map regarding changes and improvements
- Make the Update Request System user friendly
- Work as a team: with honesty, integrity, and passion to develop the best solution to the project problem

Background Information

Company History

The sponsor of our IPRO is NAVTEQ®. NAVTEQ is a “world leader in premium-quality digital map data and content.”¹ NAVTEQ supplies the information used on in-vehicle navigation systems, mobile navigation systems, navigation programs used in cell phones, and also internet based navigation websites. The data that NAVTEQ provides is extensive, covering 77 countries and spanning 6 continents. Formed in 1985 in Silicon Valley California, it is one of the founders of digital mapping data and map routing.²

Through a number of investors and owners NAVTEQ was able to grow and establish offices in other countries by the early 1990’s. It eventually moved its headquarters to the current location in the heart of Chicago. Recently, NAVTEQ was acquired by Nokia, the popular phone and electronics maker. NAVTEQ currently has about 4,000 employees spread over 190 offices in 39 different countries.³

Company Challenges

NAVTEQ has presented this group with the issue of finding an easy, user friendly way for pedestrians to incorporate local knowledge into their map data.⁵ This comes in the form of suggested updates as well as what NAVTEQ calls “micro-landmarks”.⁵ In today’s world roads and locations change constantly, and unfortunately there is no way for NAVTEQ to consistently update the map with correct information. The most efficient way to resolve this problem is to have the end-user notify NAVTEQ of the desired changes which NAVTEQ can then investigate and update the information if it is deemed necessary.

Technology and the Solutions

The technology involves mobile devices and their interaction with NAVTEQ’s servers. The mentioned mobile devices include Global Positioning Systems- GPS Navigators and cellular phones. A well designed user interface will allow the end-user to send data directly to NAVTEQ’s servers.

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Previous Work

Innovative Mapping is not aware of any previous failures NAVTEQ may have been met with while addressing these specific set of issues in-house (see appendix or refer to objectives). This project is in the infancy stages and first to collaborate on this design problem with NAVTEQ. Therefore, Innovative Mapping will initiate and conduct all the primary research itself. NAVTEQ is excited to sponsor this project because of the potential influx of new ideas into the development of their products. Also, by using this group of diverse members all within the target market, NAVTEQ gains pertinent insight to what some consumers would like to see implemented.

Ethical Dilemmas in Research

The ethical issues that may result from investigating the problem are conducting surveys with human subjects, which require release forms, and nondisclosure with NAVTEQ may require us to not report all findings.

Sociological Effects and Costs

If users do not have a viable way to send information regarding corrections, then incorrect data will go unfixed. This would cost people time if their route is incorrect. Routine checks to the disputed areas may require NAVTEQ to send their employees to verify the location before making any additional modifications. NAVTEQ communicates with the society to better track area changes. These communications require company expenses for both employers and community. Equipment may also be necessary and costly for verification.

Proposed Implementations

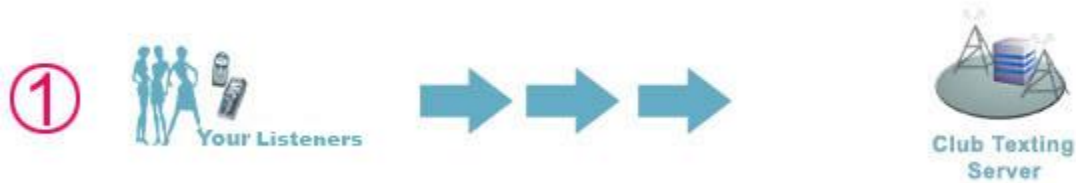
1. Provide a Short Message Service – SMS solution that allows the user to send a text regarding the information to be updated
2. Develop a web-based solution which mobile devices could access
3. Design an application to work on specific mobile devices

Previous Research

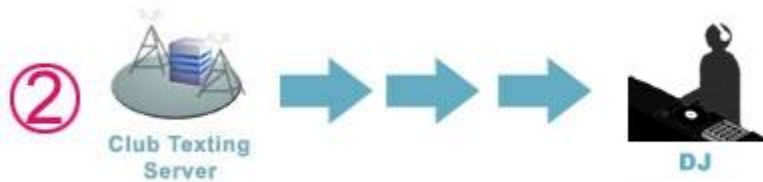
The following is a diagram describing how the first proposed solution of SMS relay has been able to transform the music and radio industries. This solution looks like a valid approach to reach the majority of users.

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How Mobile Marketing for Radio Works:



Customers hear your keyword listening to the radio. They text the keyword (which can be your station's Call Letters) in to 25827 (212121 in Canada) in order to request a song, vote in a contest, make a shout out, or participate in whatever promotion you are running.



Club Texting delivers your listener's message to the DJ or another staff member at the station. Depending on the content of the message, the DJ can then fulfill a song request, announce a contest, make a shout out, etc.



Whenever your station wants to announce a contest, promote an event/advertiser, or communicate any other urgent news to your listeners, you log on to the Club Texting website to instantly send an (SMS) text message to your entire database.⁴

Team Values

Team Ethics

Innovative Mapping must follow all laws and regulations addressed by the Illinois Institute of Technology and national procedure. Each team member is held responsible for attending scheduled meetings and meeting scheduled requirements for all work that is assigned. A professional attitude is expected amongst each other at all times.

Conflict Resolution

The following are procedures provided to help address any problems:

- Each team member is required to participate in all team activities
- All members are required to communicate via iGroups and e-mail on a daily basis
- All work will be evenly distributed among each individual team member
- Each team member is responsible for submitting documented progress and any assigned work in a timely matter
- Each team member will be respected and treated equally

Work Breakdown Structure

Problem solving process

1. Conduct surveys to determine:
 - a. Best ways for users to send feedback
 - b. Efficient and simple designs for the interface
 - c. Preferred methods of providing feedback (SMS/ Web based application / Native mobile application)
2. Precedence research
3. Develop an initial application design using survey results
4. Create a prototype of the application
5. Test application for connectivity and compatibility with NAVTEQ's map database system
6. Test usability in real world scenarios
7. Use feedback from real world testing to improve the application
8. Perform quality control and testing
9. Application ready for production use

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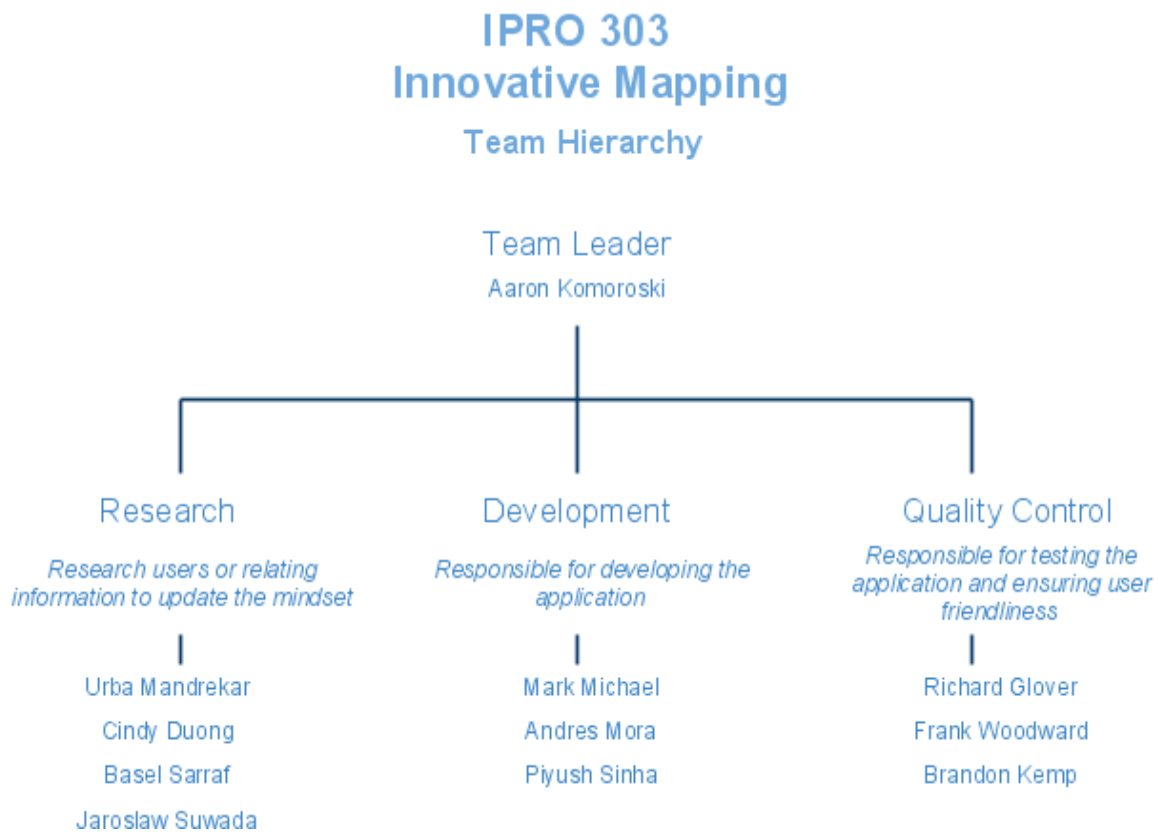
Team Structure

The tasks consist of those aimed at creating and forwarding the NAVTEQ user feedback system and those aimed at formulating its business strategy. Consequently, Innovative Mapping is divided into three broad sub-teams generally defined as the Development Sub-team, the Research Sub-team and the Quality Control Sub-team.

Each of the sub-teams work closely with each other to ensure that proper communication is facilitated and that there is minimal wasted effort toward an idea that another group might find unreasonable to pursue. Additionally, this close communication facilitates better-quality ideas that work toward creating a successful user feedback system.

Sub-teams are responsible for their own documentation. Leaders are responsible for managing the progress of their sub-teams. Additionally, the sub-team leaders are responsible for making sure that close, constant communication is ongoing between sub-teams, the team leader, and the project advisors. If inadequate progress is noted, the entire team works together to create a resolution to the issue

The established teams are organized as follows*:



**note: the first name in each sub-team is the sub-team leader*

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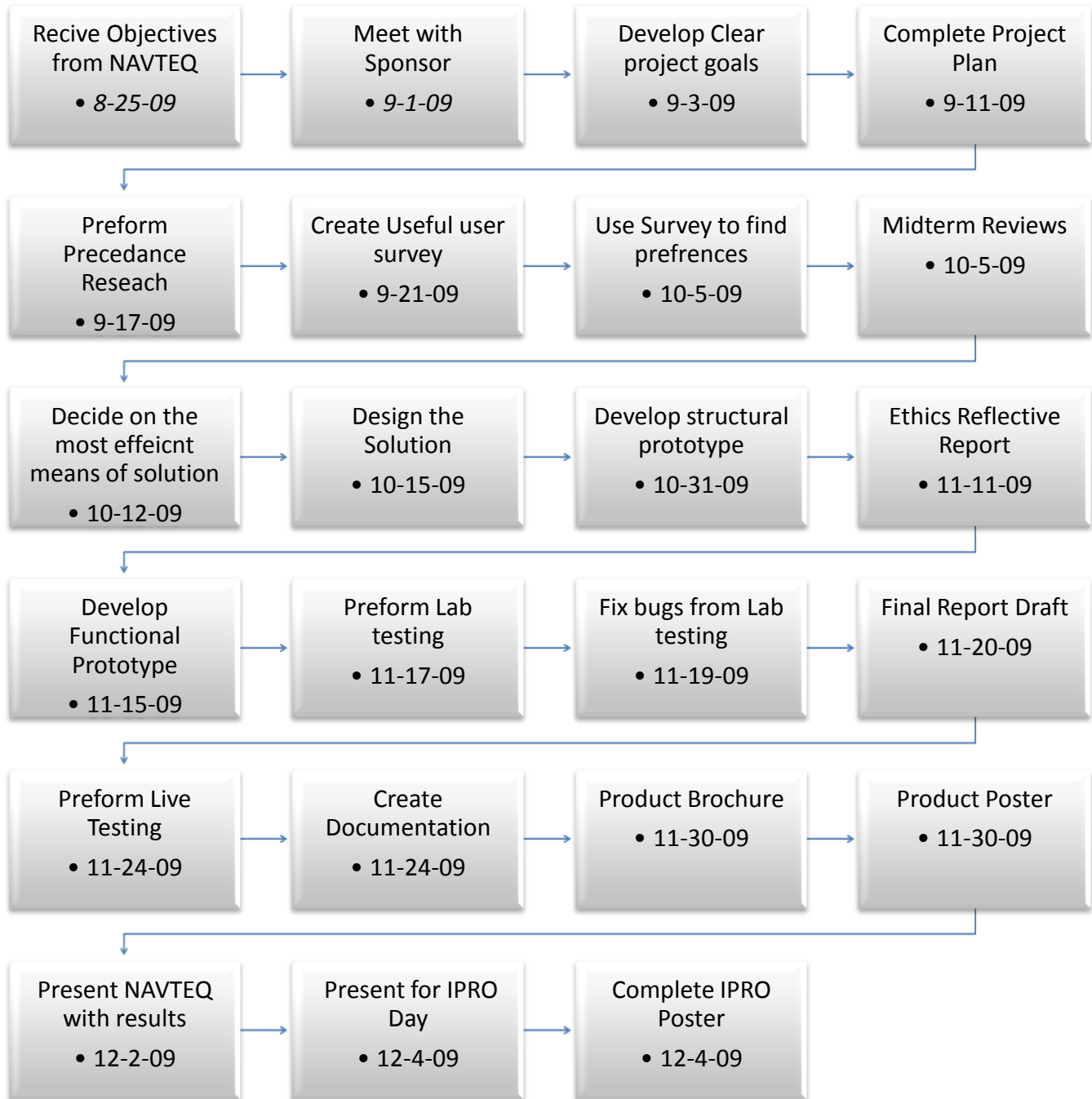
Meeting Times

INNOVATIVE MAPPING is scheduled to meet every Tuesday and Thursday afternoon.

Entire-team meetings are utilized as a forum for members of the Innovative Mapping project to present reports on recent developments and obstacles faced within the sub-team and what it means for the entire group. Solutions are then brainstormed and the process is repeated. Additionally, time in class is spent reviewing and revising the set schedule of events to make sure the issues outlined are relevant and realistic based on current progress directions. Below is a basic breakdown of the work process structure and the dates that Innovative Mapping plans to complete each step.

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Work Breakdown Chart



Expected Results

Expected Activities

The team aims to deliver at least one working solution to NAVTEQ. A group of activities are involved along this process. Those activities fit in two chronological phases:

- Phase I (August until October), - Research phase. During this phase the students will:
 - Study the requirements that were given by NAVTEQ.
 - Conduct research/surveys.
 - Discuss research/surveys results.
 - Reach consensus.
 - Define the requirements.
 - Propose achievable and realistic solution(s).
 - In October meeting with NAVTEQ representatives the students will present the team findings on a formal meeting
- Phase II (November until December) - Development and Testing phase. In this part of the project the students will:
 - Program and code a prototype(s)
 - Test the prototype(s)
 - Apply improvements to the prototype(s) according to test results
 - Deliver a working solution(s) on a formal meeting with NAVTEQ

Research and Testing Results

Conducting research in the initial phase will help specify the requirements and specifications of a possible solution. First, the precedent research and surveys would result in defining the best prototype to develop. Next, the current data update system that is used by NAVTEQ will be tested in the context of its ability to complement update requests from a pedestrian's mobile device. These test results would determine whether a solution could work along with the existing operation processes, or if new processes should be created to facilitate the project requirements.

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In the final phase of the project, when a solution or solutions are being developed, testing will be essential. Those tests will be conducted to verify the proposed solution's ability to satisfy the project requirements. The test results will allow the team to apply improvements to the prototype to comply with the system's requirements.

Products of Research and Testing

The end product of the research will be the design of a prototype, and its testing to ensure that it meets the requirements of the project.

Potential Project Tasks' Outputs

The project is new to the sponsor, thus gathering its requirements and test results are essential to its success. Initially, the sponsor presented the team with a general outline of project goals in the form of a single paged presentation slide. Research results are key to further the creation of a formal requirements document. This document shall include a list of agreeable requirements and specifications by stakeholders, the IPRO team and the sponsor NAVTEQ, and it shall be the blueprint of any resulting solution to the given problem. Test results, on the other hand, will be incorporated in another document that confirms how requirements from the above mentioned document are satisfied.

The solution, as an output, is going to be at least one of three possibilities:

- An integrated web site that would be accessible from many mobile devices or from the user's computer.
- A text messaging service that is widely accessible through any currently used mobile phone device.
- A custom made software application for mobile devices.

The Deliverables

The team anticipates three deliverables from the project tasks:

- Requirements and specification document is the first deliverable. It should result from the first phase of the project, and have the approval of NAVTEQ and the team on it.

Deliverable 1 Target : First half of October

- At least one prototype and its documentation constitute the second deliverable, and will be achievable by the end of the second phase of the project, The documentation would show how the prototype confirms the first deliverable.

Deliverable 2 Target : First half of November

- The last deliverable of this project is a presentation of the team's findings to NAVTEQ. The sponsor's decision to approve the solution after this presentation is the ultimate goal of our team.

Deliverable 3 Target : Towards end of November

Innovative Mapping: Project Plan

Project Challenges and Constraints

These few constraints have been identified so far by the team members. The main being that NAVTEQ is a leader in giving data and maps to big companies and those companies bundle them with their own software solutions to the end users, thus there is **no direct connection between the end-user and NAVTEQ**. For instance, NAVTEQ supplies MapQuest.com, GARMIN, BMW, and others with the data, and it is counter intuitive for the end-user to request an update related to a closed bar from NAVTEQ directly. Consequently, the team's main challenge would be the creation of a direct channel between the end-user and NAVTEQ to result in fast and efficient feedback-update relationship.

Technical standards and norms create additional challenges to the project. Many mobile devices producers use different technical solutions, thus a possible solution that is programmed to work on one mobile phone (say Nokia) is not necessarily going to work on another one (iPhone) and vice versa. Additionally, a website that is viewable on a larger resolution mobile phone is not going to look as effectively on small resolution screen mobile phone.

The formerly mentioned are in addition to a **fifteen week constraint** that increase the challenges faced by this team project. The team is expected to finish working on the project within one semester period, which is the time constraint of the program.

Results as a Solution

A prototype as an end result will be a solution to the described problem, because it will be an easy and user-friendly way for pedestrians to make suggestions for corrections and updates to NAVTEQ's maps.

Project Budgets

The following is a list of materials and cost that will be required to properly complete this project. Supplies will be required in the development and research phases of this project. The software development kit may be required in the design and creation of a prototype. The mobile device will be essential for the testing phase of this project.

Item	Cost	Quantity	Total Cost
Printing Costs of Surveys	\$50.00	1	\$50.00
Pens for surveys	\$5.00	4	\$20.00
Software Development Kit	\$300	1	\$300
Mobile Device	\$130	1	\$130
			\$500

Designation of Roles

- **Team Leader:** Aaron Komoroski. Provides guidance, instruction, and direction, to the team, in pursuit of realizing the expected results. Monitors the quantitative and qualitative results that are to be achieved. Creates an agenda for each team meeting, and keeps meetings on task and on schedule.
- **Minute Taker:** Mark Michael. Records events and decisions made during meetings, including task assignments or any changes. Posts them to the team's iGroups account.
- **iGroups moderator:** Brandon Kemp. Responsible for organizing the team's iGroups account and ensuring that it is used properly by keeping it up to date and having every file organized and in the correct format.

Works Cited

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4. "Text Messaging for Radio by Club Texting." *Mobile Marketing Campaigns and Bulk Text Messaging Software by Club Texting*. Web. 10 Sept. 2009.
<<http://www.clubtexting.com/radio/radio-text-messaging.html>>.
5. Tajpuria, Ashish, NAVTEQ, and Holsinger David. "IPRO 303: WHO IS NAVTEQ?" NAVTEQ Presentation. Illinois Institute of Technology, Chicago. 1 Sept. 2009.
Lecture(presentation available upon request).

Appendix

Appendix 1: NAVTEQ Requirements

Project goals

- Enable Map Reporter input
 - Focus strongly on the pedestrian and mobile handset user. This could be a website, a mobile application, or any other appropriate means of collecting this information.
 - In addition to updates or fixes – for example, correcting the address of a building – allow users to contribute to the map.
- Collect Map Reports from pedestrian users
 - Try to direct users to specific arrival points; instead of “Wrigley Field”, direct users to the Harry Caray statue.
 - Focus on visual cues that stand out to a pedestrian and could be used as a reference point to guidance.