Final Report

KALLEIDOS

Feel the social web

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IPRO 303 (Spring 2011) Sponsored by NAVTEQ

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1. Executive Summary

1.1 Sponsor Background

NAVTEQ, the sponsor of this project, is world's number one mapping solutions company. They provide high quality data, applications and marketing solutions to other business and are in a constant pursuit to evolve with the growth of the internet. This semester, NAVTEQ asked IPRO 303 to focus on extracting public information and displaying it through a user interface in an intuitive and user friendly way.

1.2 IPRO Background

The Inter-professional Projects (IPRO) Program was started at IIT in 1995 with the aim of introducing students to the work styles and environments in a work place. Through promoting the use of work skills like teamwork, innovation and complex problem-solving, the IPRO program provides students with a practical experience that can have a huge impact on their professional and personal life. Through IPRO courses, students from different majors tackle different real-world problems that appeal to their interests. In certain scenarios, an engineering major may be important for the technical side of a problem, while other majors such as architecture may help with the design and visual representation of posters and presentations. In a real-world situation, the work place is usually comprised of individuals from different academic backgrounds, thus the IPRO program works to mimic this environment.

1.3 Project Background

This is currently the fourth semester that NAVTEQ has sponsored a project with IIT. In the past this IPRO group was named Innovative Mapping and later Chujio. This semester, the IPRO had evolved to a new level while learning from the past. Previously, the team worked on creating a way for end users to send feedback to NAVTEQ in a

manner that was simple, accurate, and timely. Building off of that project, NAVTEQ wanted to automate the process of updating their current databases of Points of Interests (POI) using a live data stream from popular social networking sites. Now the focus has expanded to specific pieces of information, such as real time and location based crime, sales, flickr pages, people's feelings, and building a user interface to interact with this data without being overwhelmed. Due to this evolution, members of IPRO 303 changed the name to Kalleidos in order to better reflect the changes in the vision that had taken place. The term Kalleidos is derived from the combination of two Greek words. The first word, 'kallos,' means beautiful.[6] The second word, 'eidos,' means shape or image.[7] Putting them together gives 'beautiful image'. We see this IPRO as a way to create a beautiful image of the social web, hence the name.

1.4 Current Work

The vision of the team was to create a radically new way to interact with social media content. In order to achieve this, the team was split into four sub-teams: Development, Developmental Design, Design, and Deliverables. Each sub-team was formed by individuals who could contribute their biggest strengths to the goals of that specific sub-team. Subsequently, the teams began planning their work for the rest of the semester by learning about their deliverables and forming tasks to achieve each one. Each sub-team's goals when combined, formed milestones for the entire project. All milestones were achieved as planned.

In order to achieve our vision, a concept of bubbles was introduced in the user interface. Bubbles representing different colors, size, and shades were used to represent different categories, popularity rating, gender and age. This concept was used because each bubble had the potential to represent large amounts of information in an interactive and appealing way without overwhelming the user. This allowed us to create a user interface where words weren't useful as much anymore.

The focus of Kalleidos was on retrieving and constantly updating relevant information in four specific areas: Crime, flickr photos, sales, and people's feelings. This information was then taken and displayed through an intuitive and friendly user interface. These formed 4 different products called: Crime, View-Finder (photos), Sales, and Emoti-Magnet (feelings). In addition, a 5th product idea was created called 'Wish Map' that would serve as means to communicate the concept. The user interface was designed for all 5 products to be housed under one brand - Kalleidos. These products were chosen such that they would add value to NAVTEQ's existing and future projects and are described in detail below.

The Crime page displays real time crime information from twitter and foursquare. This data is extracted by using specific key words such as 'murder', 'fraud', and 'robbery' in status updates along with Geo Coordinates of desired location. Each bubble with different color represents the type of crime. The View Finder page consists of photos pulled from Flickr based on location and tags. The Sales page is represented as a candy machine that dispenses information about sales based on location. Users can select specific stores to view sales based on a location on chicago map. The Wish Map is a social map where users can wish for a specific business or product that they would like to see in their preferred location. The interactive page allows users to not only join each others wishes but also invite people to support their own wish, thus driving the marketing and making that specific wish viral. The wish map serves as a platform to connect businesses to their target market. The Emoti-Magnet page displays emotions people are feeling real time in a specific location based on gender. Selecting an emotional keyword pulls together people feeling that specific emotion in that moment at the selected location. Emoti-Magnet tells us how people are feeling at a specific location real time.

Kalleidos can be accessed at: http://omega.cs.iit.edu/~navteqipro/flash/ipro_final.swf.

Kalleidos is built from scratch to display real time social information without the use of a map and with minimal use of words. The program updates each piece of information automatically every minute.

2. Purpose and Objectives

2.1 Company History

NAVTEQ is a world leader in premium-quality digital map data and content,[1] and we are very fortunate that NAVTEQ decided to sponsor IPRO 303 for the fourth term. NAVTEQ provides information used in navigation systems on different mobile and internet based platforms in addition to other location based and marketing services. NAVTEQ also offers digital mapping coverage in 83 countries on 6 continents. Formed in 1985 in Silicon Valley California, it is one of the founders of digital mapping data and map routing. [2] With the help of a number of investors and owners, NAVTEQ was able to grow and establish offices in countries outside the United States by the early 1990s. It eventually moved its headquarters to the current location in the heart of Chicago. NAVTEQ now has approximately 5,100 employees spread over 212 offices in 48 different countries, and was acquired by Nokia, the popular phone and electronics maker, in 2007.[3]

2.2 Problem Statement

NAVTEQ presented this group with the challenge of extracting real time location based public data that updates itself automatically and creating a user interface to interact with it. With the recent surge in social networks, information clutter is increasing at a pace faster than ever. Businesses (NAVTEQ's customers) find it difficult to use this

information to monetize and create value for their customers using location based data when the opportunity presents itself real time.

2.3 Technology Involved in Addressing the Problem

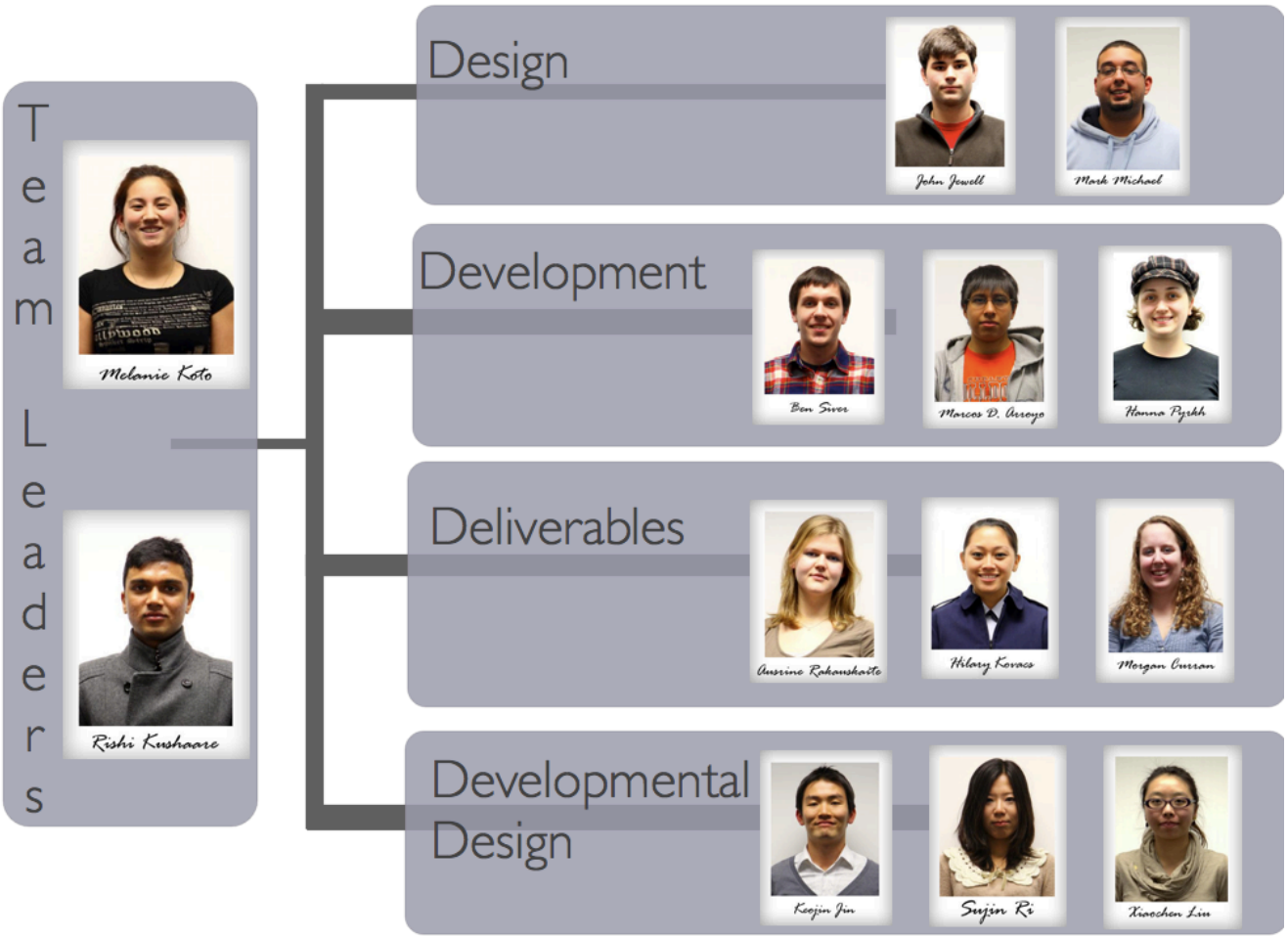
The technology involved in creating Kalleidos was designed to gather public data from different social networks: Twitter, Flickr, and Foursquare. This included work with their APIs (Application Programming Interface) as well as the development of an algorithm to filter and organize this data. The algorithm was able to sift through large amounts of data quickly and efficiently to collect useful and relevant information. A new user interface was also built such that it allowed the user to interact with this information in an engaging and useful way. In order to accomplish these tasks – a MySQL server was used, PHP for coding, and HTML flash for developing the user interface.

3. Organization and Approach

3.1 Team structure

Before the start of the semester the group was introduced to the objectives of the project that were specified by NAVTEQ. As a group, the team then studied the objectives and preformed preliminary research about resources to gather information from. At that point the group met with NAVTEQ at their Chicago office to discuss the outcome of the project. Thereafter, we soon realized that the best way to accomplish our goals would be to split up into more specialized teams. The four sub-teams created were: the Development team, the Developmental Design team, the Design team, and the Deliverables team. Each sub-team was formed by individuals who could contribute their biggest strengths to the goals of that specific sub-team. This allowed

us to use everybody's unique strengths to their fullest and to combine them to create success for the entire team. A snapshot of the sub-teams is as follows:



Design Team

Using image and video editing software, this sub-team brought to life everything that the team imagined. Through the use of CAD and advanced graphics tools - this team was responsible for creating all our promotional work such as video, posters and brochures. They also built the 43 inch display from scratch that would communicate the team's work to target audience on the IPRO day.

Development Team

The Development team collected raw data publicly available from social networking sites. The team was able to set up a mySQL web server on IIT's Computer Science Department's Omega server. The server allowed them to access and store the applications while developing them. The team was able to design a database capable of holding all the real-time information pulled from social networks. They developed a web-based application that pulls data using a specific query for selected social networking websites. The group developed PHP scripts capable of retrieving data from various websites and storing that data into the mySQL database, as well as PHP/SQL scripts capable of importing 98% of zip codes in the U.S.

Deliverables Team

The deliverables team wrote and modified pertinent documents and expressed our work into words. While working on the project plan and final paper, the deliverables team assisted design and development sub-teams in their work. This sub-team also worked to put together the mid-term and final presentations. They also created a tutorial of the final product that later served as one of our main marketing tools on the IPRO day.

Developmental Design Team

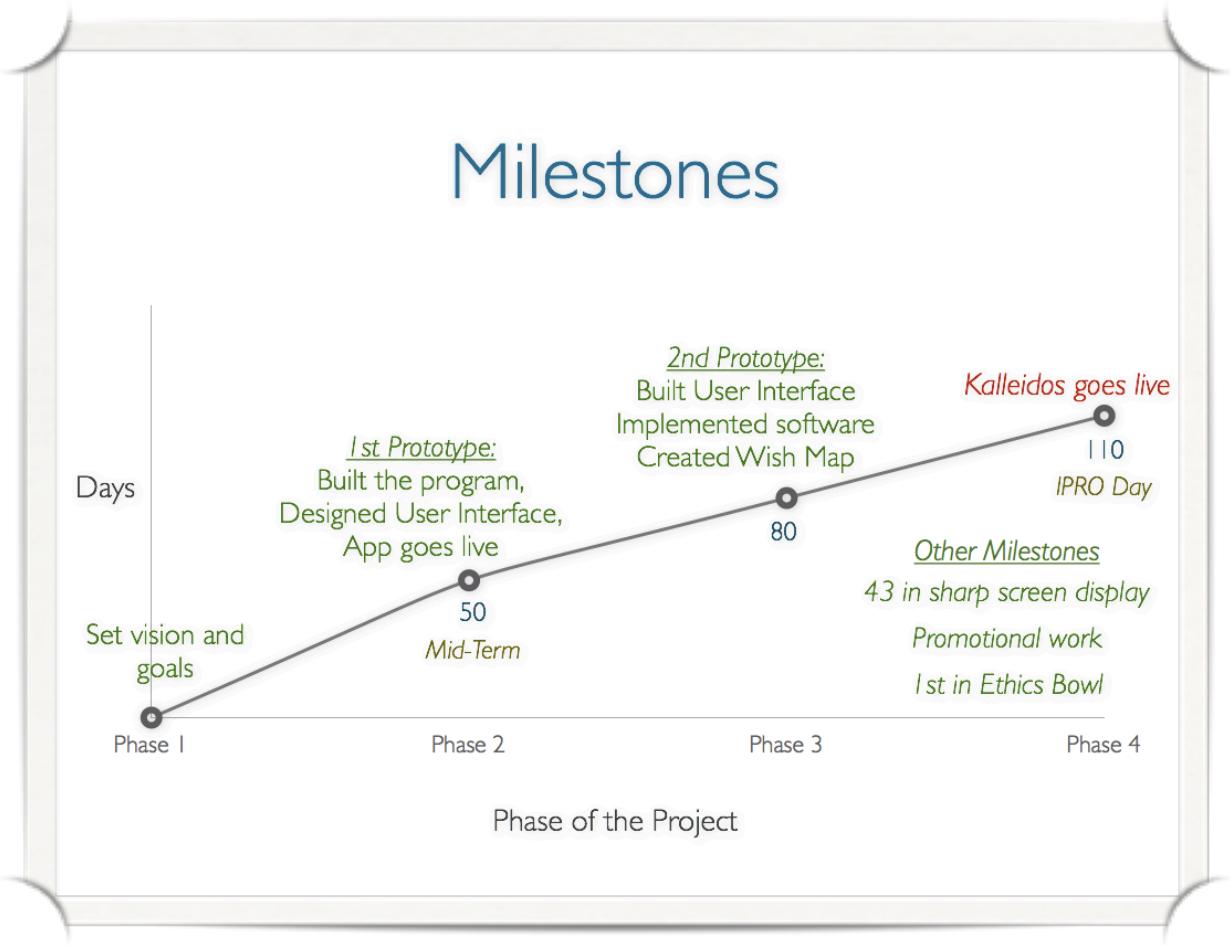
This sub-team was an integration of architects and engineers who worked together to build the beautiful user interface Kalleidos is known for. The developmental design team was responsible for implementing the code and presenting it in an engaging and user friendly manner. Due to flexibility, this team decided to use Flash with action script 3.0 as a main visualization tool. They were also able to create the database frame along with the background and layout and implement them into Flash.

3.2 Team Meetings

The Kalleidos team was scheduled to meet every Tuesday and Thursday afternoon from 3:15pm to 4:30pm. Meetings were utilized as a form for members to present reports on recent developments, address obstacles faced within each sub-team, and to discuss what these mean for the entire group and if a change in strategy is required. Solutions and ideas were then brainstormed and the process was repeated. Additionally, time in class was spent reviewing the set schedule of events to make sure the issues outlined were relevant and of highest value based on current progress. Also, efforts to evaluate any possible frictions were considered and necessary actions are taken to eliminate them to make the development process as efficient as possible. Work days were scheduled beforehand as sessions during which the sub-teams would work on respective assignments. The next section contains a basic breakdown of the milestones and the dates that Kalleidos planned to achieve each one of them.

3.3 Milestones

The semester work was planned by the number of days during which the team accomplished different milestones. In the chart below, X-Axis represents the phase of the project and Y-Axis represents the number of days into the semester.



Phase 1: January

During this phase the team members:

- Received and studied the deliverables from NAVTEQ
- Set goals and vision for the semester
- Divided the group into sub-teams and assigned goals to each
- Created a plan for accomplishing milestones

Phase 2: February

During this phase the team members:

- Built the 1st prototype of the user interface
- Built the 1st prototype of the application that pulled content
- Presented a live demo of the application at the Mid-Term Presentation

Phase 3: March

During this phase the team members:

- Built the 2nd prototype of the user interface
- Built the 2nd prototype of the application that pulled content
- Tested and debugged the application and the user interface
- Received feedback from NAVTEQ
- Created Wish Map

Phase 4: April

During this phase the team members:

- Built the final prototype of the user interface
- Built the final prototype of the application that pulled content
- Connected the user interface with the application
- Tested and debugged the application and the user interface
- Created promotional work (posters and brochures) for the IPRO day
- Built the 43 inch sharp screen display
- Presented Kalleidos live at the IPRO day

4. Analysis and Findings

4.1 Initial Research

Initial research for this semester involved finding pertinent data, and figuring out how to best display it in a visually appealing and engaging user interface. Some of this research involved figuring out how to pull relevant information from social websites to filter information with certain key words to get only useful data. Also, additional research involved determining the best way to merge data from different social

networks. Research was also done to figure out how to store information and to match zip codes to regions with latitude and longitude Geo Coordinates.

4.2 Development Resources

The development team used a multitude of available resources throughout the development of this project, including free and open sources tools, frameworks, web services, and other tools. The application used a database that held all of the real time information pulled from 3 of the most popular social networks – Foursquare, Twitter, and Flickr. Specific key words related to sales and crimes were saved into a text file. The data was read, stored into an array, and finally looped through the array, sending get requests to the websites with the key words. After the query was made using specific keywords, the results were pulled and then stored in a database using MySQL.

Incorporating a web based front-end developed with the Flash design allowed for the data to be viewed in a visually appealing and engaging way.

Software involved in the project included the following:

- Website
    - Language : ASP .NET with C#
    - Development environment : Microsoft Visual Studio 2010
- Flash
    - Language : flash 10 with Action Script 3.0
    - Development environment : Adobe Flash CS4 Professional
- Data
    - Language : PHP scripts
    - Server : Wampserver
- Database
    - DBMS : MySQL

4.3 Data Gathering Resources

The Development team focused on pulling data from Facebook, Twitter and Flickr and storing it in their database. A multitude of websites were used as the primary source for gathering the data needed for the application. The websites included the following:

- http://www.flickr.com/services/api/
- http://www.flickr.com/services/apps/create/noncommercial/
- http://www.flickr.com/services/api/tos/
- http://dev.twitter.com/pages/libraries#php
- http://apiwiki.twitter.com/w/page/22554756/Twitter-Search-API-Method:-search
- http://developer.foursquare.com/docs/overview.html
- http://foursquare.com/oauth/
- http://w3schools.com/php/default.asp

5. Challenges and Improvements

Several challenges were encountered throughout the course of this project. The first was figuring out how to begin pulling data from social networks. Although this problem was somewhat solved with the use of simple keywords, this system proved to be less accurate. Searching for certain relevant terms, such as ‘robbery’ often resulted in updates that involved ‘highway robbery’. A computer cannot distinguish between different types of contexts so we manually created rules that would eliminate irrelevant contexts as they appear. Also, the scripts were debugged when they were not functioning properly, and filters were run to remove inappropriate content. Matching the zip codes to regions, and ultimately to latitude and longitude coordinates proved as challenging tasks.

By taking on the numerous challenges along the way, team members learned valuable lessons. The Development team had to quickly become competent in the use of various technologies including MySQL, Apache, GIT, PHP, CSS, and HTML among others. The product development process itself helped each team member directly relate their class learning to solving real world problems.

While the Kalleidos in its current state is a functional product, many improvements can be made in order to have the most effective and friendly user experience that the team has aspired for. The program, as is, is innovative and has a lot of potential, but it still needs to be debugged. Also, a lot of improvements can be made to pull much higher quality data from program that extracts content. Unwanted data in many cases appear in patterns and creating rules to exclude these patterns from the pulled content can increase the quality of data dramatically in addition to implementing a more efficient code to data mine the social content.

That being said, the largest improvement can be made in the Wish Map. As of now, it is presented as an idea through images, yet this section has the greatest potential for success. Wishing we had more time, this product would have received a lot more attention and work to create a better representation of the concept specifically tailored towards NAVTEQ's plans to implement of this idea.

6. Conclusions and Recommendations

We saw this IPRO as an opportunity to change the way people interact with content – to create something that would impact the way people see the social web. We built Kalleidos because it's something we'd love to use.

The internet is evolving constantly, and due to the upsurge of mobile devices and their outreach – real time and location based information has become a primary way for people to interact with. We built all our products keeping in mind that they would add value to NAVTEQ's projects in the real time and location based technology space.

The representation of bubbles can also be applied to create a live snapshot of the social web. Every tweet, status update, and publicly available information can be captured in the form of bubbles in different colors, sizes, shades, velocities, etc to denote different topics, their popularity, gender, age, etc. Thus each bubble has the capacity to represent large amounts of information without overwhelming the user. As a result, a screen filled with such bubbles representing all the social web activity gives a live snapshot of the internet. This snapshot can be used to data mine links between different pieces of information and events and getting a much better feel for how the web interacts real time.

The Sales section was built to find any ongoing sale in the area where the user is present physically at that time. Groupon quite often require a customer to drive miles away to use a specific deal – whereas, through Sales section we wanted to accomplish giving real time data to any user such that he/she can access information about any ongoing sale in the current location. Combining this idea with the Wish Map can allow users to locate not only real time sales – but also wish for a deal that does not exist.

We believe that in future, people will make decisions to visit a specific restaurant or a bar based on real time reviews. Hence, we created Emoti-Magnet (Emotion Magnet) that identifies what people are feeling in a specific location using Geo Coordinates. Upon further development, Emoti-Magnet can be built to collect feelings of a specific business real time based on gender and age. This not only allows users to visit locations in the city based on what's happening in the moment, but also paves way for businesses to do marketing research and identifying their target market with higher accuracy and design their marketing strategy around them.

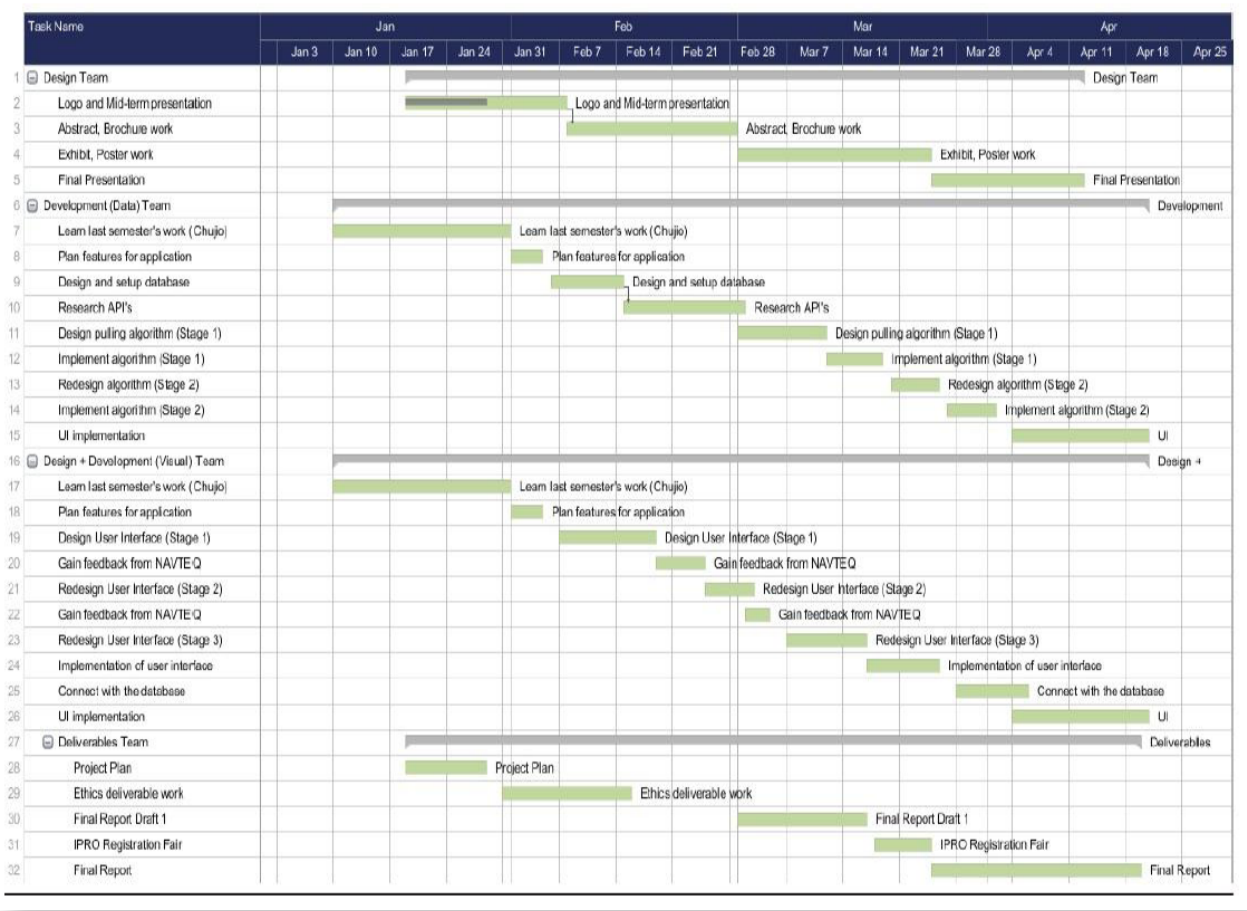
We created the Wish Map concept to not only create a new category in the social space, but also to create a new way to do business with people. Initially it simply started out as a map to wish for things on, however later it evolved in to a different concept when we designed it so as to connect businesses and people through a social perspective. Wish Map is designed such that it not only allows businesses to learn about their target market, but also design marketing and business strategy targeted to each specific audience that it wished for. We also wanted the Wish Map to be an addictive app and hence designed it such that it would motivate people to not only contribute content to the map but also drive businesses through a reward system. This has helped the Wish Map to also become a new marketing tool that brings in tangible and monetizable results.

Tweaking Emoti-Magnet such that it pulls real time wishes of people in specific locations using Geo Coordinates and adding this component to the Wish Map can help the map reach a wider net of audience.

That being said, we sincerely wish for our products to add value to NAVTEQ's projects.

7. Appendix

7.1 Gantt Chart



7.2 Project Budget

The following is a snapshot of the financial planning for the semester.

Budget IPRO 303 Spring 2011	
43 Inch Screen Display	$750
Office Supplies	$50
Marketing and Promotions	$200
Product Development	$100
Team Building Event	$50
Total:	**$1,050**

7.3 Team Roster

A) Students

Name	Major	Email Address	Phone Number
Arroyo, Marcos	Computer Science	Marroyo1@iit.edu	[redacted]
Curran, Morgan	Biology	Mcurran1@iit.edu	[redacted]
Jewell, John	Architecture	Jjewell1@iit.edu	[redacted]
Jin, Keo-Jin	Architecture	Kjin@iit.edu	[redacted]
Koto, Melanie	Biology	Mkoto@iit.edu	[redacted]
Kovacs, Hilary	Chemistry	Hkovacs@iit.edu	[redacted]
Kushaare, Rishi	Business Administration and Applied Science in Engineering	Rkushare@iit.edu	[redacted]
Liu, Xiaochen	Civil Engineering	Xliu66@iit.edu	[redacted]

Michael, Mark	Computer Information Systems	Mmichae3@iit.edu	[redacted]
Pyrkh, Hanna	Electrical Engineering	Hpyrkh@iit.edu	[redacted]
Rakauskaite, Ausrine	Architectural Engineering	Arakausk@iit.edu	[redacted]
Ri, Sujin	Computer Science	Sri@iit.edu	[redacted]
Siver, Ben	Computer Science	Bsiver@iit.edu	[redacted]

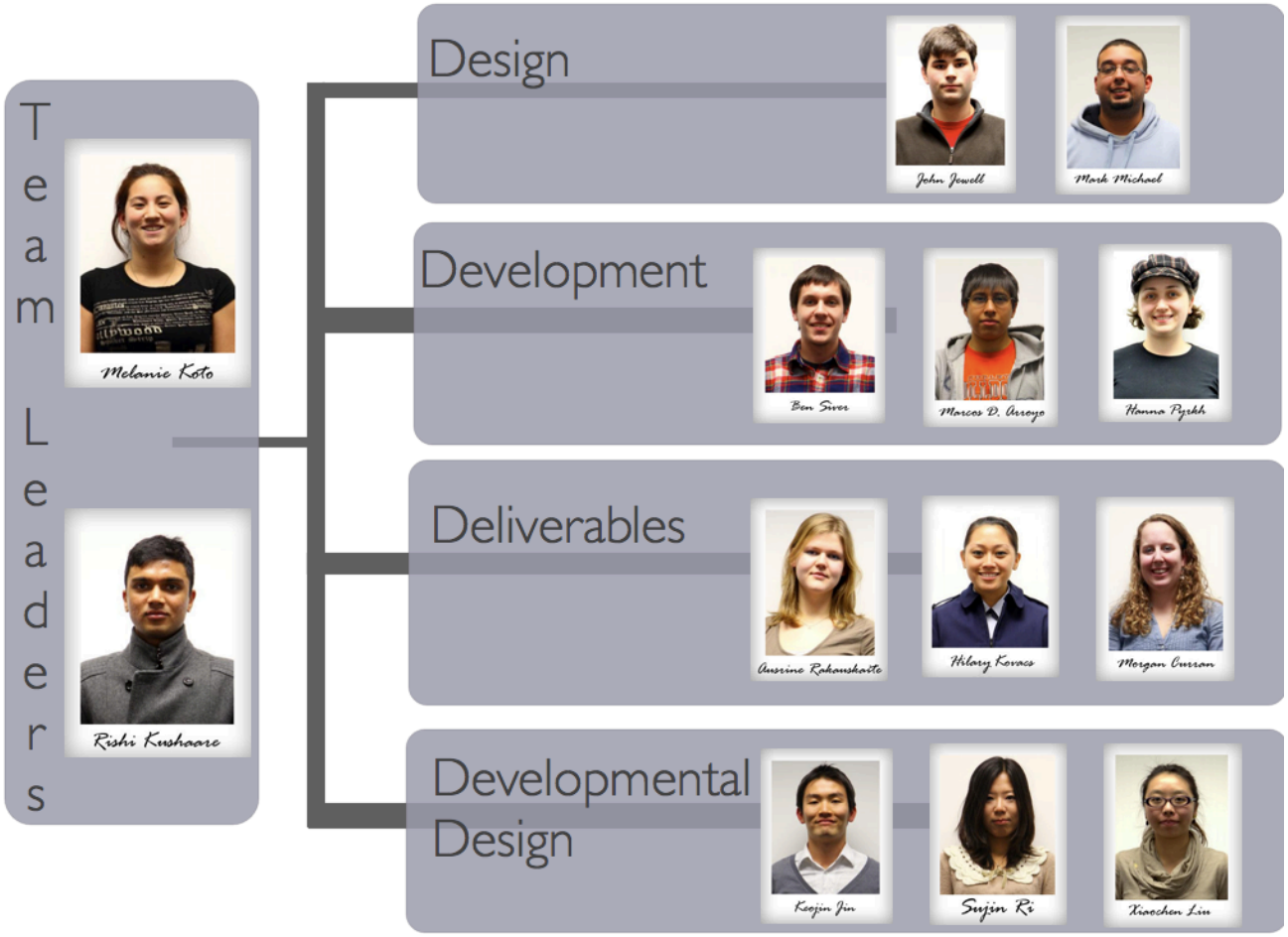
B) Advisors

Name	Email Address	Phone Number
Burstein, Jim	Burstein@iit.edu	[redacted]
Ko, David	David.Ko@navteq.com	[redacted]
Ramic, Haris	Haris.Ramic@navteq.com	NA
Redzic, Gordon	Gordan.Redzic@navteq.com	NA

7.4 Sub-Team Organization

Faculty Advisor: James Burstein

NAVTEQ Advisors: David Ko, Haris Ramic, Gordan Redzic

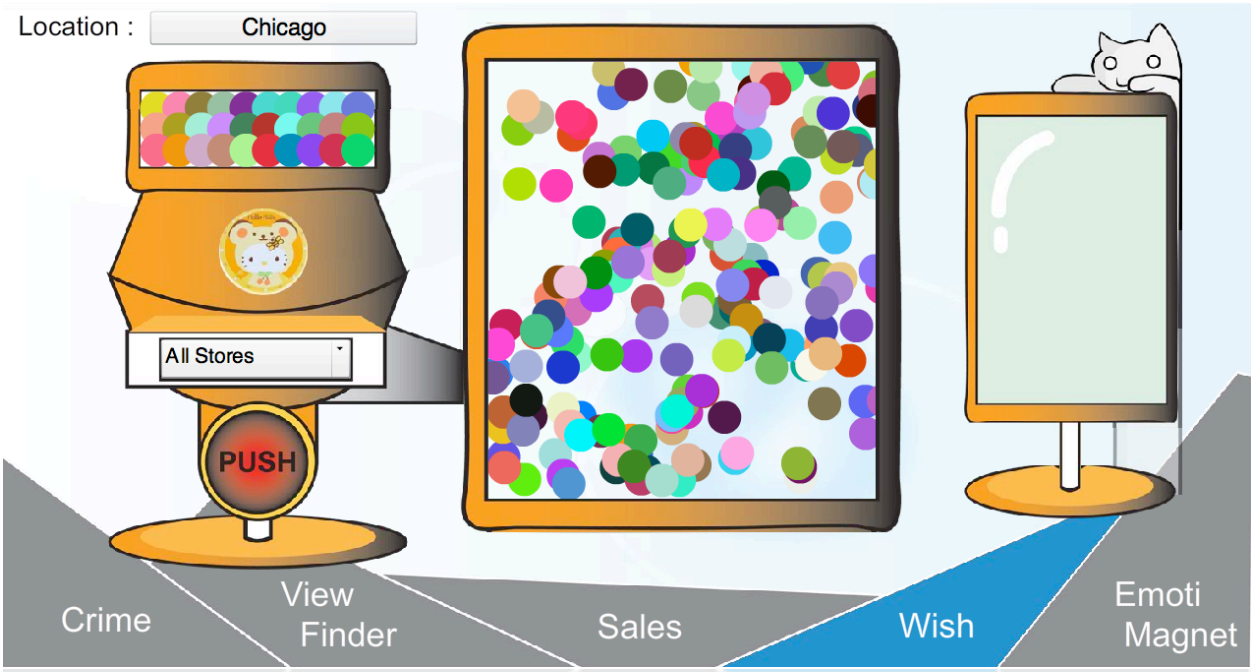


7.5 Product Screen Shots

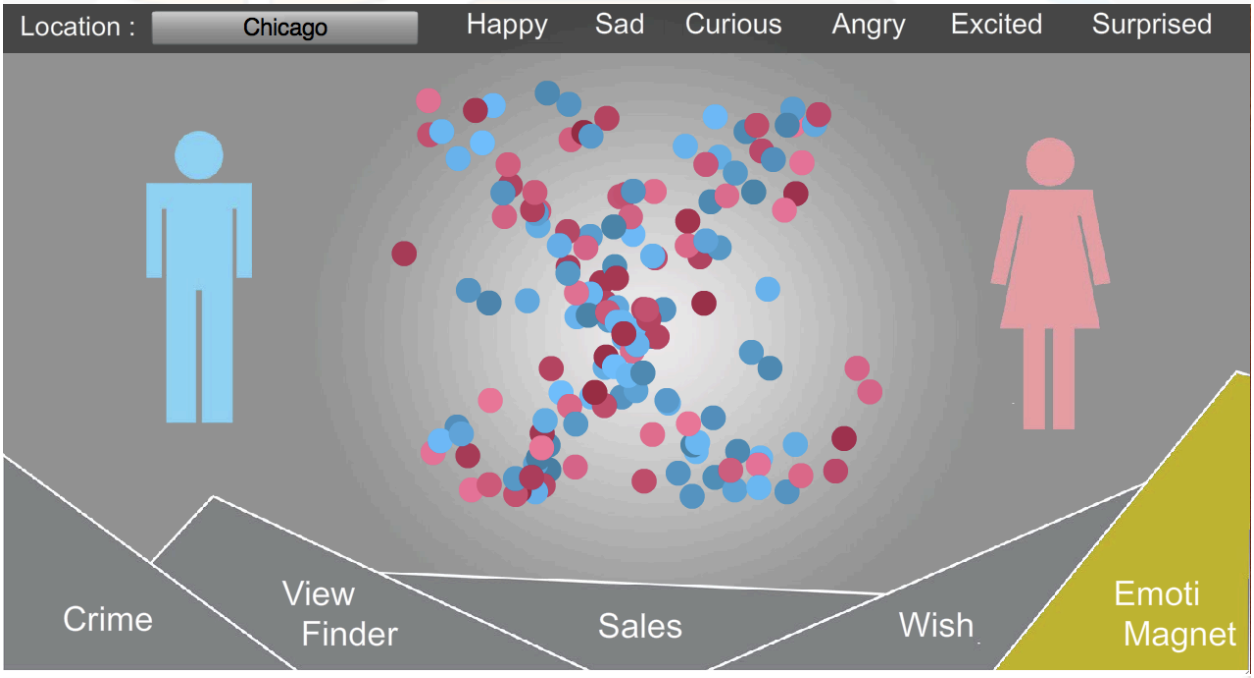
1) Crime

2) View Finder

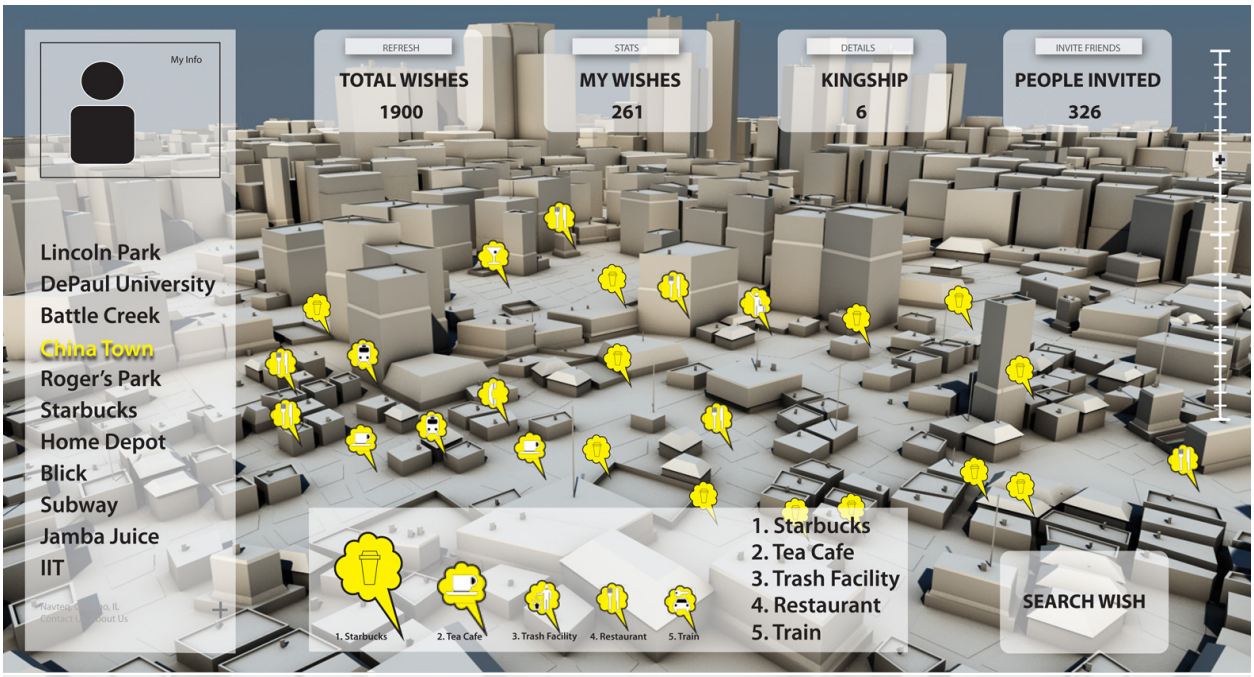
3) Sales



4) Emoti Magnet



5) Wish Map


My Info
REFRESH
TOTAL WISHES
1900
STATS
MY WISHES
261
DETAILS
KINGSHIP
6
INVITE FRIENDS
PEOPLE INVITED
326
Lincoln Park
DePaul University
Battle Creek
China Town
Roger's Park
Starbucks
Home Depot
Blick
Subway
Jamba Juice
IIT
1. Starbucks
2. Tea Cafe
3. Trash Facility
4. Restaurant
5. Train
SEARCH WISH

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