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Study on developing a potential way-finding map design of  
an iphone & ipod web application for Rochester Institute of  
Technology (RIT) Library

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Jeong Ah Kim

Rochester Institute of Technology  
Computer Graphics Design  
Thesis Report

Approved Date  
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# Table of Contents

Abstract	1	6. Technical process	24
1. Background	2	6.1 Coding and Resouces	25
1.1 IPhone Application	3	6.2 Building and Testing	27
1.2 Way finding	3	6.3 Publishing	27
2. Research	4	7. User experience	28
2.1 I learn to code Xcode	5	7.1 User survey	29
2.2 Case studies	5	7.2 Analysis: Evaluation result	30
3. Ideation	6	8. Conclusion	31
3.1 Introduction	7	9. Appendix: Proposal	33
3.2 Sketches	8		
3.3 Workflow	8		
4. Design methodology	12		
4.1 Grid system	13		
4.2 Four-color system	14		
4.3 3D perspective effect	15		
4.4 Texture	16		
4.5 Design theme	17		
5. Design process	18		
5.1 Map design	19		
5.2 Icon design	19		
5.3 GUI design	22		
5.4 Interface design	22		

---

# Table of Images

3. Ideation		6. Technical process	
3 -1 Image	8	6 -1 Image	25
3 -2 Image	8	6 -2 Image	26
3 -3 Image	9	6 -3 Image	27
3 -4 Image	9		
3 -5 Image	10		
3 -6 Image	11		
4. Design methodology			
4 -1 Image	13		
4 -2 Image	13		
4 -3 Image	14		
4 -4 Image	15		
4 -5 Image	15		
4 -6 Image	16		
4 -7 Image	16		
5. Design process			
5 -1 Image	19		
5 -2 Image	19		
5 -3 Image	20		
5 -4 Image	21		
5 -5 Image	21		
5 -6 Image	22		
5 -7 Image	22		
5 -8 Image	23		

# Abstract

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Have you ever wondered how many wall maps are actually used as “maps” rather than as decoration? Have you ever had trouble finding your way around small areas? Have you ever had a hard time finding brochures, even when they’re displayed right at the entry or on the first floor of a building?

Since the beginning of human civilization, wayfinding systems have been developed as tools to deliver information and assist people seeking routes or specific locations. Updates to new technologies have allowed vast quantities of information of varying quality to become a huge part of our lives. However, signs and brochures are limited as far as offering users valuable information for various reasons: limited screen space for content, limited technical abilities of users, and the possibility of a ubiquitous environment.

Given the problems arising from such limitations, developing a wayfinding map application for the iPhone may be the best solution for two reasons. First, the limitation caused by a small display can be improved with the possibility of interactions. Moreover, users would be able to download such an application from the App Store at any time and in any location.

For this project, the Rochester Institute of Technology (RIT) library floor map was chosen as the best experimental item to improve because it contains poor map contents and its design is of low quality. In other words, this floor map presents a number of challenges and has great potential to be redesigned. In particular, creating a novel design of this map is an excellent challenge.

Developing the RIT library floor map application involved research, design methodology, user testing, and technical implements. Ultimately, the project suggests a new wayfinding system using information contents, design improvements, and new technical elements.

In conclusion, I expect to solve problems related to displayed maps and hard-to-obtain contents by creating an improved concurrent wayfinding system as a new Web application for a portable navigation device, the iPhone. In addition, I expect to improve graphic user interface environments. This project, developed for the RIT library navigation system, will be one example of a solution for contemporary wayfinding systems.

## **Key words**

Navigation, Way-finding, RIT Library, iPhone application, Interaction, Mobile device

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# 1. Background

# 1. Background

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## 1.1 iPhone Application

The iPhone application is a revolutionary idea and a groundbreaking item in the area of Smartphone content. While other Smartphone application environments exist, such as Google, which introduced Android as its supporter to compete against iPhone applications, unfortunately, it has not become as popular as the iPhone. iPhone applications are open source for developers, which means there are no developing limitations or requirements for developers. Developers with the right amount of technical skills and ideas can create their own application and put it on the market at the App Store. Participants who want to create a new application can publish and have their business fields at the App Store. Compared with former content environments in the smartphone area, this is an extremely novel and exciting notion in the field of developers.

## 1.2 Wayfinding

In this project, wayfinding is defined as “encompasses all of the ways in which people and animals orient themselves in physical space and navigate from place to place - *wikipedia*.” In other words, the purpose of wayfinding is mostly to convey contents of directions and information about locations with technical renovations. In addition, wayfinding has applied forms such as sign systems, brochures, and maps. For this reason, the value of wayfinding exists in the degree to which it shows specific locations and provides information to users who want to move from one place to another quickly, easily, and effectively.



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## 2. Research

## 2. Research

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### 2.1 Learn to code in Xcode

Xcode is a unique type of software for developing iPhone applications. For this reason, learning Xcode was the only way to develop the wayfinding application. To learn to use Xcode, I referred to several books. In addition, to obtain information about how to develop an application, I visited tutorial websites, which contain lectures on how to start using Xcode.

When I first started to learn Xcode, my drive was tested by difficulty in even understanding how to use it. In other words, I was too innocent a beginner to start. Further, trying to learn a new media software independently was a large problem because tutorials by themselves are not sufficient to convey all the necessary information, and “help to find the way to fix problems all the time” was not included in the service. Thus, I needed intelligent tutorials, like a personal instructor, to help me solve errors whenever they occurred. Because of these learning difficulties, the process was extremely slow, and following the schedule was a big issue.

For this reason, I decided to take a class from The Pragmatic Studio, where the teachers are professional programmers. To participate in the class, I traveled from Rochester to Denver. The class curriculum was designed to help Xcode beginners. It involved four days of classes, nine hours per day with a one-hour lunch break. Though quite a challenging class, there were numerous valuable resources to learn from and to keep. It was also impressive that many students had traveled to take the course. Most of them had programming backgrounds, and they were much faster learners. Still, after completing the class, I knew far more about Xcode than before.

### 2.2 Case Studies

I had been investigating iPhone applications at the App Store since summer 2008. To analyze trends of applications in the market, especially in navigation categories, I had to collect as much information as possible. As of October 6, 2006, 146 navigation applications had been published. These could be classified by terms such as traffic, GPS, locations, and so on. Currently, the number of applications in the navigation category has increased to 342 items, indicating that the navigation application market has been growing fast.

According to case studies on current wayfinding media, most floor maps for public locations such as libraries and museums have their own design styles, trends, and methodologies of creation. They comprise brochures, interactive maps on Websites, and signage. For example, the Museum of Modern Art (MoMA) offers a PDF version of their floor map brochure on their Web site.

Another area of study was the design strategies of libraries in universities. The design strategy of most school libraries involves following the school's primary brand design strategy concepts in their design guidelines.

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## 3. Ideation

## 3. Ideation

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### 3-1 Introduction

The idea for this project started from the potential of applications to contain infinite contents via a ubiquitous device like the iPhone combined with the desire to create better interface environments with a design strategy. For example, the multi-touch interface system can build an intuitive graphic user interface with two-finger gestures. For this reason, designers might be able to apply tiny images to the limited screens in portable devices. With the introduction of zooming technical functions, the size limitation was solved and the environment is much improved. Although image quality can be an issue when users zoom in excessively, developers can restrict the function. Further, the applications had enormous potential for developers to invest their time and effort. In other words, the innovative functional feature of the iPhone improved the interface system and usability environments effectively, usefully, simply, and easily.

Original plans called for a search-engine function being included, in addition to more interaction-controlling functions for all contents for the RIT library. However, the limitations related to my technical abilities, in areas such as coding and app development knowledge, were too large a problem to overcome.

While developing the application, I made a number of attempts and faced many challenges as well. In fact, the Interface Builder software was one of the easiest ways to create a graphic user interface. However, I chose to use only coding to use my created images in order to apply a unique design style and creative ideation.

### 3-2 Sketches

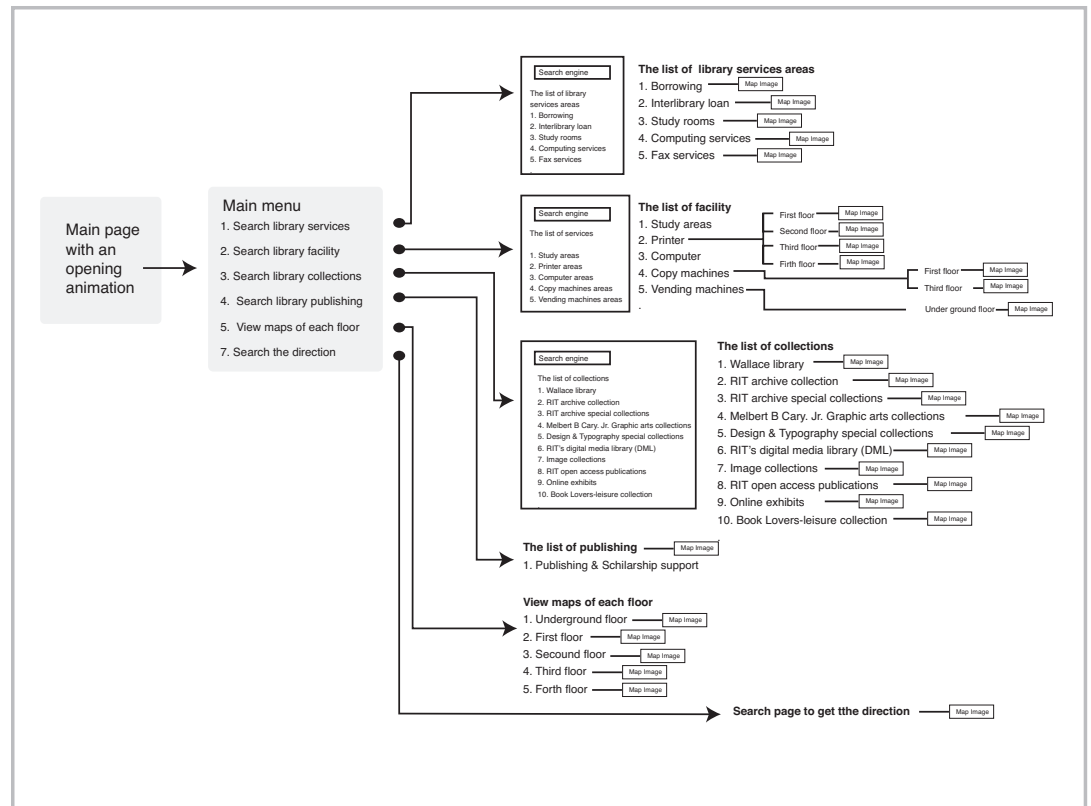
My ideas of sketches began the process of how to plan a better interface design while considering better workflow and design themes. All of the sketches were based on my rough plans; however, after conducting many experimental studies, they evolved into the blueprint of my RIT library application. Many sketches were produced for icons, interface, each graphic element, and so on. Based on these sketches, the application could be created with strong structures and bases.

### 3.3 Workflow Chart

The workflow chart shows a brief description of the interface structure. From beginning to end, the chart was altered several times to improve all the functional aspects, such as usability, design aesthetics, and technical issues. The first design was based on my first unpolished design plan, but after several modifications, the final version was based on solid elements such as user testing, benchmarks, and the realization of tasks.

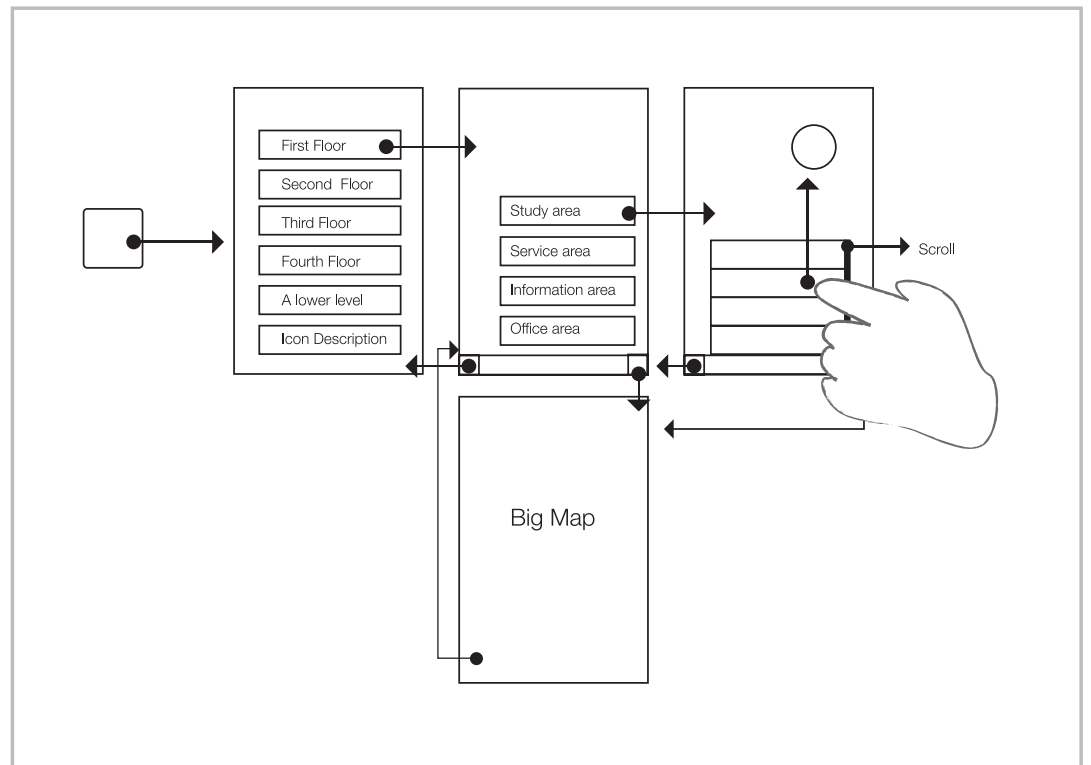
The wire frame, the basic visual guide, gives an effective sense of the description. It shows the idea of connection between each page. There have been several versions of the wire frame created since the previous year. The first version was based on research from the RIT library Web site, and the structure of the frame followed the structure of the site. For this reason, the first idea more closely resembles a Web site than a floor map as an application. However, based on research, this idea was not compatible as an iPhone application because a huge amount of content is not associated with iPhone capacities. The first wire frame image is shown in Image 3-1 below:

### 3. Ideation



[Image 3-1] Version 01 / 06:  
RIT Library Application Flow  
Map. 2008. November

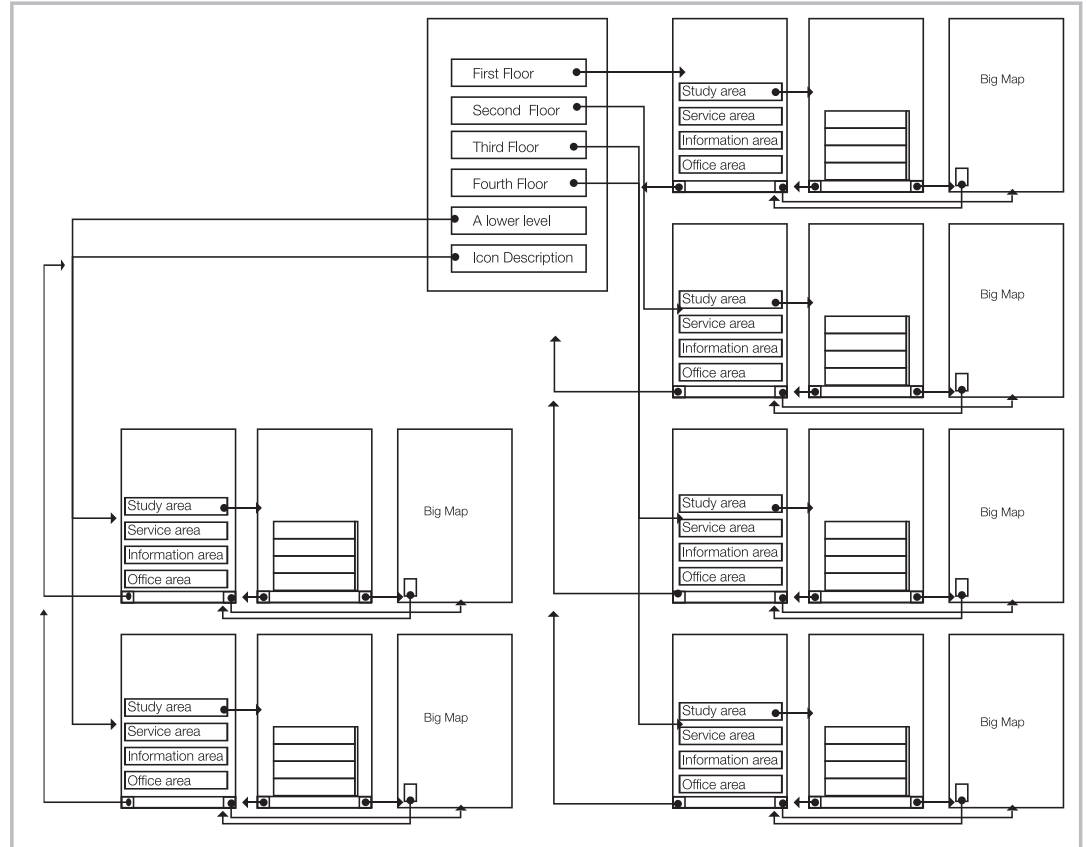
After this first extensive version, the workflows were simplified and made more effective and suitable for the iPhone's capabilities and environments. The later version is shown in Image 3-2 below.



[Image 3-2] Version 02 / 06:  
RIT Library Application Flow  
Map. 2009. March

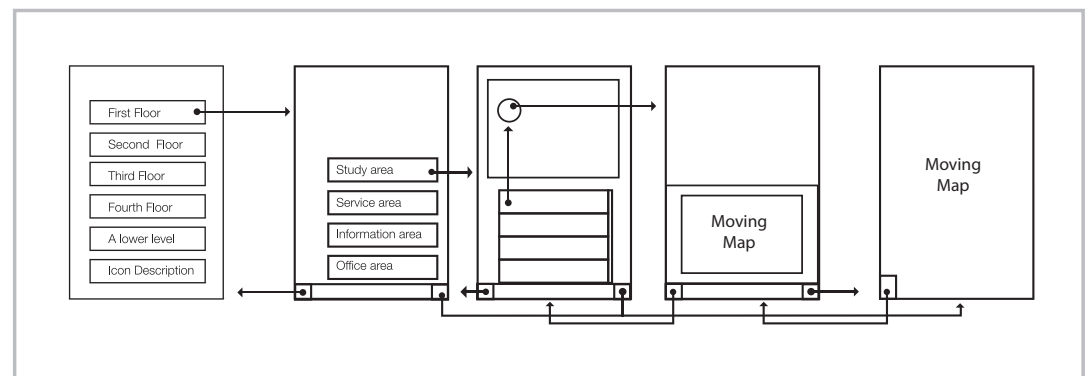
### 3. Ideation

Furthermore, I conducted user testing with a beta version of the application. After user testing, minor issues with the usability were resolved to improve the app's capabilities and the user environment. For example, from the results of a user test, I found that users preferred to use buttons rather than gesture functions such as swapping. For this reason, I took out the swap function to change the page, and replaced it with the button image used to change pages.



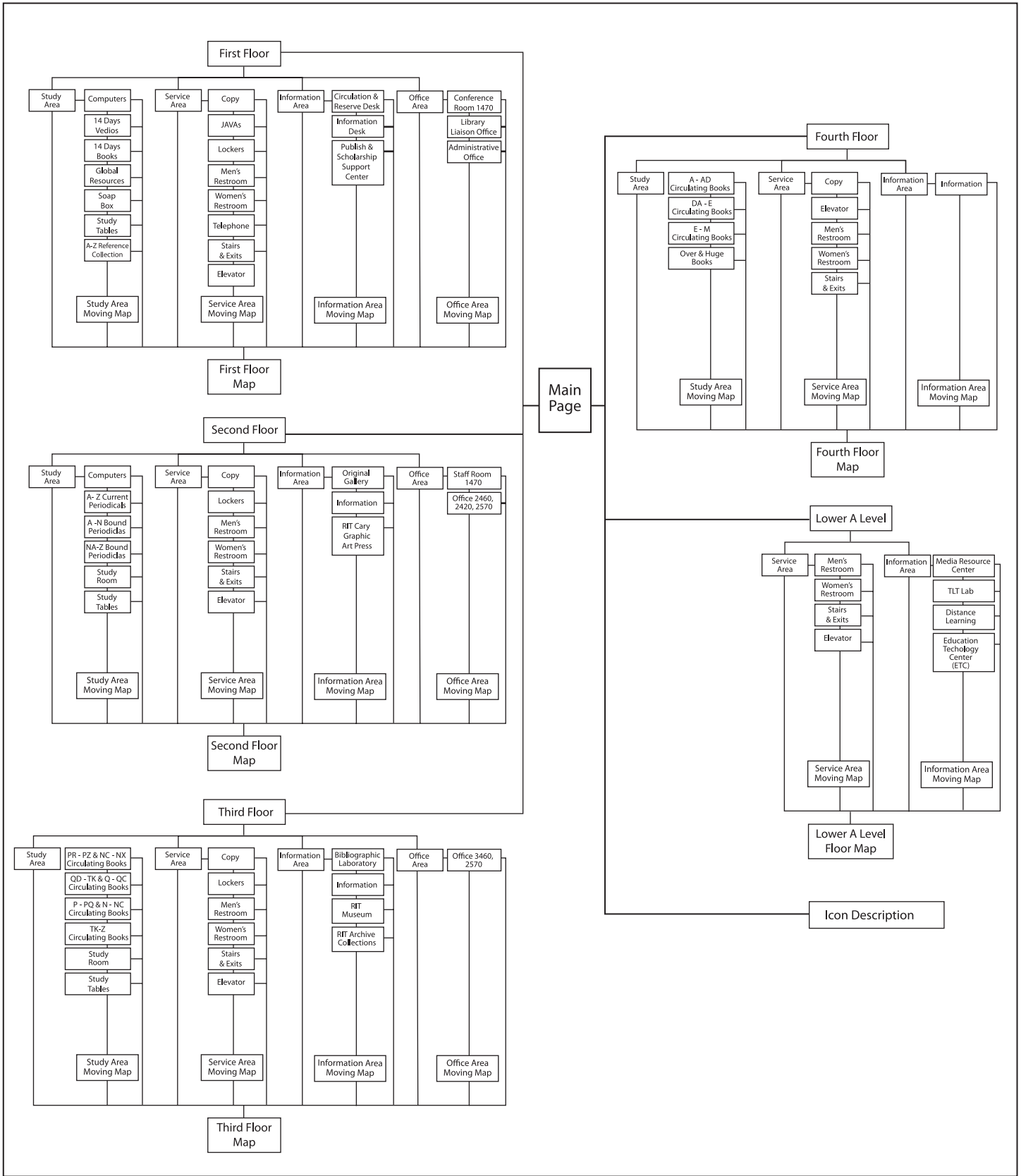
[Image 3-3] Version 03 / 06: RIT Library Application Flow Map. 2009. May

A number of minor issues, such as adding interactions on small icons to show more specific information for each of area that needed to be fixed and improved, were identified as a result of testing that evaluated factors such as user experience and user interaction.



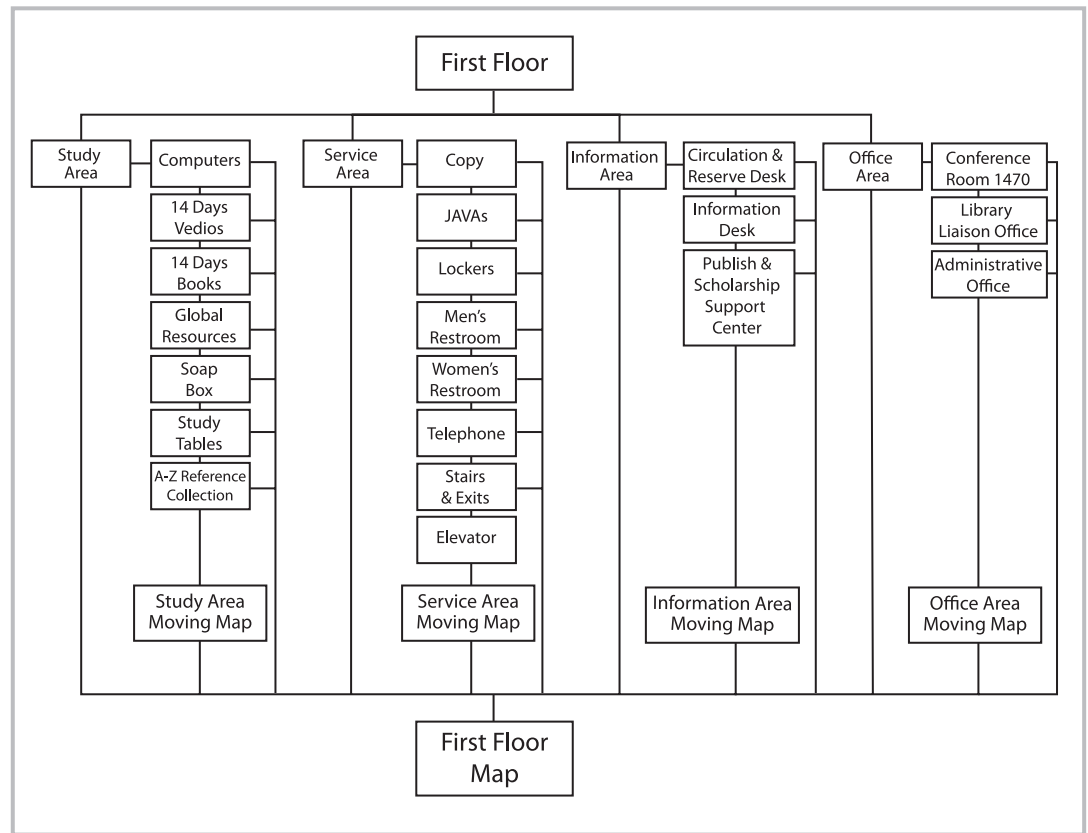
[Image 3-4] Version 06 / 06: RIT Library Application Flow Map. 2009. June

Ultimately, the final version was created based on all evidence collected from research and testing. This version was adjusted to the capabilities of iPhone applications and featured a better interface system than the first version. The final wire frame is shown in Image 3-5 below:



[Image 3-5] Final version: RIT Library Application Flow Map. 2009. July

### 3. Ideation



[Image 3-6] Final version: RIT Library Application Flow Map of the First Floor. 2009. July

Image 3-6 shows more a specific workflow for the first floor. All floors are divided into four areas such as study, service, information, and offices, and each area has its own specific categories connected with moving maps. In addition, all the areas connect to the map that contains all contents, thereby helping users to find the location easily. The first floor contains more services than other floors, which is easily observed in the workflow image.



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# 4. Design Methodology

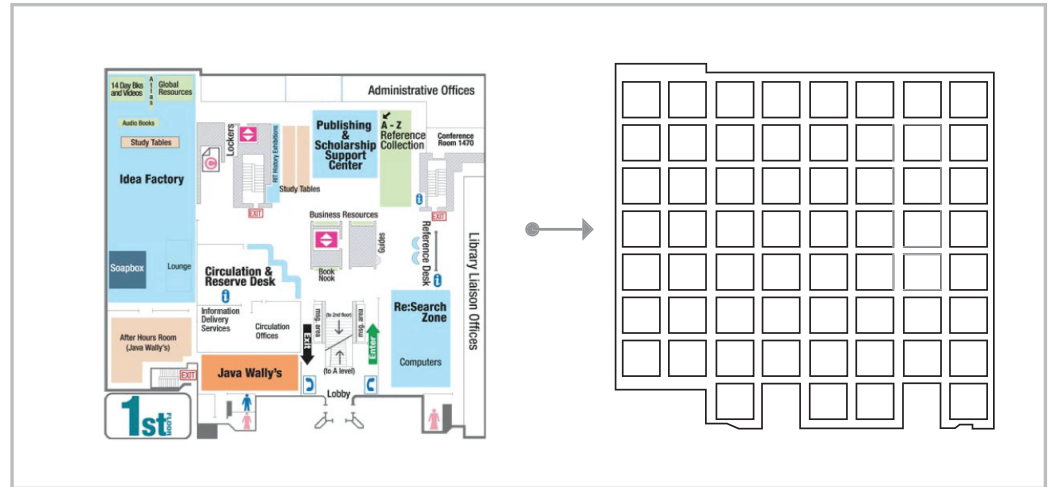
## **Introduction**

The design methodology for this application is based on basic graphic design theories and methodologies. The idea stemmed from the signage systems, icons, and simple graphics available for wayfinding, that is, helping people find their way in specific areas. Brochures and signs are designed to convey information to people without prior knowledge of the area, and public places are usually equipped with maps or directional information for visitors. A grid system, color system, and design principles were applied as design methodologies in creating this application.

# 4. Design Methodology

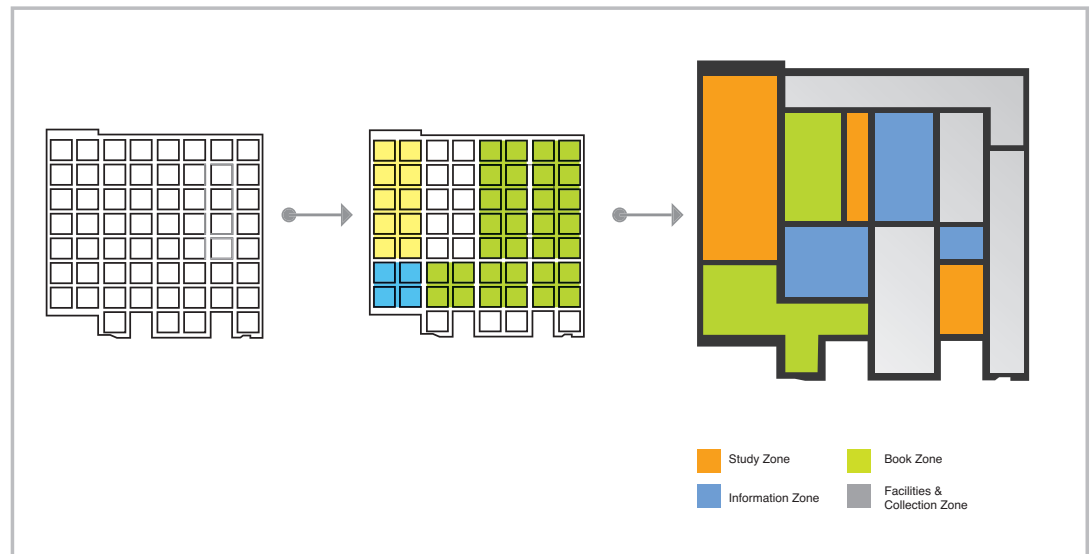
## 4.1 Grid System

A 7x7 grid system was developed for the RIT floor maps based on individual research. According to an analysis of RIT library maps, facilities such as desks, offices, bathrooms, and so forth are located in regular positions that allow easy division. In other words, most facilities are located and divided by 7x7 cubic modules. This grid system offers a method of designing specific areas with clean and simple arrangements for the new map design. Arranged elements will help convey information to users faster and also improve design aspects. Image 4-1 below supports this theory.



[Image 4-1] The cubic-module grid system principle

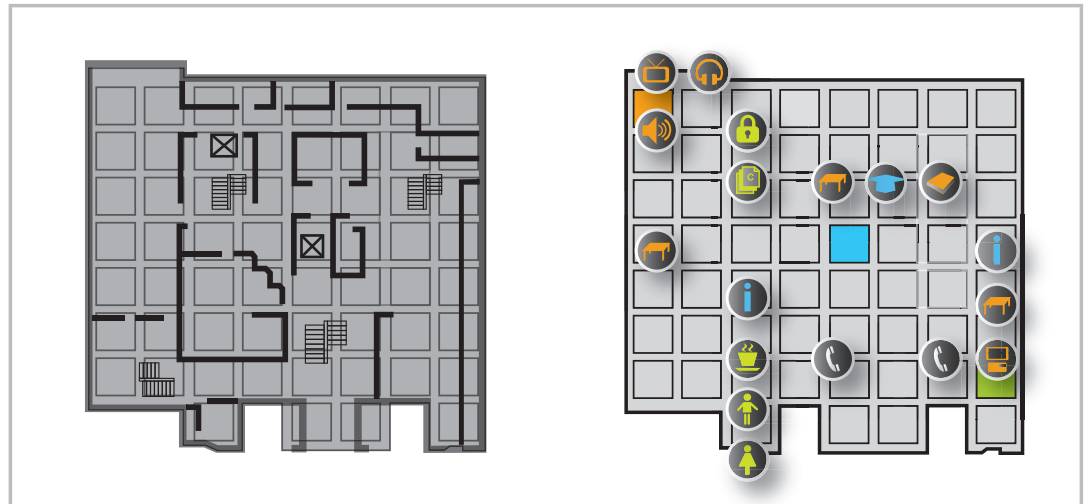
After creating a cubic grid system, the next step was grouping cubes by features of location and facilities. Finally, this grouping process supported the creation of a zone system. The zone system is also divided features of facilities. Image 4-2 below details this division process.



[Image 4-2] Grouping cube grid system

## 4. Design Methodology

The created zone system did not flow with the exact grid lines, but it helped in designing arrangements of graphic elements. Image 1-8 represents the process of how the cubic grid system was used to create a new design system for the RIT library floor maps.



[Image 4-3] Design the map based on grouping cube grid system

The grid system was also applied to the graphic interface design. Most of the graphic elements on the screen are aligned and arranged. For example, all design elements, such as button images, are aligned according to invisible rules for arrangement by the grid system.

### 4.2 Four-color System

The color theme for the application began from the identity of RIT. The orange color represents RIT itself, as the color of its mascot, a tiger, as well as the bricks of the buildings on the RIT campus. According to the RIT identity guideline manual, the main identity color of this application was chosen to be a shade of orange. For this reason, orange is applied to the study zone, where RIT students spend a great deal of time. In addition, an overall color philosophy is applied to the system of four colors. To decide on the four colors to represent four different zones, each a different feature of locations, color philosophy was used to select the colors. According to *Color Symbolism*,<sup>1)</sup> blue, green, orange, and gray have unique meanings and symbols:

Blue (Intuition): Using intuition to teach and serve  
Green (Will): Living willfully  
Gray (Honoring): Friendship  
Orange (Learning): Kinship

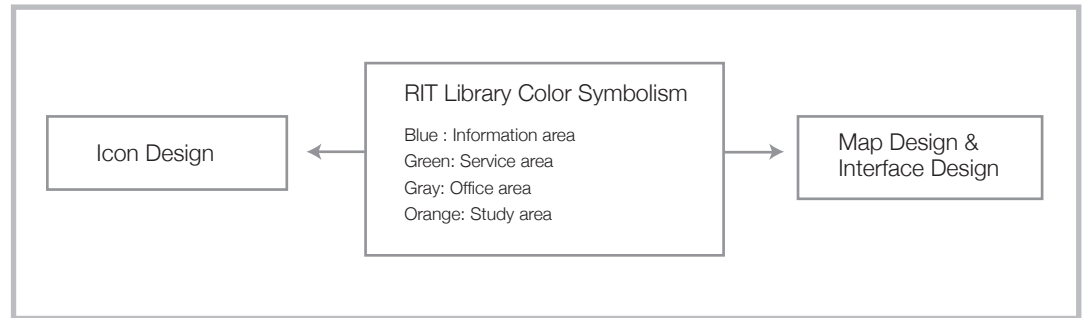
Regarding this color symbolism theory, the color system for the RIT library also selected these four colors. The RIT library color symbolism is applied to the four-color system:

Blue: Information area  
Green: Service area  
Gray: Office area  
Orange: Study area

1) Article, The Cryptic and the Unfathomable World of Color Symbolism, *Annette Labedzk*, <http://ezinearticles.com>

## 4. Design Methodology

The chart below shows how NACS affects the RIT library floor map color system. Furthermore, NACS also affects the icon color design system such that all designs are unified by one color guideline.

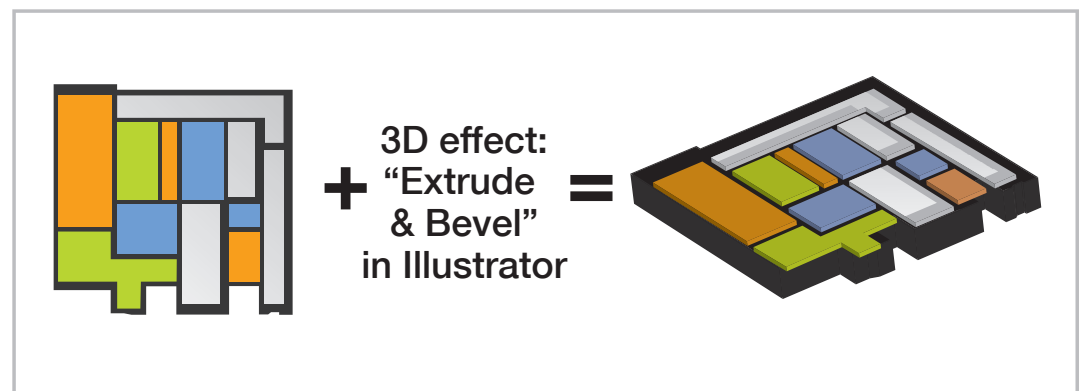


[Image 4-4] A chart how to apply color system philosophy to 4 colors system

This system supports the division of areas and specific zones by their features, which helps convey information about a specific location to users. However, the four-color system is just for icon design and design of the zone system. In other words, this system does not apply to background or all graphic elements. With this four-color system, texture is also applied to graphics. The inspiration of a main material color comes from the desks of wooden texture because the symbolic character of the library is “a place to study.” Therefore, the texture of a desk made of wood was chosen to be the main texture color. Since the main design concept of RIT buildings is brick, a dark red color was used as a main background color to give an effect of a brick-like texture. Texture will be further discussed in Chapter 4.4.

### 4.3 Three-dimensional Perspective Effect

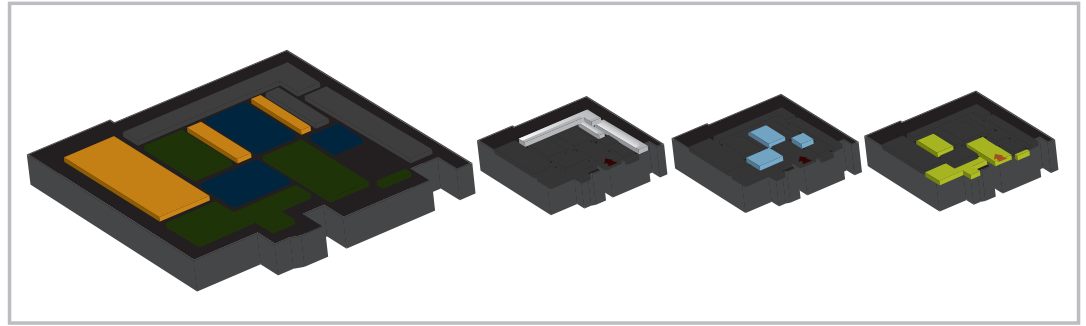
To represent three-dimensional (3D) real spaces as two-dimensional (2D) spaces on the screen, 3D perspective effects resulting from graphic effects and techniques were one solution proposed to reflect space perceptions. For this application, the Extrude and Bevel effects in Illustrator were used to design spaces of the RIT library. In particular, the image of each floor was created using this Extrude and Bevel effect to project a 3D expression on a 2D screen.



[Image 4-5] Creating 2D image to 3D by perspective effects

## 4. Design Methodology

Image 4-5 represents how a 3D image is developed using 2D image elements. After applying the Extrude and Bevel effect, designers should trim the image to arrange all of the positioned elements.



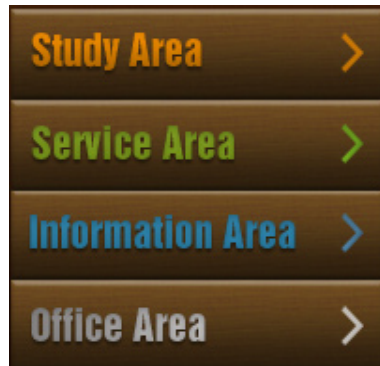
[Image 4-6] Perspective effects with zone & color system

Image 4-6 represents how the four-color system is applied to 3D floor map graphic images. All design methodologies are related by organic connections and theories.

### 4.4 Texture

#### Wood texture idea from desks in the library

In the RIT library, the majority of desk materials are wood. In particular, wooden desks are common from the second floor upward. The wood texture in the application symbolizes



[Image 4-7] Images of texture

the desks in the RIT library. Thus, this texture is used for most of the graphic elements in this application, including bars, buttons, and backgrounds.

#### Brick colors as a texture from RIT buildings

Given that the main design concept of the buildings on the RIT campus is brick, a dark red color was used as a main background color. Thus, images of texture have the effect of a brick texture. Brightness and chroma were the methodologies used to control the balance of designs as well as the overall color of texture. Furthermore, gradation effects and shadows were applied to each graphic to give more textural effects.

To give more mood to graphics like buttons, most of the buttons also had Emboss effects and gradations applied to them. Image 4-7 shows graphic elements with applied texture effects. Generally, buttons are the best example to show applied effects.

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### 4.5 Design theme

Applying the RIT logo was another issue to be dealt with. Since the purpose of this app was to maneuver within the RIT library, the real RIT logo was used instead of creating a new logo or new idea.

#### 1. Zone system

The zone system is divided according to several factors such as grids, colors, and features of areas. The features of areas in the RIT library allowed for information to be conveyed effectively to users. Every library location was divided into four zones by four area factors, such as study, service, information, and office. For example, the Study area features all study facilities, such as desks, study rooms, and so on. Similarly, other areas

Including the feature dividing, color systems, which already mentioned chapter 3, applied the zone system to complete its value. Dividing by color allows users to obtain information from the color code and have a greater sense of the features of each area quickly and easily.

#### 2. Typography

There were three different typefaces used for the graphic design of this application. Typography took on the role of representing features and characters of the application, and the typefaces help complete the overall look and feel of the design. Ultimately, the major concerns were with legibility, design themes, design compositions, and so on. Three typefaces were applied to the RIT library floor map application.

##### Helvetica Inserat

Helvetica Inserat is a member of the Helvetica family. It is not simple because of its round shapes, and it contains more decorative elements than other typographic families. It has little space between letters, which makes it perfect typeface for small and narrow spaces. Unfortunately, the iPhone display only has 320×480 pixel areas, which is not sufficient for wide typefaces. The features of Helvetica Inserat, such as narrow and bold, can be adjusted to the iPhone screen environment perfectly.

##### Helvetica Neue

Helvetica Neue was used for texts for designing the RIT library floor map application. It is also a narrow typeface, making it a perfect graphic element for the small screen areas. In addition, the sans-serif typeface offers high quality legibility. For this reason, it was used to explain the features of each location in the RIT library.

##### BlairMdiTC TT

BlairMdiTC TT is a clean, modern typeface in the humanities. It can represent features like information-based public implements for RIT students and faculty members, and banks of contents and history. For this reason, this font was used for the word “Library” in this application.

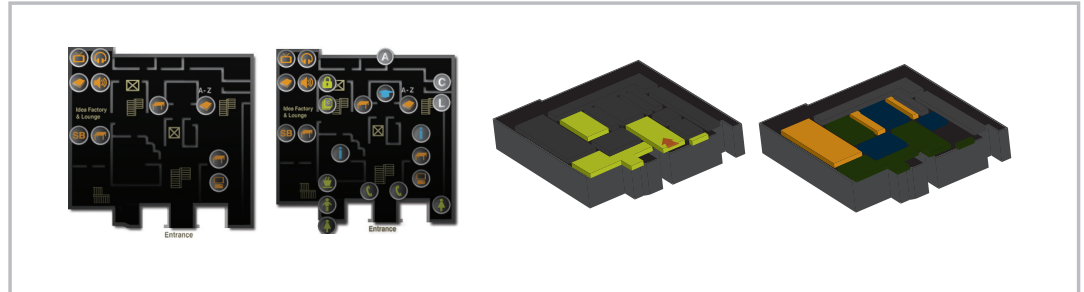
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# 5. Design Process

## 5. Design Process

### 5.1 Map Design

Based on the grid system and 3D perspective effects, the design of the floor maps was developed according to two different design themes: a 2D and a 3D image. For the interactive icon pages, according to the final design samples, 3D floor images with icon interaction offer a more intuitive information design for wayfinding than 2D images. However, to convey more specific wayfinding information to users, 2D graphic map images were used for the zooming functions, which can be used to find specific locations in the library.

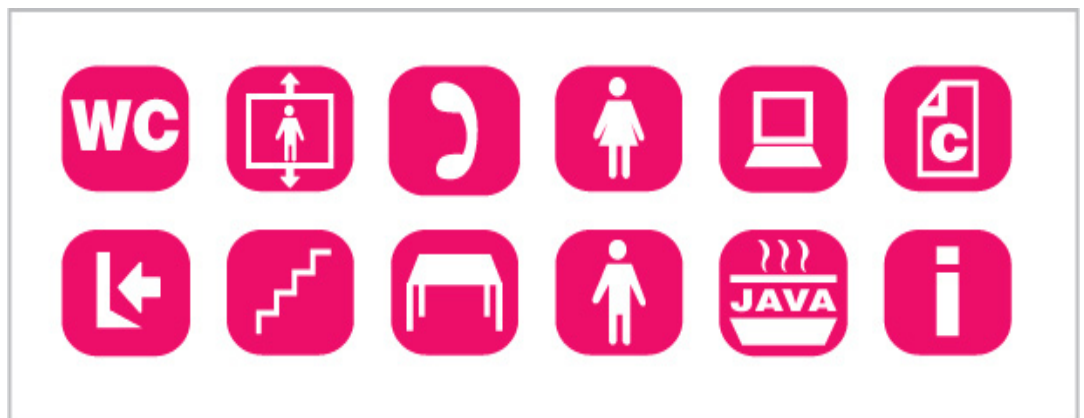


[Image 5-1] Map Design styles

Image 5-1 shows various design styles with all design methodology systems successfully related according to color.

### 5.2 Icon Design

The design of icons began with several tests and the challenge of fitting them on the small screen of the iPhone. At first, less consideration of the display environments was applied to design works; therefore, creating icons were much concerned with details. However, the testing results indicated that the choice to focus on detail was the worst design method for the iPhone screen. Greater detail produced much worse results because of legibility, design quality, and so on. In addition, the small size of the screen caused bad graphic quality, for example, of the small icons. Therefore, the strategy for icon design was changed from “detailed” to “simple.” Image 1-15 below shows the initial conception of icon design; some of these icons were too complicated for the screens of portable devices.

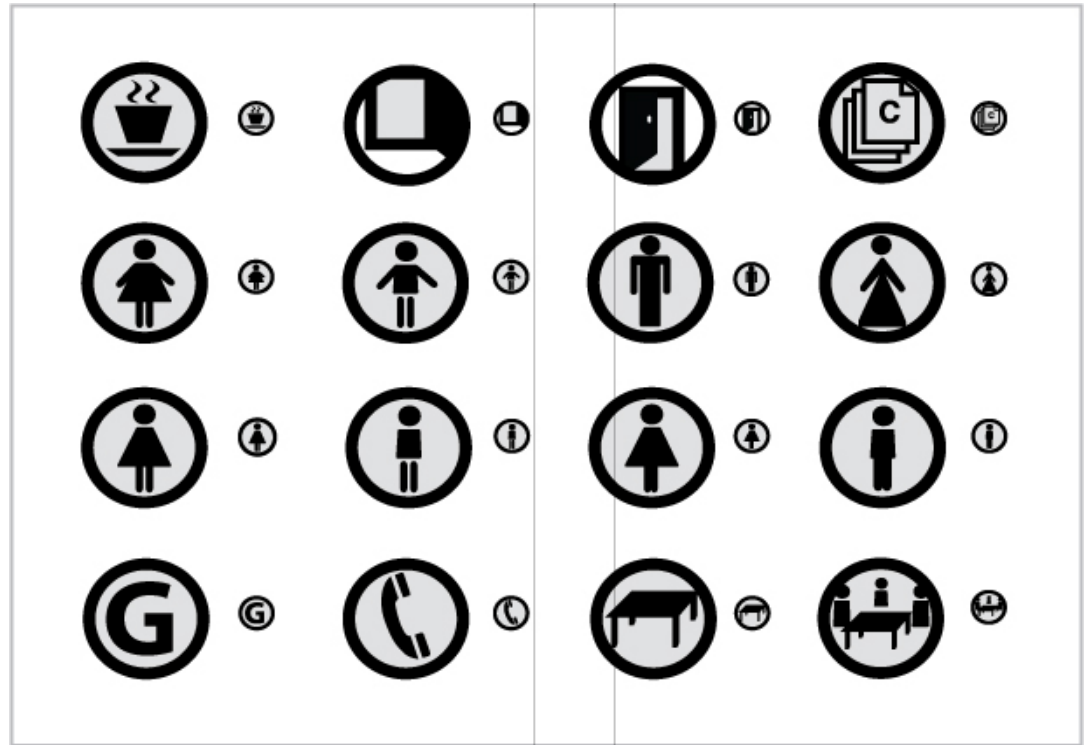


[Image 5-2] Icon Design  
Version 01



## 5. Design Process

After realizing designing detailed icons was not an effective method, the concept of icon design was changed to “clean” and “simple.” However, several tests and redesigns were still necessary. After reducing the scale of the completed icons to fit on the screen, many of the icons lost the details of their original shapes. Image 5-3 below shows another version of the icon images, which started to consider a simpler design.



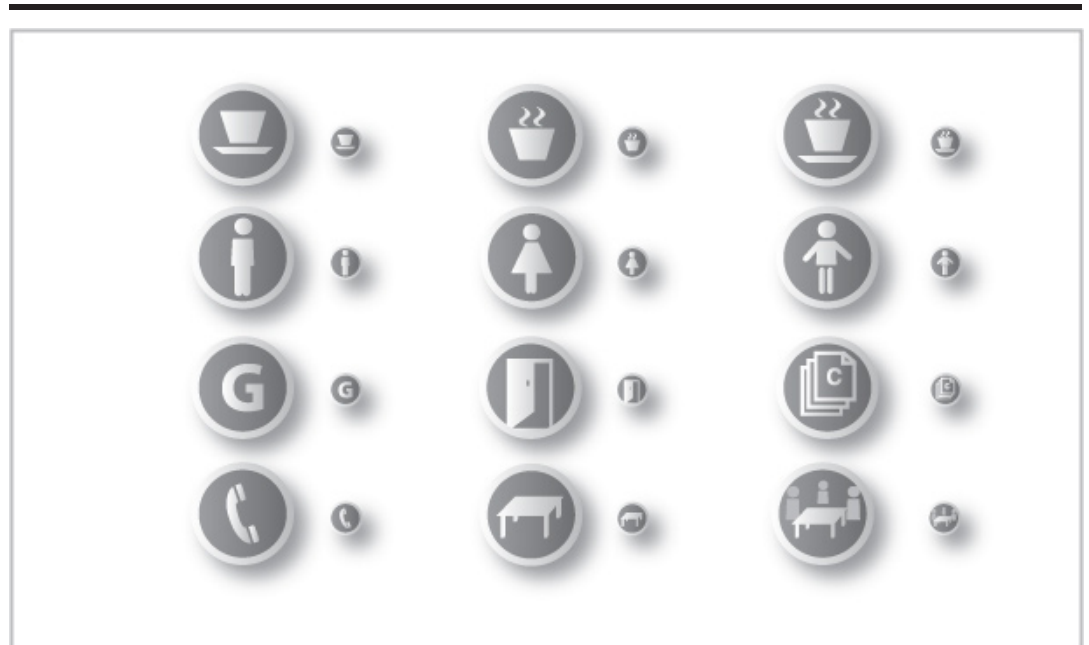
[Image 5-3 ] Icon Design  
Version 02

Although some of the icons in Image 5-3 were improvements on version 01, there were still a number of issues, such as how to develop the design successfully. In addition, another design methodology issue was how to make icon names of each specific location. To build icons with an intuitive meaning of the locations' features, it was necessary to have a successful creative design methodology. For this reason, the first letter of each feature or location name was used to create the icon design. For example, the gallery icon is identified by the letter “G,” the first letter of the location.

Image 5-4 below is an upgraded version of Image 5-3, in which effects of gradation were applied and the color was changed to grayscale. The black and gray color scheme in Image 5-3 was too saturated to use with other colors on the small screen. For this reason, the color was changed to a smoother mood of white and gray, and, to give 3D effects, shadows and gradation effects were also applied.

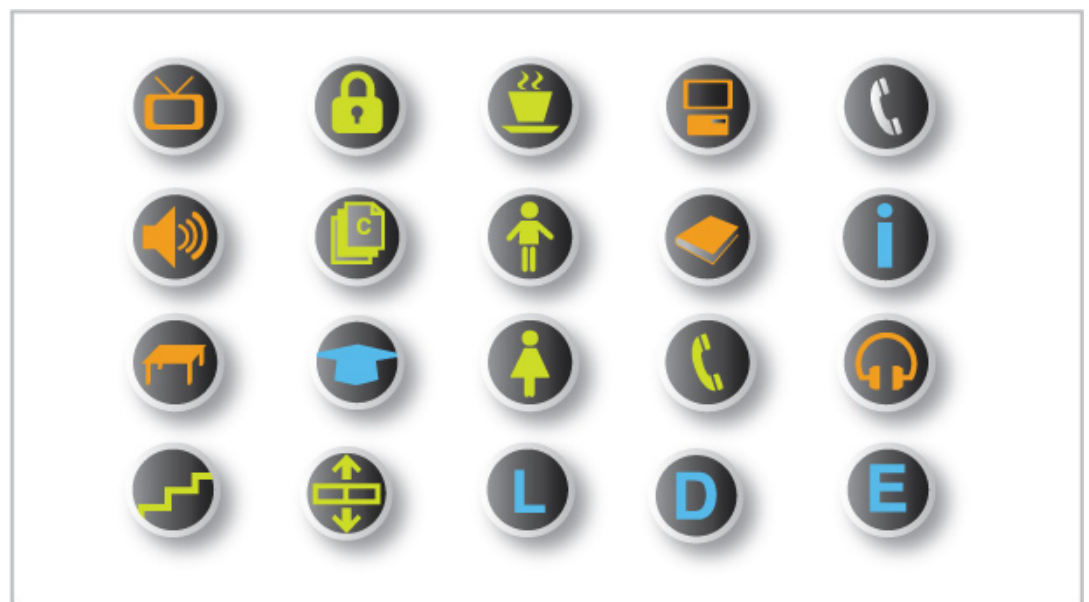
The experimental design was still tested to obtain better results. Each icon was tested with different designs, and the best design was selected for the application. For example, Image 5-4 shows several designs for the Java icon. The number one rule number, “keep it simple,” had to compete with another rule, that of obtaining “better communication.” Achieving both goals when designing the icons was somewhat difficult, and a number of attempts were made to develop icons with better designs.

## 5. Design Process



[Image 5-4] Icon Design  
Version 03

Finally, there was one more design revolution for the icons because of the color system. Icons located by zone areas should have colors covered zone areas.



[Image 5-5] Icon Design  
Version 04

For this reason, the color system was applied to the main shapes in the circle, and the background was given a much darker color of gray. After applying the color system, all of the designs were more organically related to build a systematic design for the iPhone graphic user interface.

## 5. Design Process

### 5.3 GUI (Graphic User Interface) Design

#### 1. Graphic User Interface Design Issues

One of the most important steps to offering better graphic environments is considering various issues in the design process. For example, usability, size, color, and legibility of texts have to be considered to improve the final product, and these need to be tested several times to achieve better designs. Design issues can occur at any time during the process.



[Image 5-6] Early GUI Design Studies

Graphic user interface design is the final product that synthesizes the design methods, themes, rules, and methodologies of the design elements. However, to create the perfect interface design, design elements such as usability, multitasking, information design, and representing feedback were stated as necessary considerations. For example, the function of this application is focused on button functions and zooming in and out with two-finger gestures. Thus, designers should consider how to design these functions as well as other aspects of tasking when they begin their design process.



[Image 5-7] Final GUI Design

Finally, balancing design elements is another big issue for the graphic user interface. A unified style builds the identification of applications in addition to strategic positioning factors for marketing.

#### 2. Technical Issues of Graphics

How to build code with images is another issue of the design methodology. There are two ways to build graphic elements in Xcode. One way is using the software Interface Builder, which has strong connections with Xcode. Interface Builder can edit and create a link with the code effectively.

The other method of creating graphic elements for the iPhone is using the language of the code "CGRectMake", which calls and positions images on the screen. The graphics

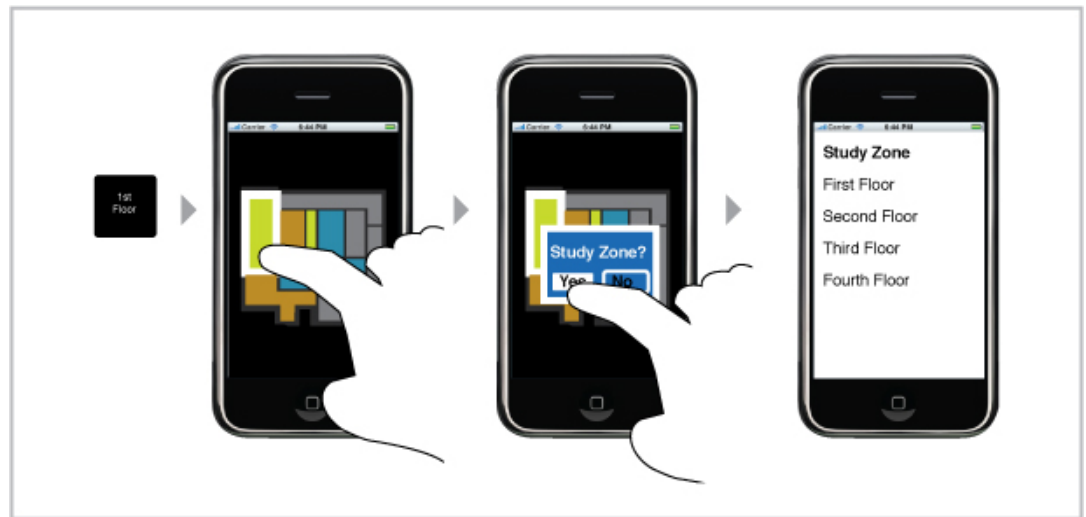
## 5. Design Process

of the RIT library floor map application were created by the second method, using code to call and position the image as well as to construct images. In other words, building images in code for this application did not require Interface Builder. In fact, this software offers standard graphic elements created by Apple designers, so it might be much easier to use than the first method. However, the first method might be not helpful in unifying styles of interface design.

For this reason, the use of code to create images on the screen was chosen as the better design solution for this case.

### 5.4 Interaction Design

Given that it synthesizes all elements of building an interface design, interaction design is the step that completes the design project. In particular, interaction design is helpful in conveying more information in limited spaces and providing more effects to decorate the screen. As far as the aspect of user experience, interaction design helps users achieve a more comfortable, usable environment. All of the roles of interaction design are important in completing the project successfully. For the most part, this application is composed of four different interactions: button actions and simple animations for page changes, controllers, and zooming in and out.



[Image 5-8] An early idea of Interaction Design Studies

Buttons have to be considered in terms of their size and placement for usability and feedback. In addition, because the animation of changing pages was related to workflow, it worked successfully as a user task. Furthermore, in this application, controllers are colored by the color zone system, allowing users to follow the zone system with the color codes. Lastly, the zoom in and out functions work with multi-touching, which allows two-finger gestures to control the size of the maps.

To build these interactions, the considerations of information design and coding were the most important factors. If the requirements of perfecting design elements are included, interaction design will be successful in all aspects.

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## 6. Technical Process

## 6. Technical Process

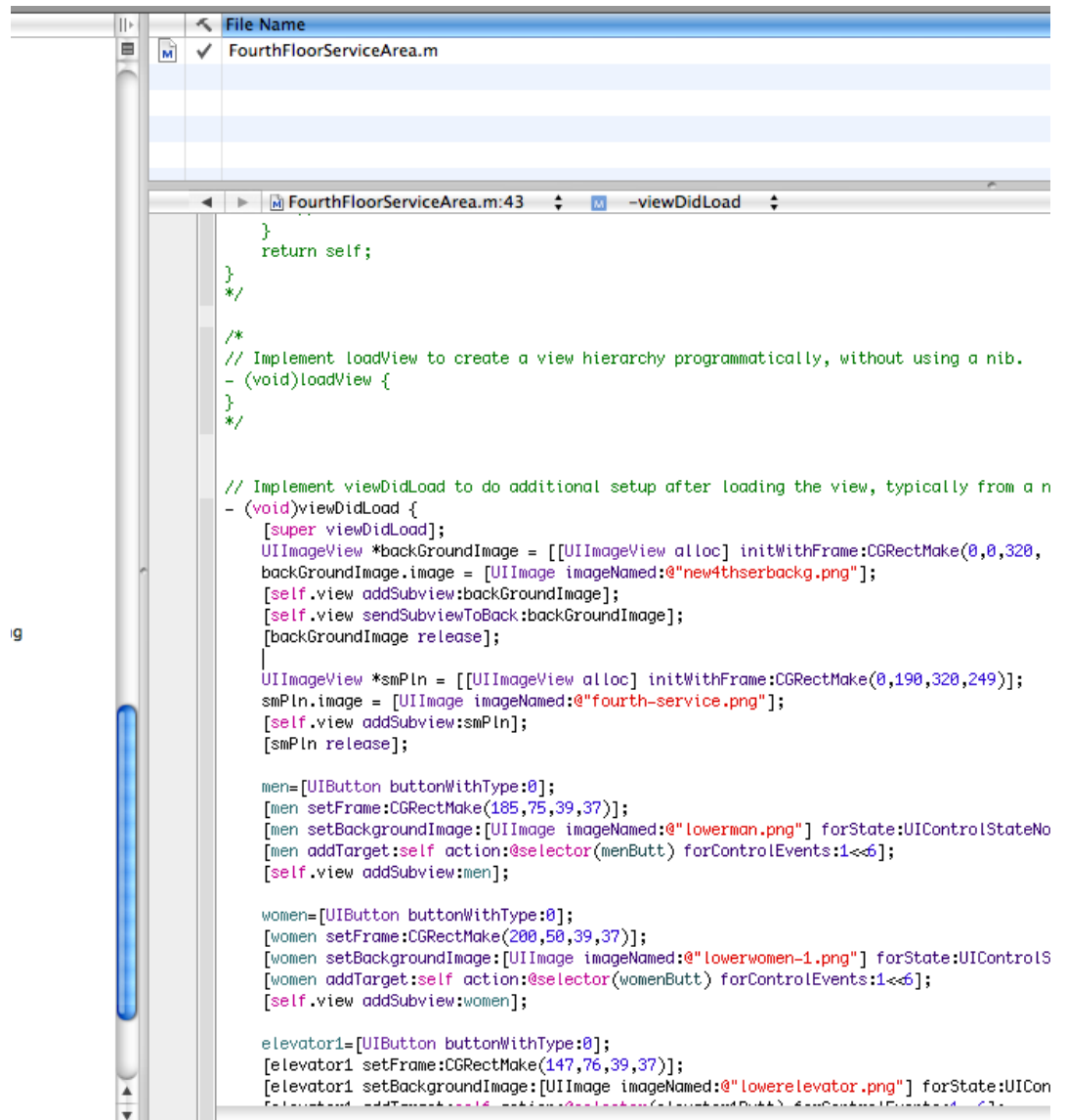
### 6.1 Coding and Resources

Developers must know how to use Xcode to build applications for the iPhone, and coding with Xcode is based on understanding the language, Objective-C. Apple offers a free software development kit (SDK) that includes all the necessary software such as Xcode, Interface Builder, and iPhone Simulator.

There are many ways to build applications using the iPhone SDK. However, the RIT library floor map application developed for this project was done only using code.

According to guidelines from Apple, it is necessary to prepare a PNG format file; this can be created in Photoshop, which has a “save for Web device” function. After creating all of the graphic elements, the file must be placed in the “resources” folder in the file list of Xcode. Without this step, it is impossible for Xcode to realize images.

The script CGRectMake is usually used to call images and requires four numbers to define the placements of graphics. The script UIButton is the way of calling the image as a button. In the void script, developers can give interaction functions and apply more specific interaction varieties. Image 6-1 below is an example of the Xcode interface.



[Image 6-1] The interface of Xcode

## 6. Technical Process

In Xcode, all codes are composed with two different file formats, such as “m” and “h.” These code formats are related organically and affect each other. #import script is to create connections between files. Furthermore, many scripts are used to build the application, which function effectively. During developing, there were some issues such as using Interface builder or not, many warnings about duplicating images, and uploading app to iTunes.

The first issue, I focused on, was whether to use Interface Builder or not, because this app is more focused on the design, so the role of the code is just for the tool to realize interactions and functions. I tried to use this way to place images in the Interface Builder and give them functions, but it was too confusing to manage hundreds of images. For this reason, I started to use only Xcode, to place images, and give interactions.

Moreover, at the first time, I didn't know that I don't have to re-import the images using Xcode when I want to change them. If I want to re-import a new image, than I just need to resave it to the same folder which linked to the Xcode. For this reason, my best warning message was “duplicated images”, whenever I re-imported, changed or fixed images. Also, it was a long project, so at the last stage, hundreds of images were imported in the resource folder, even what I didn't use. It created some problems such as making the file size bigger, and creating more warning messages. For this reason, I started to rearrange images. Also, sometimes, whenever I deleted images, which I thought it were not useful or being used, another new error message was showing as well. However, after the rearrangement of all images, there was no more confusion, which created the largest issue: to upgrade the version of app on the app store.

Finally, when I uploaded the file to the iTunes website, it asked for a binary file, including .app file. I did not know what was the .app file, so I had to spend more time to figure out how to upload, and what was the file. Actually, it was created when I built the Xcode. I need to find the folder that had the files for the distributing.

In conclusion, Xcode is quite different from other basic program software, but, despite all problems and issues, it is a very effective method of developing iPhone applications.

A screenshot of the Xcode code editor showing the implementation of a class named FourthInfomation. The code is in Objective-C and includes comments, imports, and an implementation block. The code is as follows:

```
// FourthInfomation.m
// RIT Library2
//
// Created by Jeong Ah Kim on 11/13/09.
// Copyright 2009 Rochester Institute of Technology. All rights reserved.
//

#import "FourthInfomation.h"
#import "FourthFloorZoom.h"
#import "FourthFloorInfoArea.h"

@implementation FourthInfomation

/*
// The designated initializer. Override if you create the controller progri
- (id)initWithNibName:(NSString *)nibNameOrNil bundle:(NSBundle *)nibBundle
if (self = [super initWithNibName:nibNameOrNil bundle:nibBundleOrNil]) {
// Custom initialization
}
return self;
}
*/
```

[Image 6-2] Coding in Xcode

## 6. Technocal Process

### 6.2 Building and Testing

There are two ways to simulate the code: built by a device or built by a simulator. Before testing the simulator, the code-building step is helpful to correct all errors and warnings. If developers register their devices for testing, they can simulate their application on their test devices. Otherwise, developers can also use the simulator. By opening code from either the simulator or the device, developers can test their work before uploading the application to iTunes. Building the version as a completed application requires a slightly different process from the regular building process. Specifically, it is necessary to create distribution when developers are building the project. The project menu contains an edit project submenu, which can create and edit the project identification. After creating a distribution menu for building, the developer can create the .app file to be ready to upload.

### 6.3 Publishing

iTunes reviews the application for several days to confirm the feasibility of presenting the developer's application at the App Store. iTunes asks developers to prepare a 57x57 pixel icon for display on the iPhone and a 257x257 pixel icon for the iTunes App Store, in addition to screenshot images to display on iTunes. Finally, a .zip file, which includes the .app file, is required. Developers can set the application's price themselves; the RIT library floor map application is available for free to users.



[Image 6-3] The image of a published application at the app store



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# 7. User Experience

## 7. User Experience

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### 7.1 User Survey

There are 5 standard bases for evaluating the application based on the user survey: information architecture, design improvement, usability, utility, and user experience. The intention of this questionnaire is to assess various tendencies of library users and evaluate their comments about the usability of the application.

#### Survey Questionnaire

1. Gender

1. Female      2. Male

2. Age

1. 10 – 20      2. 20 – 30      3. 40 – 50      4. 50 – 60      5. 60 - 70

3. Status

1. Student      2. Faculty      3. Others \_\_\_\_\_

4. Are you familiar with the location of the RIT Library?

1. Very familiar   2. Familiar      3. Average      4. Not familiar   5. Not at all familiar

5. If you have problem finding the location, what do you usually use?

1. Information Desk   2. Map      3. Internet      4. Sign      5. Others

6. Did you have any problem using the methods to find the location?

1. Always      2. Yes   3. Sometimes   4. No   5. Not at all

7. Did you ever use the RIT Library floor map to find a location?

1. Yes   2. No

If, you select “No” please go on to the survey below. If you select “Yes”, this completes the questionnaire. Thank you.

1. Does this application make it simple for you to find a location?

1. Absolutely   2. Yes   3. Average      4. No   5. Not at all

2. Is the interface easy to learn to use?

1. Absolutely   2. Yes   3. Average      4. No   5. Not at all

3. Is downloading convenient?

1. Absolutely   2. Yes   3. Average      4. No   5. Not at all

4. Does the new design provide improved aesthetics and functionality?

1. Absolutely   2. Yes   3. Average      4. No   5. Not at all

5. Do you have any problem finding the information you are looking for?

1. Absolutely   2. Yes   3. Sometimes   4. No   5. Not at all

6. Do you recommend this application to be a required service of RIT Library?

1. Absolutely   2. Yes   3. Average      4. No   5. Not at all

7. If you have problem finding a location, do you intend to use this application again?

1. Absolutely   2. Yes   3. Average      4. No   5. Not at all

## 7. User Experience

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8. Would you recommend this application to your acquaintances?

1. Absolutely    2. Yes    3. Average    4. No    5. Not at all

9. Please rate this application (on a scale of 1 to 5, with 5 being the perfect score)

1. 1                      2. 2                      3. 3                      4. 4                      5. 5

10. More suggestions or comments

Thank you for your cooperation.

### **7.2 Analysis: Evaluation Results**

The evaluation results provide some interesting information, such as aesthetic and functional aspects from the users' perspective. Ten people agreed to participate in the user testing. Each participant tested the application by completing their own mission to follow directions or find specific locations. To achieve their goal, participants used provided iPhones and, after testing, recorded their responses in a questionnaire survey.

Analysis of results from the tests indicated that users were more inclined to use signs than wall maps to find their way. I believe that users did not use posted maps because they are often hard to find in unfamiliar areas. Therefore, they tended to try to connect with other faculties for help or use signs to find for simple locations.

In addition, users enjoyed using the maps in the iPhone, and they would like to have this application available as a formal service of the RIT library or other public establishments. More than 70% users agreed to recommend this application to acquaintances. Users also liked the download feature to get the app whenever and wherever they need it. They strongly agreed about the need for improvement of graphic aspects over the current design because the map design in the library features design aspects of a low quality. Users also liked the simplicity of the design of this application.

On the other hand, users had some complaints about the size of the file, 15 MB, which is too large to maintain in the devices of individual users, and they suggested this application needs more functional improvement to contain more information and offer more interaction. Further, they did not feel strongly about the limited choice of the device itself and strongly agreed that it would be better if the library offered the device so that visitors and students would be able to use the application often.

In conclusion, the average rating was 3.8 out of 5, indicating that testers evaluated the value of the application as higher than normal. The application was valued by 76% of users, who agreed on the positive value and potential of the application.

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## 8. Conclusion

## 8. Conclusion

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This thesis project proposed opportunities to improve higher-level design projects for the field of smart mobile devices for the following reasons: suggesting new graphic user interface design aspects for wayfinding, acting as a research basis for future wayfinding design studies, forming a relationship between programming and designing, giving designers the potential to plan the entire process of an interface builder, and creating organic positions for the entire process of a project.

Moreover, it was helpful to learn useful knowledge necessary to be an iPhone application developer: how to code in Xcode, the actual process of developing the application, and design know-how in the iPhone environments, especially graphic user interface areas.

From the real-world experience of undertaking all the steps to develop the application, to the mistakes made when I designed the user interface, spending time trying to figure out the relationship between code and design and experiencing the various methodologies of developing an iPhone application provided tremendously valuable experience in my field of design.

Lastly, from all of the research analysis results, especially user testing, I expect this application will help suggest better solutions for iPhone graphic interface design fields, such as compensating for defaults of rack data base systems. In addition, more interactions and providing further specific information were defined as requirements to improve future wayfinding maps.

In conclusion, this project suggests the potential of wayfinding maps in the field of smart devices, as well as more subjects of research for future studies and possible improvements for a better solution.

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## 9. Appendix

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# Thesis Proposal for the Master of Computer Graphics Design Degree

Study on developing a potential way-finding map design of an iphone & ipod web application  
for Rochester Institute of Technology (RIT) Library

by Jeong Ah Kim

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## Abstract

The development of way-finding started when people established human civilization. To make advanced way-finding systems, people create and develop maps and sign systems, which are the most important parts of contemporary way-finding systems. Better design, better information architectures, and more studies about psychology helped make advanced systems for way-finding. Nowadays, new technologies, such as navigation systems, GPS, digital maps, and search systems on websites, like "Google map," help people find ways much more easily and quickly.

However, even though people tried to develop improved way-finding systems, many times it creates problems to figure out directions because of three reasons: poor information for small areas, difficulties accessing websites during moving, and less map and navigation contents for small places. For the example, first, when people want to go to some specific places, which just have rough maps, poor information, or complicate structures, it makes it easier to lose their ways. I believe that most people have an experience losing their ways when they visit some unfamiliar places, even though many signs are there for finders. These solutions such as sign systems are developed for way-finding, but, when ways are so complicated and small, still, it's hard to get correct ideas of directions. Moreover, when people are walking without computers or any other technical devices, it is also not easy to have information about correct directions. Searching on websites using portable mobile phones is the newest technology right now, but it is not comfortable at all, because, except for some famous places, most places, small areas, and buildings don't have digital map-contents for download, and there are not enough contents to get fast and easily. Therefore, even though people have portable devices, unfortunately, there are not many ways to get maps or information as contents of directions.

To solve these problems, I want to develop a new content for way-finding systems of web applications for iphone user interface environments. Web applications for iphone are a new technology for portable mobile devices for two reasons: the first reason is about interaction systems of the multi-touch interface with new groundbreaking technologies. Another is about the Apple store, which provides the best technical environment for downloading and a free market place of web-applications. The web application is a kind of software for the smart device like iphone or ipod. It has many features, and convergent all kinds of new technical functions, such as mp3, cell phone, camera, e-mail, and games. It's also easy to download like other devices for ubiquitous environments. In other words, it can offer web applications to users at any time, and anywhere.

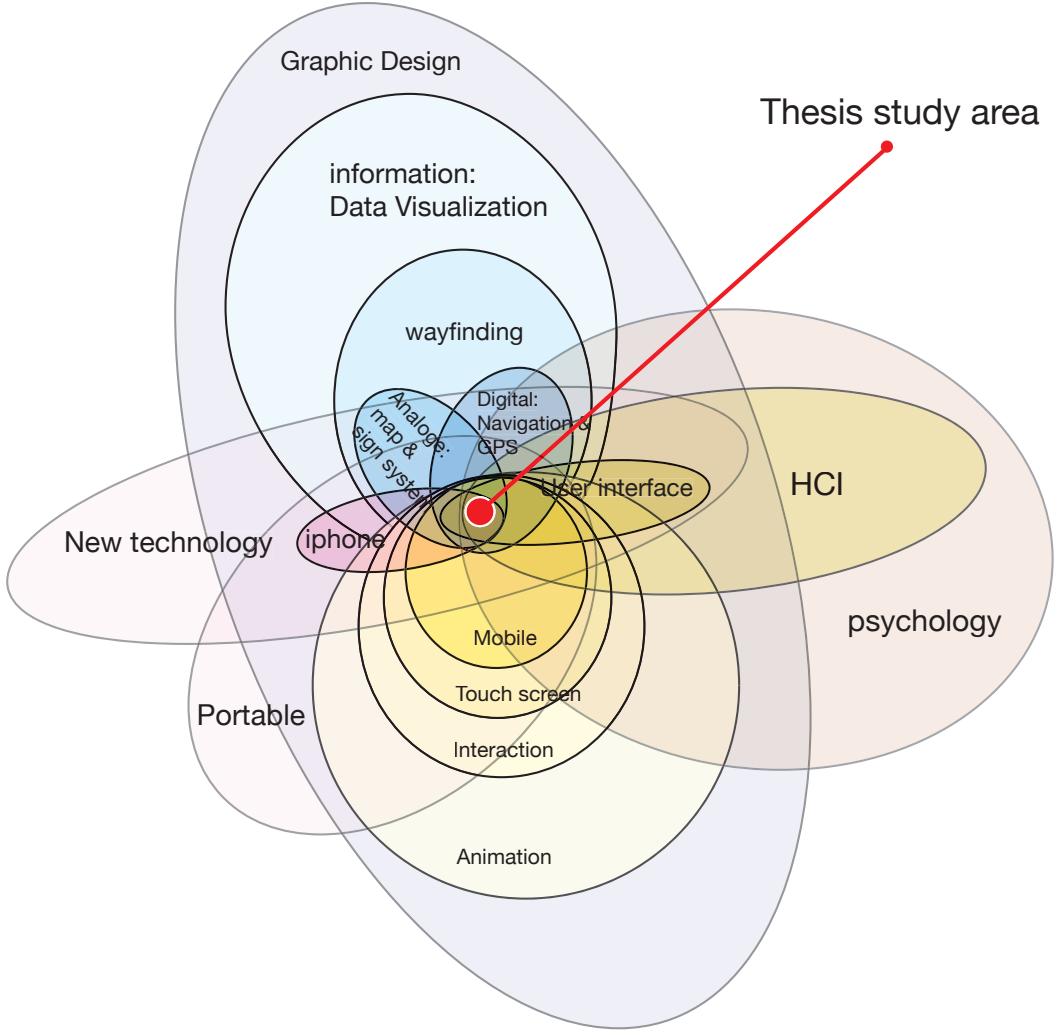
In conclusion, I expect that this thesis project will solve these problems of concurrent way-finding systems as a new web application of portable navigation devices. I also expect to improve graphic user interface environments for iphone. This project, developed for the RIT library map and way-finding system for iphone web applications, is an example of a solution for all problems of contemporary way-finding systems.

# Scope

This project covers a variety of computer graphics design areas such as interface design, information design, interaction design, and so on. There are two big issues, related with the design, such as a small display, and an interaction.

First, when developers build each screen for the mobile device, they need designer's opinions and concern because of legibility, and the size of contents. These are problems of a small display device, which has a small screen. 320 X 480 pixels are not enough to show all of the information at one time. For example, this thesis project needs to combine sign systems and maps in the real world into a small screen, like an iphone. For this reason, developers need to be concerned with an well-developed design like an appropriate size of buttons without making any mistakes, and reasonable size of text to read. The actual size of sign systems and maps is too big for portable devices without well-developed design. To solve this problem, designers should consider good design when designers interpret information as graphic images to the new media environment.

Moreover, lots of information designs for way-finding need better interaction design for two reasons: transferring information effectively and showing much information easily during short and limited time. Interaction with animation can improve portable devices display areas. Interaction design is one of the main areas of computer graphic design. Adding interaction can show more possibilities to communicate information with users much more effectively than before.





## **Project Description / Methodology**

Design of application should follow the parts of design guideline from Apple. However, this project will be more considered about legibility and small display for users. From feedback of two users, iphone users and non-users, it will prove that this project has well-developed design for iphone. For the map illustration, nowadays, most developers just use map image from Google. For this reason, this project will make another design approach than others which have improved color systems, and interface design. For this project, Mac is the best choice, because SDK, software for developing iphone application, can be run only at the Mac OS system. The Apple provide SDK software as a free for developers.

### **Procedure**

1. Research: Market, theory, case study
2. Built: work flow, contents, design, coding
4. Combine
4. get feedback

### **About RIT Library**

Studying in the library to develop a way-finding system is the best subject for this thesis project for two reasons: contents to develop and the size of building.

First, the RIT library has lots of services, events, facility areas for students. There are lots of studies about information design for libraries, because they have lots of contents to find. In my opinion, the RIT library will provide enough and more data to develop web application for this thesis project. the RIT library is made up 5 floors including the underground floor with public facilities such as copy machines, printers, and study areas. Moreover, the RIT library has confused structures for finders, so this will be the good subject as a thesis project.

This project is still in process, but there are three things that I'm looking for: well-developed design system, well-organized user interface, and well-built interaction system. These will be what I'm looking for as a result.

### **Limitations**

Advanced coding like professional programmers to develop application. I just started to learn coding and other softwares.

### **Marketing Plan:**

After finishing all the work for developing my idea, I will represent this web-application project on the Apple app store, which provides a free marketplace for application developers. Right now, in October 2008, there are 146 navigation applications on the store. To show this application to the world, to get some feedback from users, and to watch the result of needs of navigations for specific areas, uploading the work to the store is the most important element to finish this thesis project. The application store is still a hot issue for iphone and ipod users for two reasons: it offers the environment to be able to personalize iphones, and it also can provide much more comfortable and creative developed functions to users than the original one.

### Budget:

\$2000 for cost of Macbook pro

200 for cost of books

\$100 to involve Apple developer's membership

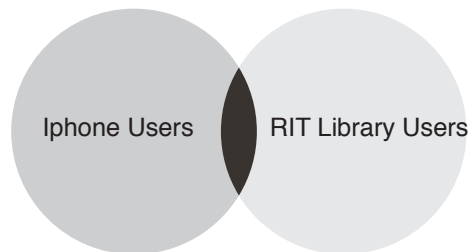
\$100 to buy and test web application

\$100 facility and extra budget

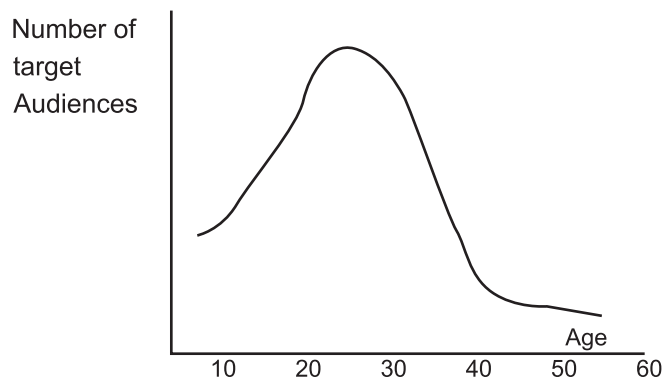
Total: \$2500 & up to \$3000

### Target Audience

- Iphone users & RIT library users (students, staff, faculties)



- Graph of age groups: From 10 to 40



Educational Level: More than Elementary School

Motivational Level: Early adapters & Nomal users

Experience with Thesis Subject Matter:

All kinds of experiences will be accept, but first users are more appropriated for this project

Target audience:

1. John Meader

Age: 20

From: Buffalo

The first year student at RIT

What he likes: iPhone, Mac, Game, Football, and so on

Life: Study & Hang out with friends

Need: More knowldge about campus and this town

2. Ellen Hue

Age: 30

From: Rochester

The first year student at RIT for MFA program

What she likes: iPhone, Mac, and so on

Life: Study, hang out with friends, reading books, stay at home, and so on

Need: More knoweldge about campus

### **Software and Hardware Requirements**

- Macintosh Intel Core 2 Duo: 2.4GHz, 200GB Hard drive, 2GB memory
- Xcode
- Interface builder
- Cocoa
- Obejct C+
- Illustrator CS3
- Photoshop CS3

# Literature Survey

## Books

### **Jacobson, Robert E.: Information design. Cambridge, Mass.: MIT Press, 1999**

This book is like a dictionary for the information design area. It describes information design from theory to practice very intently. The author tried to convey the message about the real meaning of the term, information design, and using specific examples to explain about more detail. Also, readers need to think about philosophical aspects of design when they are finished reading.

### **Kim Baer, Jill Vacarra : Information Design Workbook: Graphic approaches, solutions, and inspiration plus 20 case studies: Rockport Publishers, 2008**

Compared with the book, *Information Design*, this book focuses on the case study of current information design area. Also, the authors offers much more detail about information design and its history, definition, and theory. In this reason, readers can approach various aspects about information design easily.

### **Andreas Uebele: Signage Systems and Information Graphics: Thames & Hudson, 2007**

The book showcases strong examples of signage design worldwide, ranging from museums and schools to transport systems, with an emphasis on the most original approaches.

### **Calori, Chris: Signage and wayfinding design : a complete guide to creating environmental graphic design systems. Hoboken, N.J. : John Wiley, 2007**

*Signage and wayfinding design* is a comprehensive resource that enables readers to get more information easily than other books. It contains lots of case studies of large and small projects in efficient and proven cases. It shows not just focus on sign systems of design, but also environment and building structures.

### **Alina Wheeler : Designing Brand Identity: A Complete Guide to Creating, Building, and Maintaining Strong Brands: Wiley, 2006**

This book has the innovative approach about brand identity design for designers. Moreover, it has more theory for brand design with graphics and easy explanations to build much stronger design. Also, case studies are specific examples for branding design.

### **Berger, Craig: Wayfinding : designing and implementing graphic navigational systems. Crans-Près-Céligny. Hove : RotoVision, 2005**

This book is focusing how to develop succesful graphic design system for navigation systems. It also has strong examples for navigation systems.

### **Wagner, Richard: Professional iPhone and iPod touch programming [electronic resource] : building applications for Mobile Safari. Indianapolis, Ind. : Wiley, 2008**

This nook include strong coding and ways to develop iPhone anad iPod touch programming. To build professinal coding, this book is the best choice for developers.

### **Aaron Hillegass: Cocoa(R) Programming for Mac(R) OS X. Addison-Wesley Professional; 3 edition, 2008**

This book shows how to write cocoa programming for Mac OS system. I took this book to help to understand cocoa programming and programming systems of iPhone.

## Websites & Blogs

### **Bill Dudney , blog for iphone developers, 2008 <<http://www.subfurther.com/blog>>**

This websites is created by Bill Dudney who is a software developer and entrepreneur currently building software for the Mac. It has lots of resources such as coding for developing web application and other programming areas.

### **Iphone development central: Tutorial, 2008 <<http://www.iphonedevcentral.org/>>**

This websites has well-developed tutorials from beginners to advanced programmer who want to build their own web application. Also, it has lots of information of iphone developer's area. Users can get information faster like what's going on, forums, and news.

### **Apple Inc. 2008 < <http://developer.apple.com/iphone/>>**

The Apple provides and share information to develop application for iphone. They opened developers' membership site for developers who want to try developing application. This websites also shares guidelines, several sample coding, and tutorials for developers.

Apple Inc., iPhone Developer Programa; Standard Program Portal User Guide for iPhone OS 2.1. 2008 <<http://developer.apple.com/iphone/>>

Apple Inc., Introduction to the iPhone SDK. 2008 <<http://developer.apple.com/iphone/>>

Apple Inc., iPhone Development Tools Overview. 2008 <<http://developer.apple.com/iphone/>>

Apple Inc., iPhone Application Development - Getting Started. 2008 <<http://developer.apple.com/iphone/>>

Apple Inc., iPhone Application Frameworks - In Depth. 2008 <<http://developer.apple.com/iphone/>>

Apple Inc., iPhone Graphics and Media Overview. 2008 <<http://developer.apple.com/iphone/>>

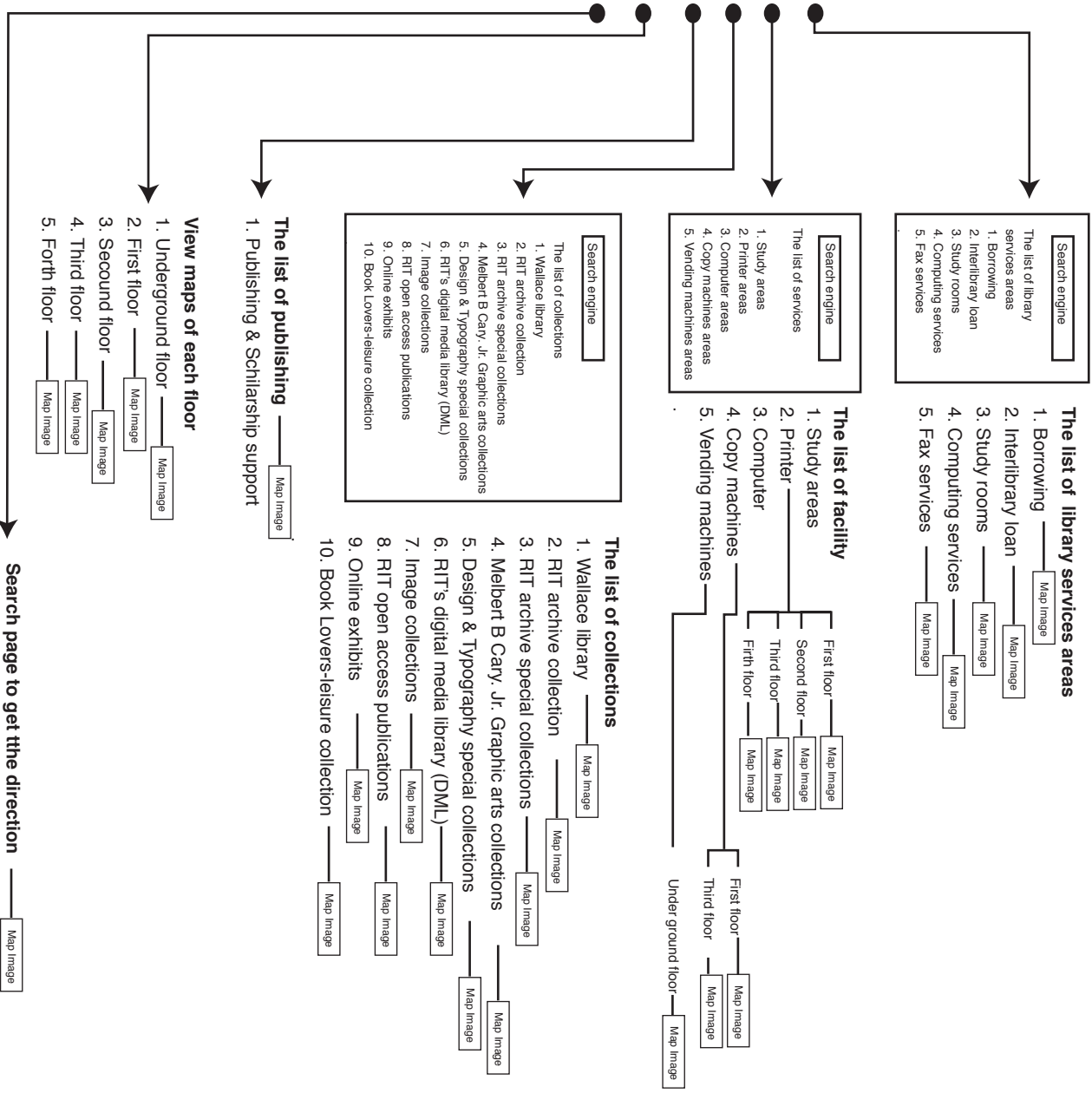
Apple Inc., Using iPhone Features in Your Application. 2008 <<http://developer.apple.com/iphone/>>

# The Work Flow For The RIT Library Navigation System

Main page  
with an  
opening  
animation

## Main menu

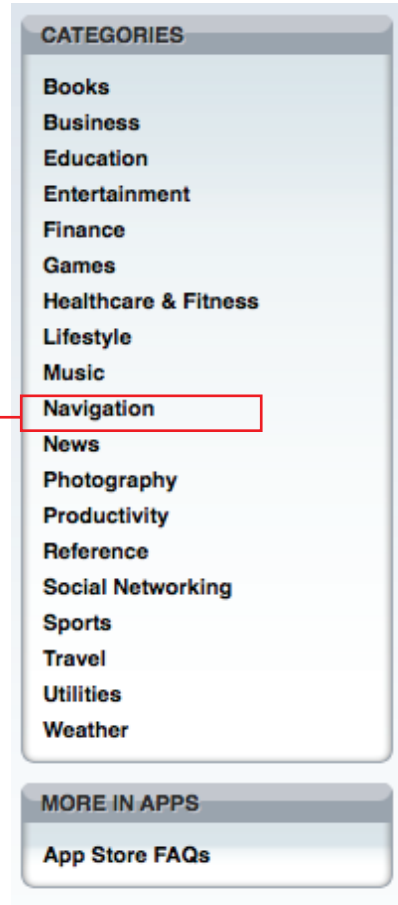
1. Search library services
2. Search library facility
3. Search library collections
4. Search library publishing
5. View maps of each floor
7. Search the direction



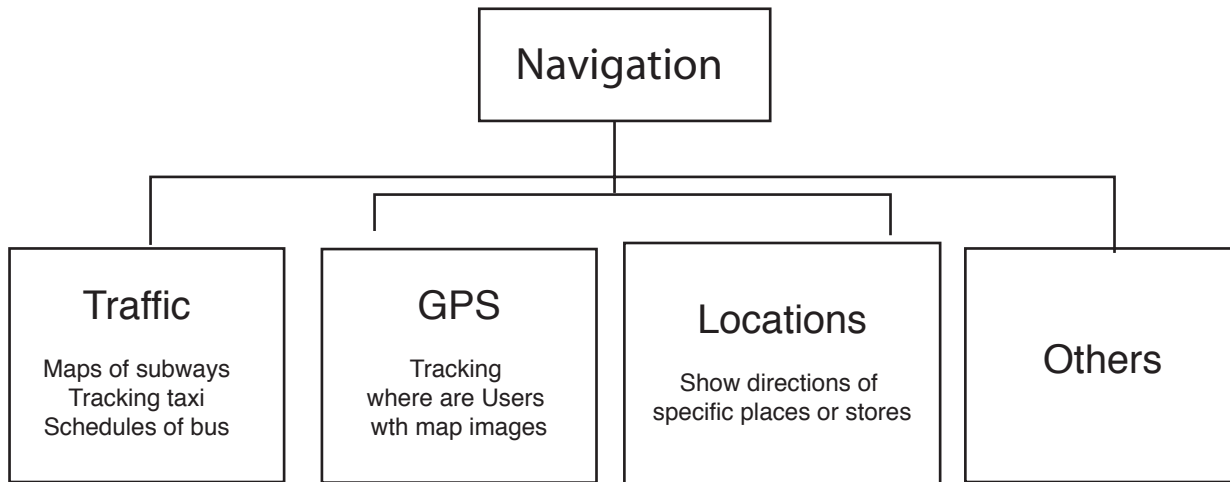
# The study about current iphone navigation markets

## Iphone app store

Total: 146  
(October. 06.2008)
























## Classifying navigation application



# The study about current iphone navigation market

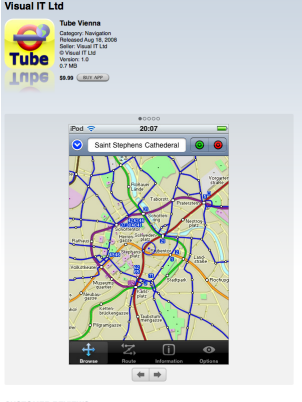
## NAVIGATION

Page 1 of 7 Sort by: Release Date

 <p><b>Traffic UK</b> Category: Navigation Released Oct 03, 2008 <b>\$1.99</b> <a href="#">BUY APP</a></p>	 <p><b>Vancouver Traffic</b> Category: Navigation Released Oct 02, 2008 <b>\$9.99</b> <a href="#">BUY APP</a></p>	 <p><b>Montréal Traffic</b> Category: Navigation Released Sep 29, 2008 <b>\$9.99</b> <a href="#">BUY APP</a></p>
 <p><b>NavigX Touch</b> Category: Navigation Released Sep 29, 2008 <b>\$2.99</b> <a href="#">BUY APP</a></p>	 <p><b>Québec Traffic</b> Category: Navigation Released Sep 29, 2008 <b>\$9.99</b> <a href="#">BUY APP</a></p>	 <p><b>Traffic</b> Category: Navigation Released Sep 29, 2008 <b>\$1.99</b> <a href="#">BUY APP</a></p>
 <p><b>Calgary Traffic</b> Category: Navigation Released Sep 28, 2008 <b>\$9.99</b> <a href="#">BUY APP</a></p>	 <p><b>Cheapskate</b> Category: Navigation Released Sep 28, 2008 <b>Free</b> <a href="#">GET APP</a></p>	 <p><b>iTrans LA Metrolink</b> Category: Navigation Released Sep 28, 2008 <b>\$4.99</b> <a href="#">BUY APP</a></p>
 <p><b>Say Where!</b> Category: Navigation Released Sep 28, 2008 <b>Free</b> <a href="#">GET APP</a></p>	 <p><b>Toronto Traffic</b> Category: Navigation Released Sep 27, 2008 <b>\$9.99</b> <a href="#">BUY APP</a></p>	 <p><b>GiPosition</b> Category: Navigation Released Sep 27, 2008 <b>\$1.99</b> <a href="#">BUY APP</a></p>
 <p><b>Path Tracker</b> Category: Navigation Released Sep 27, 2008 <b>\$0.99</b> <a href="#">BUY APP</a></p>	 <p><b>gpsCompass</b> Category: Navigation Released Sep 26, 2008 <b>\$1.99</b> <a href="#">BUY APP</a></p>	 <p><b>Marine Maps (Great Lakes)</b> Category: Navigation Released Sep 26, 2008 <b>\$44.99</b> <a href="#">BUY APP</a></p>
 <p><b>G-Park</b> Category: Navigation Released Sep 25, 2008 <b>\$0.99</b> <a href="#">BUY APP</a></p>	 <p><b>London A-Z</b> Category: Navigation Released Sep 25, 2008 <b>\$9.99</b> <a href="#">BUY APP</a></p>	 <p><b>Marine Maps (Alabama and Florida)</b> Category: Navigation Released Sep 25, 2008 <b>\$44.99</b> <a href="#">BUY APP</a></p>
 <p><b>Marine Maps (California)</b> Category: Navigation Released Sep 25, 2008 <b>\$44.99</b> <a href="#">BUY APP</a></p>	 <p><b>Marine Maps (Delaware, New Jersey)</b> Category: Navigation Released Sep 25, 2008 <b>\$44.99</b> <a href="#">BUY APP</a></p>	 <p><b>Marine Maps (Georgia and South Carolina)</b> Category: Navigation Released Sep 25, 2008 <b>\$44.99</b> <a href="#">BUY APP</a></p>



**APPLICATION DESCRIPTION**  
Where™ is an iPhone-based application that helps you connect with the people, places and things around you. Really Fast.  
- the hottest restaurants from Yelp  
- the nearest Starbucks  
- the cheapest gas with GasBuddy  
- nearby alcohol retailers  
- which concerts are in town with Eventful  
- where your friends are and local happenings  
You can even take QuikGo Outlets, see the stars with Starline, or learn more about your commuting with MyBusLines.  
In the end, our intuitive interface, you have access to all the local information & maps you could possibly want. From New Content to Microsites, that's only Where™.  
Where™ works with the original iPhone, and the iPod touch 2G iPhone.  
**WHAT'S NEW IN THIS VERSION**  
- Improved map speed  
- Increased battery when using widgets  
**LANGUAGES**  
- English  
**REQUIREMENTS**  
Compatible with iPhone and iPod touch  
Requires iPhone 2.0 Software Update  
- Requires Communications Web Site  
- Where! Support



**Visual IT Ltd**  
**Tube Vienna**  
Category: Navigation  
Released Aug 15, 2008  
Saves Visual IT Ltd  
Version 1.0  
\$9.99 [BUY APP](#)

**APPLICATION DESCRIPTION**  
Tube Vienna is a superb interactive guide to the Vienna Metro - both in Vienna, Austria (Central/Eastern Europe).  
With no need for an Internet connection Tube Vienna will always be available to display a clear and detailed view of the city's transport network, plus it also provides the current status of your journey.  
Comprehensive details of your planned route are provided, including the changes, directions of travel, number of stops, preferred journey times, etc.  
Quick station search and information are just a few taps away. Current info information along with places of interest, parks and main streets, etc. are also included.  
A must have for anyone traveling in and around Vienna.  
Your own route planner is available for all major cities of the world for your iPhone or iPod Touch.  
**LANGUAGES**  
- English  
**REQUIREMENTS**  
Compatible with iPhone and iPod touch  
Requires iPhone 2.0 Software Update  
**Visual IT Ltd Web Site**  
**Tube Vienna Support**


Page 1 of 7 Sort by: Release Date

 <p><b>Tube</b> Category: Navigation Released Sep 17, 2008 \$9.99 <a href="#">BUY APP</a></p>	 <p><b>Central Park NYC</b> Category: Navigation Released Sep 17, 2008 \$9.99 <a href="#">BUY APP</a></p>	 <p><b>Dubrovnik in Bosnia and Herzegovina</b> Category: Navigation Released Sep 17, 2008 \$9.99 <a href="#">BUY APP</a></p>
 <p><b>Baltimore</b> Category: Navigation Released Sep 17, 2008 \$9.99 <a href="#">BUY APP</a></p>	 <p><b>Key West FL</b> Category: Navigation Released Sep 17, 2008 \$9.99 <a href="#">BUY APP</a></p>	 <p><b>Hempstead</b> Category: Navigation Released Sep 17, 2008 \$9.99 <a href="#">BUY APP</a></p>
 <p><b>GPHockey</b> Category: Navigation Released Sep 17, 2008 \$9.99 <a href="#">BUY APP</a></p>	 <p><b>Indio Palm Springs</b> Category: Navigation Released Sep 17, 2008 \$9.99 <a href="#">BUY APP</a></p>	 <p><b>The Boeing B737</b> Category: Navigation Released Sep 17, 2008 \$9.99 <a href="#">BUY APP</a></p>
 <p><b>Portland Mead</b> Category: Navigation Released Sep 17, 2008 \$9.99 <a href="#">BUY APP</a></p>	 <p><b>Waco Texas</b> Category: Navigation Released Sep 17, 2008 \$9.99 <a href="#">BUY APP</a></p>	 <p><b>Twin Falls</b> Category: Navigation Released Sep 17, 2008 \$9.99 <a href="#">BUY APP</a></p>
 <p><b>PortlandMaine</b> Category: Navigation Released Sep 17, 2008 \$9.99 <a href="#">BUY APP</a></p>	 <p><b>Indio Palm Springs</b> Category: Navigation Released Sep 17, 2008 \$9.99 <a href="#">BUY APP</a></p>	 <p><b>Indio Palm Springs</b> Category: Navigation Released Sep 17, 2008 \$9.99 <a href="#">BUY APP</a></p>
 <p><b>PortlandMaine</b> Category: Navigation Released Sep 17, 2008 \$9.99 <a href="#">BUY APP</a></p>	 <p><b>Indio Palm Springs</b> Category: Navigation Released Sep 17, 2008 \$9.99 <a href="#">BUY APP</a></p>	 <p><b>Indio Palm Springs</b> Category: Navigation Released Sep 17, 2008 \$9.99 <a href="#">BUY APP</a></p>
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Page 1 of 7 Sort by: Release Date

 <p><b>Baltimore</b> Category: Navigation Released Sep 17, 2008 \$9.99 <a href="#">BUY APP</a></p>	 <p><b>Baltimore</b> Category: Navigation Released Sep 17, 2008 \$9.99 <a href="#">BUY APP</a></p>	 <p><b>Baltimore</b> Category: Navigation Released Sep 17, 2008 \$9.99 <a href="#">BUY APP</a></p>
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Page 1 of 7 Sort by: Release Date

 <p><b>Phonetic</b> Category: Navigation Released Sep 17, 2008 \$9.99 <a href="#">BUY APP</a></p>	 <p><b>Pittsburgh</b> Category: Navigation Released Sep 17, 2008 \$9.99 <a href="#">BUY APP</a></p>	 <p><b>Pittsburgh</b> Category: Navigation Released Sep 17, 2008 \$9.99 <a href="#">BUY APP</a></p>
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 <p><b>Phonetic</b> Category: Navigation Released Sep 17, 2008 \$9.99 <a href="#">BUY APP</a></p>	 <p><b>Pittsburgh</b> Category: Navigation Released Sep 17, 2008 \$9.99 <a href="#">BUY APP</a></p>	 <p><b>Pittsburgh</b> Category: Navigation Released Sep 17, 2008 \$9.99 <a href="#">BUY APP</a></p>
 <p><b>Phonetic</b> Category: Navigation Released Sep 17, 2008 \$9.99 <a href="#">BUY APP</a></p>	 <p><b>Pittsburgh</b> Category: Navigation Released Sep 17, 2008 \$9.99 <a href="#">BUY APP</a></p>	 <p><b>Pittsburgh</b> Category: Navigation Released Sep 17, 2008 \$9.99 <a href="#">BUY APP</a></p>
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Page 1 of 7 Sort by: Release Date

 <p><b>Portland</b> Category: Navigation Released Sep 17, 2008 \$9.99 <a href="#">BUY APP</a></p>	 <p><b>Portland</b> Category: Navigation Released Sep 17, 2008 \$9.99 <a href="#">BUY APP</a></p>	 <p><b>Portland</b> Category: Navigation Released Sep 17, 2008 \$9.99 <a href="#">BUY APP</a></p>
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Page 1 of 7 Sort by: Release Date

 <p><b>Tube</b> Category: Navigation Released Sep 17, 2008 \$9.99 <a href="#">BUY APP</a></p>	 <p><b>Tube</b> Category: Navigation Released Sep 17, 2008 \$9.99 <a href="#">BUY APP</a></p>	 <p><b>Tube</b> Category: Navigation Released Sep 17, 2008 \$9.99 <a href="#">BUY APP</a></p>
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Page 1 of 7 Sort by: Release Date

 <p><b>Baltimore</b> Category: Navigation Released Sep 17, 2008 \$9.99 <a href="#">BUY APP</a></p>	 <p><b>Baltimore</b> Category: Navigation Released Sep 17, 2008 \$9.99 <a href="#">BUY APP</a></p>	 <p>&lt;</p>
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