

# **Information Aesthetic Visualization: Exploration of the Calendar**

**By**

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## STATEMENT OF PROBLEM

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Most software calendar applications today present appointments textually to the user in a grid-like-graph that resembles traditional paper calendars. The user is presented with content that is visually mundane and unappealing. Web calendars such as Google Calendar™ (2007) (see Figure 1 and 2) and desktop calendars such as Microsoft Outlook (Version 2003) (see Figures 3 through 5) do not offer users with much ability to personalize the look of their appointments. Users can make “categories” and assign a color that represents a type of appointment (e.g. Blue for Business); however, the event itself is not unique from other events.

Current digital calendaring systems do not extend representation of chronological events, recurring events or even priority of events in a manner different from traditional appointment books. In addition, the primary mode of viewing events in digital calendars is chronological and does not offer users the ability to view events in a variety of other ways such as a user viewing all doctor related appointments.

## SIGNIFICANCE OF PROBLEM

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There has been a great deal of interest and research in the area of information aesthetics and information visualization. Information aesthetics focuses on “representing abstract data, providing an interactive interface, and using visual appeal to engage the user” (Lau and Moere, 2007). Information aesthetic visualization (IAV) is an emerging sub-field of information aesthetics that uses “visualization techniques [that demonstrate] both artistic and informative value” (Lau et al., 2007). IAV utilizes techniques from and related to both

information visualization and visualization art (Lau et al., 2007). The field of information visualization “aims to amplify cognition by developing effective visual metaphors for mapping abstract data” while visualization art “aim to express the subjective experience of our information society by artistically motivated but data-driven forms” (Lau et al., 2007).

Due to the increasing interest in the area of information aesthetics and information aesthetic visualization, there have been numerous web applications that attempt to visualize data such as news, pictures, music and even emotions from weblogs. One example is a web application created by Jonathan Harris and Sep Kamvar called “We Feel Fine” (Kamvar and Harris, 2005). This application is an “exploration of human emotion on a global scale” that gathers data relating to emotions from weblogs (Kamvar et al., 2005). The user is then presented with options to filter and view the data.

Current digital calendaring systems such as Google Calendar™ (2007) have revolutionized how people have used the calendar. People can now share calendars with each other, book appointments on someone else’s calendar, and even set up recurring events (e.g. daily workout hour). For example, before digital calendars, a secretary in charge of twenty traditional appointment books would have difficulty booking one meeting among all those books.

While these applications have helped evolved the many uses of the calendar, none have properly addressed the presentation of information displayed to the user. With the onslaught of web applications such as Facebook (2007), users are allowed to visually personalize and share their site with others. It would then be a natural progression to personalize and share a calendar. However, at this point, users can only share their calendar but have yet to personalize the presentation of information that is most important to them.

Based on the lack of research, I conclude that one reason for this is due to a lack of incentive. My reasoning is that people view the calendar as a tool to manage events in their lives and the digital calendar makes managing events a lot easier. In addition, another reason could be that by allowing users the ability to personalize their calendars, it would require additional features, tools and resources.

Even within the field of information aesthetic visualization, there has been a lack of interest on the calendar. Thus far, I've only been able to find one paper where a group of researchers' aim was to explore "how to use 3D graphics and interactive animation to design and implement visualizers that improve access to large masses of time-based information" (Mackinlay, Robertson, and DeLine, 1994).

I suspect this is due to the fact that researchers are more interested in finding ways to visualize and represent the complexity of data which is apparent in the website Visual Complexity (Lima, 2005). Visual Complexity is a website dedicated to "the visualization of complex networks" (Lima, 2005). The calendar is based on hierarchal time-based information, which is not that complex compared to other data. Furthermore, it could be said that the digital calendars' only mode of viewing events in a chronological order is acceptable to users.

My plan is to design and implement a functional prototype that users can input and view their events in a standalone calendar application. This prototype will be different from the current digital calendars in that it will not only focus on the data that is being displayed and the interaction, but the aesthetic appeal as well. These three factors: data, aesthetics, and interaction are crucial in the field of information aesthetics (Lau et al., 2007).

There has been much research done in the field of information visualization and information aesthetics.

In the article “Towards a Model of Information Aesthetics in Information Visualization”, the authors proposed “a model of information aesthetics in the context of information visualization” (Lau et al., 2007). These authors proposed their own model of information aesthetics in which art can help influence a “mapping technique of a specific visualization, and the aesthetic engagement it affords.” The article is significant in that helps define terminology and show the differences between information visualization and information aesthetics.

The authors also built a domain model which portrayed various areas such as Information Design, Human Computer Interaction and Interactive Art in regards to three factors: data, aesthetics, and interaction (Lau et al., 2007). The domain model helped during the Design Phase of my Capstone in that I had to keep in mind that the three factors: data, aesthetics, and interaction deserved equal and special attention in the application and that by focusing in one area more than the others would stray from my goal (Lau et al., 2007).

This article was also essential in helping define the type of area for the calendar application. The term “Information Aesthetic Visualization” that was used for the title of the Capstone Project comes from this article (Lau et al., 2007).

One aspect of information visualization is that it is a broad field in which not only computer scientists are interested in, but graphic designers and interaction designers as well. Greg Judelman wrote a paper called “Aesthetics and Inspiration for Visualization Design: Bridging the Gap between Art and Science,” in hopes that it will provide “pointers to

resources which can provide aesthetic and conceptual inspiration for visualization design” (2004). Judelman (2004) “introduces a selection of examples from algorithmic art, architecture, computational complexity, and nature” and proposes the idea of collaboration among multiple disciplinary fields for future work in this emerging field.

Judelman’s (2004) article provided some resources and inspirations for the metaphors that were developed during the Design Phase such as Nature. Furthermore, Judelman (2004) mentioned the notion of having collaboration and exchanging ideas between the computer science community and the digital arts community. This idea of using both technology and art together is essential to my application and what drives my Capstone.

There are many resources available on visualization techniques and methods have aided me in developing my designs. Colin Ware wrote a book about perception that lists a variety of techniques for the field of information visualization (2004). In one chapter, Ware discussed the issue of whether text or images were better and when it would be best to utilize them (2004). This chapter gave me the idea to use pictures as the event in the Day View of the calendar application.

Edward Tufte wrote a book in regards to displaying information called “Visual design of the user interface: Information resolution, interaction of design elements, color for the user interface, typography and icons, design quality” (1989) which proved to be useful in developing the calendar application. Tufte’s concept on improving information resolution by reducing noise and improving signal proved to be an inspiration in developing the metaphors (1989).

Ben Schneidermann wrote a book entitled “Designing the User Interface: Strategies for Effective Human-Computer Interaction Third Edition” (1998) and wrote a chapter on information visualization and stated that one of the main principles of visual design can be

“summarized as this visual-information-seeking mantra: Overview first, zoom and filter, then details on demand” (Schneidermann, 1998). This mantra was what drove the display of the views and information in the calendar application.

There are currently many applications that attempt to address the visual presentation of data. Information Aesthetics (Vande Moere, 2004) is a website that showcases an assortment of visualization projects. By subscribing to this website, I was well informed of new projects and was able to use as a resource and a source of inspiration during the Design Phase of my Capstone.

## PLAN OF WORK

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There are two primary phases to this project: design and implementation.

The design phase consisted of: exploring various metaphors for the calendar (e.g. Time has a circular motif or “Life is a Highway”), developing ways to filter and display data which will coincide with the metaphor, investigating and researching a variety of visualization techniques by looking at current projects, and delving into current research in this area.

Developing a metaphor that users will be able to comprehend in all aspects of the calendar is important because it will be the underlying visual schema for the design. For an example, with the metaphor “Life is a Highway”, the art technique of perspective could be utilized to display events based on user’s preferences and interaction considerations could reflect the idea of someone moving along on a highway.

Through a process of iterative design, each metaphor was explored in depth using a variety of methods. Some methods that were considered during the design process were: art

design guidelines such as the elements and principles of design, typography, and graphic design techniques that were found in the book “The Elements of Graphic Design” (White, 2002).

The first design phase resulted in five disparate designs based upon different metaphors. Once that was completed, the designs were presented to my capstone committee and I gathered feedback. The second design phase resulted in revising and synthesizing the 5 designs. After the revision, I once again presented my designs to my capstone committee and then selected one to build the demo.

I went through three design iterations. Upon completion of the third design phase, I selected one design to implement based on criteria that I have set and with input from my capstone committee. The criteria for the final design were: aesthetics (e.g. Is it visually appealing?), presentation of information (e.g. Are users able to understand when their events are based on what type of view they are in?), and interaction (e.g. Does it engage the user?).

Once the final design had been selected, the implementation phase began. The prototype was implemented in Adobe Flash (Version CS3). The functionality of the prototype will allow users to: input events, set priority events as well as recurring events, categorize events, search events, and allow the user to view events based on the criteria they have selected. It is important to note that the prototype is a demonstration of what the calendar would do and is not meant to be used as an actual application.

### *Design Phase:*

During the design phase, I wrote and sketched all my ideas and the brainstorming sessions in a sketchbook. The first seven pages of the sketchbook was a collective of brainstorming sessions. I first came up with a brief overview of things that needed to be accomplished (see Figure 6 below). After that was accomplished, I decided to think about anything and everything that I would or may need in a calendar including the functionality of the calendar.

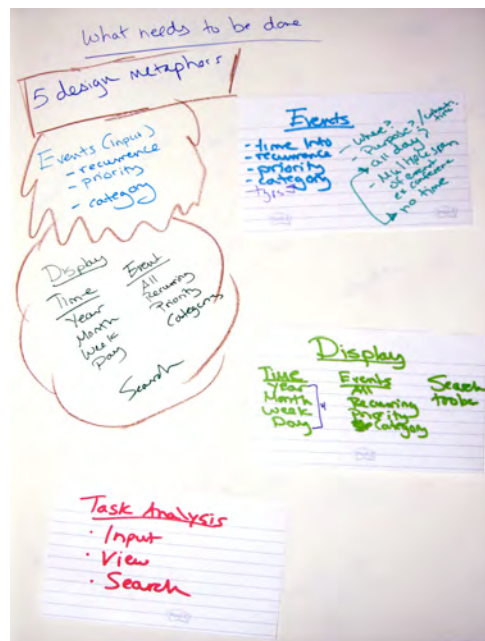


Figure 6. Sketchbook - Page 1

During this time, I began to think about the calendar information and how it would be displayed, the various views in regards to time, and what type of information an event would entail such as priority and categories. By being able to assign events to a category and a priority, the user can better view and access the events that they may be looking for. I knew

that in the Day View of the calendar, I wanted the events to be represented by a picture or an icon. In addition, I also worked on the visual presentation on how the user would input in an event. Figures 7 through 9 (below) shows the information that would be displayed.



Figure 7. Sketchbook – Page 3

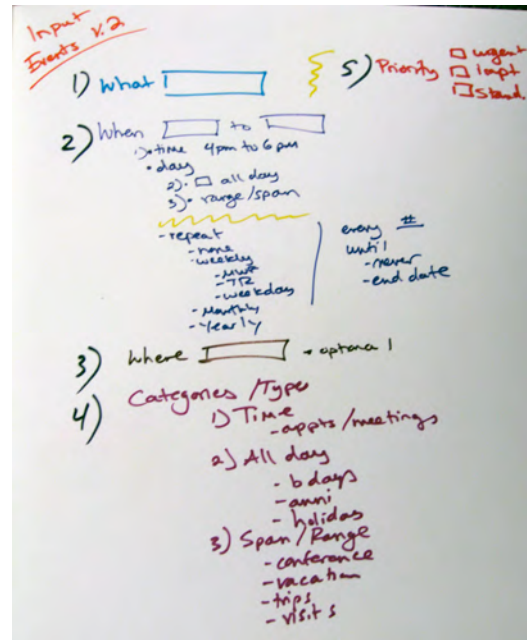


Figure 8. Sketchbook – Page 6



Figure 9. Sketchbook – Page 7



Figure 10. Sketchbook – Page 2

Once I had a better idea of the type of information that would be displayed, I began to think up of various metaphors that I could use for the calendar (see Figure 10 above) such as: Time is an endless circle, amplify, subway map, and galaxy. At this point, I was jotting down any metaphor that came across my mind and did not concern myself with whether or not it would work with the calendar application.

After the brainstorming session, I looked over the page with initial idea of the metaphors and picked five that were interesting and began to work on it and see where the metaphor would take me. Figure 11 (see below) showed the evolution of the metaphors and the three revisions that took place.

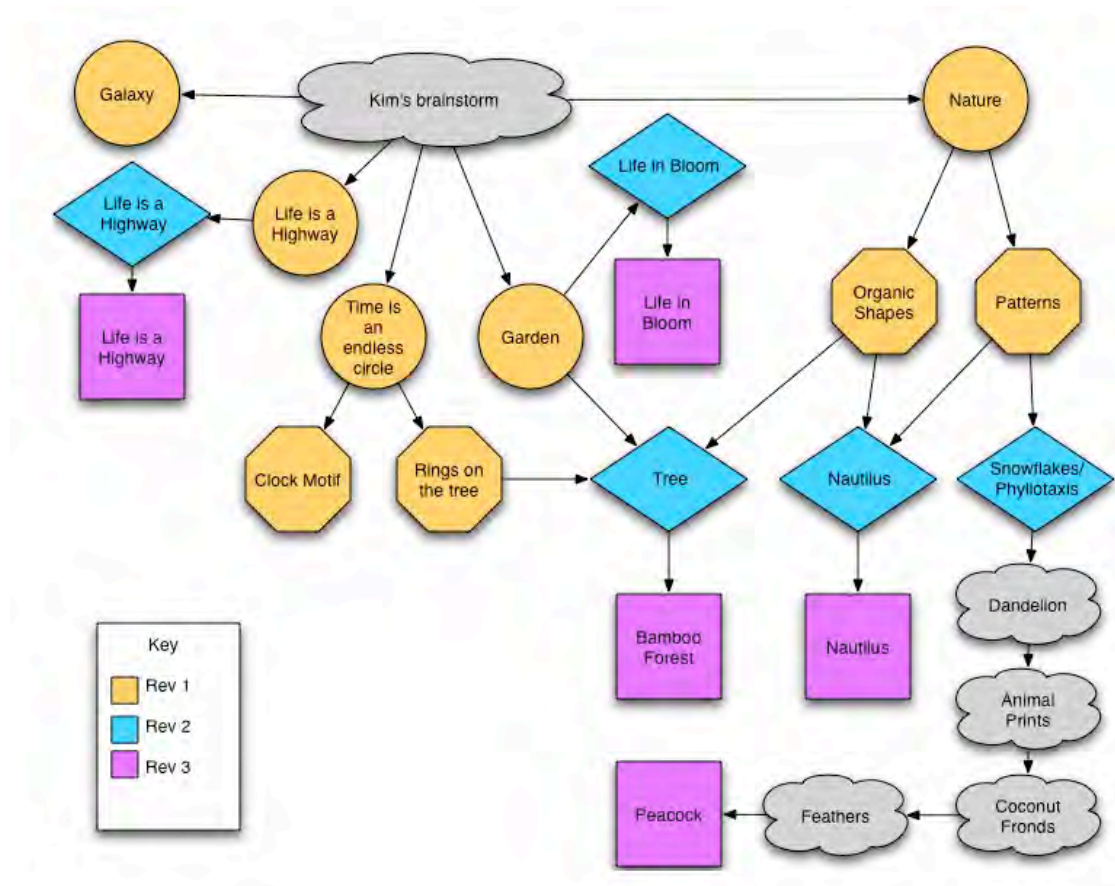


Figure 11. Evolution of the metaphors

The first revision (in yellow) of the metaphors was: Galaxy, Time is an endless circle (this metaphor had two sub-divisions: clock motif and rings on a tree), Garden, Nature (this metaphor also has two sub-divisions: organic shapes and patterns), and Life is a Highway. In the first revision with each metaphor, I initially briefly did some research and would contemplate on the feasibility of the metaphor.

The feasibility of the metaphor was dependent on the ability for the calendar information to transcribe well onto the metaphor. Things that had to be considered were how the picture or icon would be displayed for the single event and how categories and priorities would be displayed in the various views. With each metaphor, I spent a few hours to see if I could come up with a rough idea of how the application might work. It was important for me to keep in mind that the metaphor would not only be used for the visual design, but for the interactions as well. I examined how each view would look separately as well as how all the views would look together in one page. Furthermore, I would also look at how the interactions would coincide with each other and how the events would be portrayed in each view. I also looked at pictures relating to the metaphor to help inspire more ideas and if found useful would print out the picture and paste it into my sketchbook for future reference. If I were having trouble coming up with ideas, then the metaphor would either be further revised or forgone.

I first began working with the metaphor Time is an endless circle. I chose this metaphor because I felt the idea of how Time never ceases and is a continuous clock might translate well with the calendar. The idea of a continuous clock suggested of two separate ideas. I kept thinking of how a clock would work and toyed with the idea of segments, which is similar to a pie chart. I also played with the idea of time moving forward in a clockwise rotation or counterclockwise to represent the past in a spiral-like manner. The

other idea was how time is translated on the rings of a tree. At that time, I was unsure on whether to separate the ideas into two metaphors or try to combine them into one. I then decided to split the metaphor 'Time is an endless circle into two which are: the clock motif and the rings on the tree.

The Life is a Highway metaphor was an idea pitched by my friend Andrew Luly. This metaphor was inspired by the idea of a person traveling a road and taking various paths. Life is a Highway proved to be fun and interesting to me because I was able to use the idea of dominance and perspective. Dominance is a design technique that is used to lessen competition between various elements, while perspective is used to depict volumes and spatial relationships on a flat surface (White, 2002). By making one view bigger than the rest, the user can easily focus on that one view. By utilizing the techniques of perspective and dominance, I was able to experiment with how the views are presented to the user and how I could lead the user from one view to the other. I also looked at a variety of images that contained highways and anything that might be seen on a highway such as bridges, billboards, and signs.

When exploring the Garden metaphor, I thought of having different types of flowers with a specified amount of petals to represent the views on a calendar. For example, a four-petal flower could represent the four weeks in a month view. This proved not to be the best option due to a limited amount of petals a flower can have. I then proceeded to think about gardens and plants and how they began from a seed, would grow into full bloom, and then withered away to die. The Garden metaphor then evolved into a different metaphor: Life in Bloom. The idea is that the future would be a seed, the present would be a flower in full bloom, and the past would be a withered flower.

The next metaphor that I worked on was Nature. I thought about all things there were related to nature such as trees and animals. Last year, I had a conversation with a teacher who was telling me how she was interested in the patterns of cells and small organization. It was from this memory where I began to think about patterns and the organic shapes in nature. Just like the metaphor: Time is an Endless Circle, the Nature metaphor is now divided into two: organic shapes and patterns.

The last metaphor that I worked on was Galaxy. I looked at a variety of images on the Internet as a source of inspiration. I thought about the idea of using planets, astronomy, or even rockets and stars. After spending a few hours researching and contemplating, I found that I could not figure out a way to represent the information on the calendar. It was then decided to drop this metaphor.

After exploring the metaphors, I then revised the metaphors into a second list. One metaphor that was kept the same in the second list was Life is Highway. Galaxy was dropped from the second list. Garden evolved into Life in Bloom. Nature evolved into three metaphors, which are: tree, nautilus, and snowflakes/phyllotaxis. The tree metaphor spawned from the metaphors: Time is an endless circle and nature while the nautilus and snowflakes/phyllotaxis came from the Nature metaphor.

It was after this first round of metaphors that I then realized that I would need another design iteration. My original plan was to go through only two design iterations. However, after the amount of time spent on brainstorming, being creative, and essentially trying to think outside of the box, I felt the need to add that third one. My reasoning is that because I was so involved in the metaphors I needed fresh eyes and another person's perspective. By gathering insight from my Capstone Committee and other people, I could then further develop the metaphors.

In the second round of revision, I explored the metaphors that were new in the second revision. The new metaphors: tree, nautilus, and snowflakes/phyllotaxis required the same amount of research and investigation that was done in the first list of metaphors. The nautilus metaphor was somewhat easier than the other metaphors due to the fact that I was using the shape of a nautilus. Therefore, I was able to focus more on the interactions and the placement of the events in the nautilus. One idea for the nautilus metaphor that originated from the Time is an Endless Circle metaphor is the clockwise rotation. The idea is that the user can wind clockwise to move forward in time while by going counter clockwise will move back in time, thus representing future and present. Another idea that utilizes the rotation is to represent the various views. By moving back, the user would see and overview (for example the year view) and by progressing inwards the user can see a detailed view (for example the day view). To represent the various types of events for the nautilus metaphor and also an event that may span segments of a nautilus, I thought about using various size and color of bands in the segments.

The next metaphor that I worked on was the tree metaphor. When I started working with this metaphor, I thought about Chinese paintings and how they were visually simple. I pondered using cherry trees, leaves and branches of a tree, and even the idea of a family tree. As I began to experiment with the ideas, I thought about how the events would be presented in the various ideas. This process led to the elimination of some ideas (for example the family tree) and helped evolved other ideas. Because I was thinking about Chinese paintings, one subject that often came up was the idea of bamboo. It was then I realized that the tree metaphor evolved into the bamboo forest. By utilizing the segments and the leaves of a bamboo, I can better represent the various types of events.

The snowflake/phyllotaxis metaphor proved to be the most difficult for me to work with. My original inspiration for this metaphor came from the idea of patterns and nature. Just like the other metaphors, I began to look at images on a variety of snowflakes as well as learn more about phyllotaxis. Through this period of research as well as sketching out ideas, I felt that these patterns would be too difficult to portray the calendar. I then decided to think about other patterns in nature. I recalled skimming through a book that talked about patterns in nature. I remember seeing a picture of a dandelion, animal prints, and coconut fronds. It was the picture of the coconut frond that reminded me of feathers. As I thought about feathers and the various types of patterns, I began to look online to see the types of feathers that existed. I then saw a peacock feather and that was when the idea hit me. I would use the Peacock as a metaphor. Unfortunately, the idea came the night before I had my first real critique with my Capstone Committee the following morning. Therefore, I was not able to explore this metaphor in depth.

I had my first critique with my Capstone Committee and showed them my sketches and ideas. Up until this point, I never really sat down with them to discuss my ideas and gather insight. This critique was important to me because I needed some feedback and also some guidance. Because I was essentially working on five metaphors at once, my mind was bouncing back from one metaphor to another and by the time I reached the Peacock metaphor; I was running out of ideas.

My Capstone Committee looked at my sketchbook and liked what I was working on so far. I asked for some guidance on the Peacock metaphor and some ideas that were suggested were: a flock of peacocks and how the tail of the peacock can expand and collapse to show the various views. They also suggested that I further explored each of the metaphors by providing more details.

After the critique, I began the third revision. The final list of metaphors for the third revision is: Life is a Highway, Nautilus, Life in Bloom, Peacock, and Bamboo Forest. With each metaphor, I began to add and flush out details. For example, the Life in Bloom metaphor, I decided to play around the use of space and dominance with the three flowers that represented past, present, and future. One example is a close up of a flower that is cut off on the left side while the user sees the other two flowers in the background.

With the Nautilus metaphor, I proceeded to hash out more details on the rotation and with the Peacock metaphor I explored the suggestions by my Capstone Committee. With the Bamboo Forest metaphor, I thought about what type of visual marker that can be used to provide feedback to the user to know what event they were looking at. I came up with the idea of either using a frog or a dragonfly that could move up and down the bamboo.

With the metaphor Life is a Highway, I began to construct various highways with different perspectives, widths and curves to represent the various views. I began to toy with the idea of using a number of lanes and the dashes in a lane to represent a segment in time. Originally, I thought about using a literal translation of highways for this metaphor but I decided to use it as inspiration and in an abstract sense. This metaphor diverges from other metaphors because it is not a literal visual design. There are no traffic signs or various landscapes used in this metaphor. Instead, I used the idea of perspective to portray the feeling of a highway going off into the distance.

The revisions of the metaphors were necessary due to the presentation of the calendar information. With each metaphor that I explored, I followed the mantra of “Overview first, zoom and filter, then details on demand” (Schneidermann, 1998). By

following this mantra, I decided to utilize techniques such as scaling, blurring, and adjusting colors to filter out information.

With each metaphor, I envisioned the user seeing the overview of the calendar application, which includes the view for year, month, week, and day. As the user begins to select the information (the view), the application would zoom in and increase in scale to display the relevant information. The important information would be dominant and take up most of the viewing space while any irrelevant information would be blurred or faded out. This can be seen as something equivalent to someone taking a picture with a camera and zooming in and out and focusing on a subject. This mantra helped drive the necessary revisions and helped evolved the metaphors.

One important aspect throughout the various revisions of the metaphor that I needed to consider was how literal I wanted to portray the metaphor. My personal design style can be viewed as minimalistic and simple. I only incorporate elements that are crucial in relaying the information to the user. With each metaphor, I would start with a literal translation of the calendar application and would then proceed to strip away any unnecessary elements that were not needed to relay the information. My style resembles gesture drawings where an artist would draw the essence of a figure and not necessarily the details. With a few lines and some strokes, the essence of the figure can be seen.

Once I came up with a final list of the metaphors and had finished roughing out the design, I personally ranked the final list of metaphors in order by: the visual appeal of portraying the calendar in that metaphor, whether the interactions would fit the calendar, and if it was feasible to implement. The final list by rank is:

- 1) Life is a Highway (see Figure 12)
- 2) Peacock (see Figure 13)

- 3) Nautilus (see Figure 14)
- 4) Bamboo Forest (see Figure 15)
- 5) Life in Bloom (see Figure 16)

After consulting with my capstone committee, I picked one metaphor out of the five to further explore and build a prototype that would demonstrate how the application would work. The final metaphor that was chosen was Life is a Highway. I chose this metaphor to build the prototype because throughout the revisions, I personally enjoyed working on this metaphor and I felt that the metaphor was different and can proved to be an exciting new visualization for the calendar.

The metaphor was different in that it allowed me to be truly creative. I was able to let my imagination and creativity run wild but within certain guidelines such as ensuring the use of perspective and dominance. I could picture the calendar application as a literal translation of the metaphor to just the essence of the metaphor. Furthermore, I felt that metaphor was in essence another alternative to the grid that is currently being used in current digital calendars but is presented in a different manner to the user. In addition, compared to the other metaphors, I felt that the Life is a Highway metaphor best presented the information on the calendar.

From this point, I began to sketch on the computer. As I began to draw the metaphor on the computer using Adobe Illustrator (Version CS3) and Adobe Photoshop (Version CS3), some issues arose. One issue was the ease of drawing a curved grid with perspective. I was having a tremendous amount of difficulty drawing the curved grid with perspective in the program. Also at this time, I finalized the categories that the events would fall into. The final category list is:

- All Day

- Birthday
- Anniversary
- Holiday
- Span Days
  - Conference
  - Trip/Visit
  - Vacation
- Specific Time
  - Appointment
  - Meeting
  - Social

After spending a couple of days on the perspective-curved grid, I decided to focus more on drawing curves that would in essence represent the curves on a highway. It was important for me to keep in mind how I would implement the graphics. It is easier and less performance intensive to use a graphic that can be reused to build a bigger graphic than use just one big graphic. Figure 17 (below) demonstrates the latest version of Life is Highway.

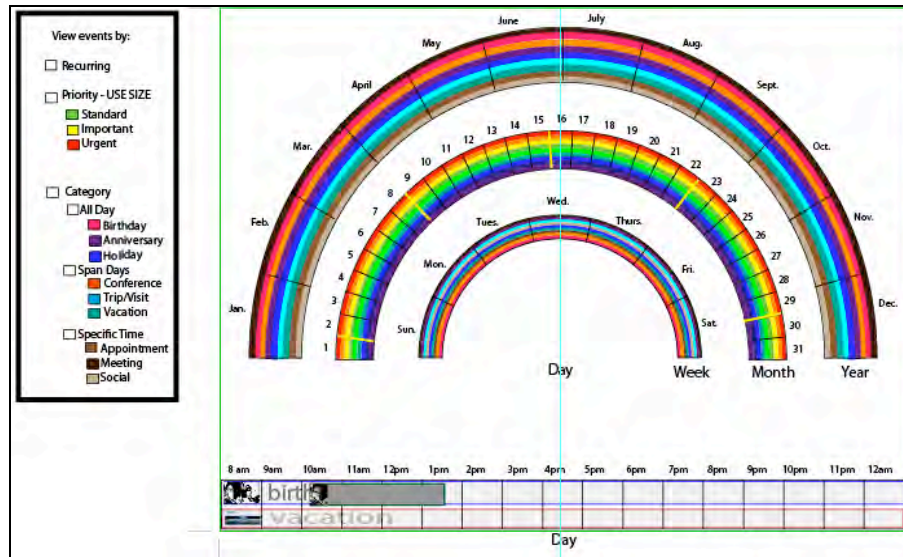


Figure 17. Life is a Highway (v. 5)

It was at this point in time that I realized I was no longer working with the metaphor Life is a Highway. Due to the complexity and the amount of time necessary to implement the various perspective-curved grid, I made the difficult decision to forgo implementing the perspective. By dropping this important aspect, the metaphor began to change into a different metaphor. My initial reaction to the decision I made was that I had failed the metaphor.

The use of perspective is important and is a key component to the visual design of the metaphor Life is a Highway. Figure 18 and 19 (below) are some of the initial sketches that I came up with for this design. In Figure 20 and 21 (below) are my attempts in drawing the grid with perspective in Adobe Illustrator (version CS3). I was experimenting with different ways to draw this essential aspect but I felt that the results were not up to my expectations. Furthermore, as I was drawing the sketches in Figure 18 and 19 (below), I knew that implementing this into the application would not be feasible due to time constraints.



Figure 18. Life is a Highway (v. 1)

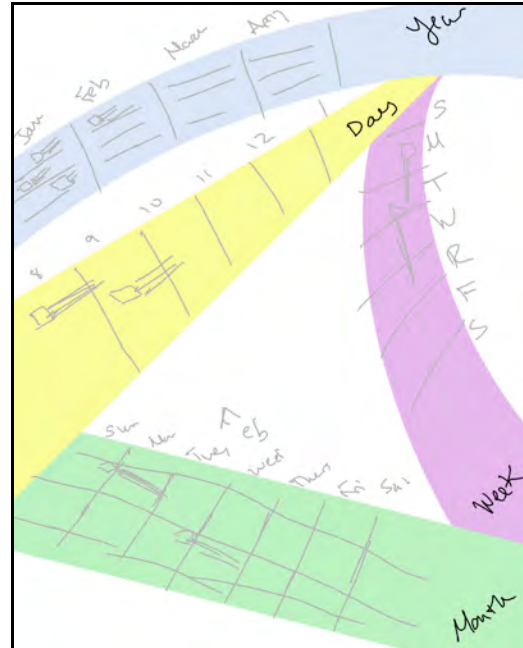


Figure 19. Life is a Highway (v. 2)

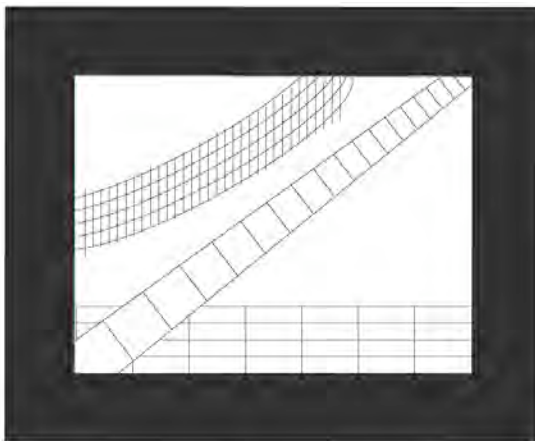


Figure 20. Life is a Highway (v. 3)

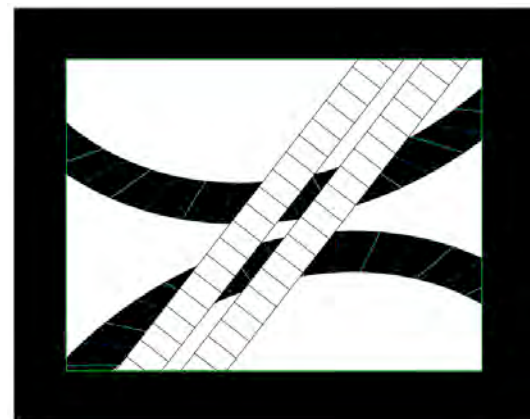


Figure 21. Life is a Highway (v. 4)

After having a discussion with my Capstone Committee, I realized that I did not necessarily fail in bringing about the Life is a Highway metaphor. If anything, the metaphor evolved into the Sundial metaphor. Even though the use of perspective was dropped, the purpose for it is still used in the Sundial metaphor. The purpose of perspective was to show either the emphasis of a view or an event by diminishing those that were not needed. The

Sundial metaphor used scale as way to differentiate things that are important by either increasing the size or decreasing the size.

The design process is often changing and evolving. In my case, the primary reason for the change in metaphors was simply due to time constraints. Furthermore, another important factor was the ease of drawing the graphics and being able to implement it via code. The precision and splicing of the grid was necessary and crucial so that the graphics could be easily imported and used in Adobe Flash (Version CS3). Figure 22 (below) shows the final evolution of the metaphors.

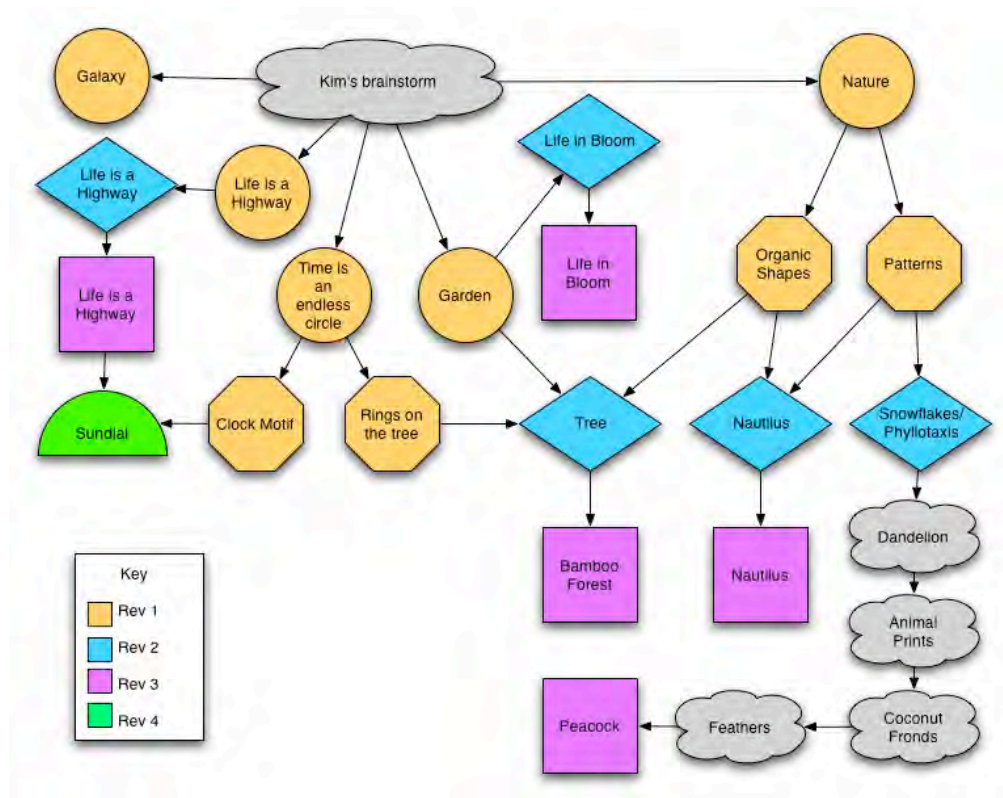


Figure 22. Evolution of the Metaphors – Final

After fully accepting the decision I made, I went back and did some adjustments to the design. In regards to the interaction between the user and the time views, I used the idea of the rotation, which stemmed from the clock motif metaphor. I also borrowed some of the visual elements from the clock motif metaphor such as the segments (see Figure 23 below). The segment is used in the Sundial metaphor to portray the categories as well as block of time such as a day in the month view. As the user rotated the view clockwise, time would move forward towards the future while rotating counter clockwise would move time backward towards the past. Figures 22 through 26 shows the various stages of design that I went through.

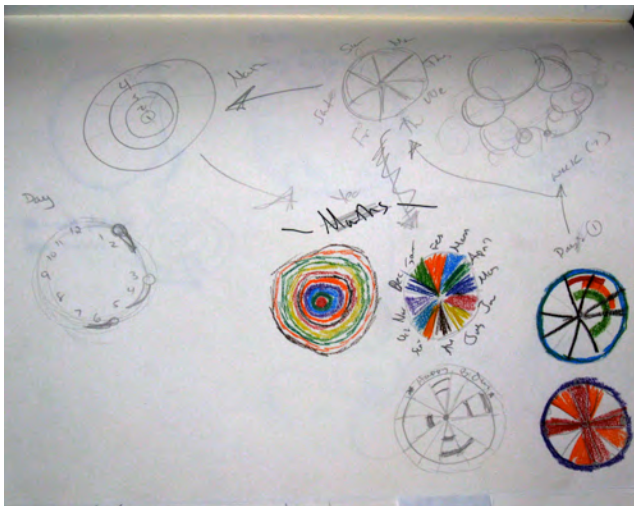


Figure 23. Sketchbook – Page 13

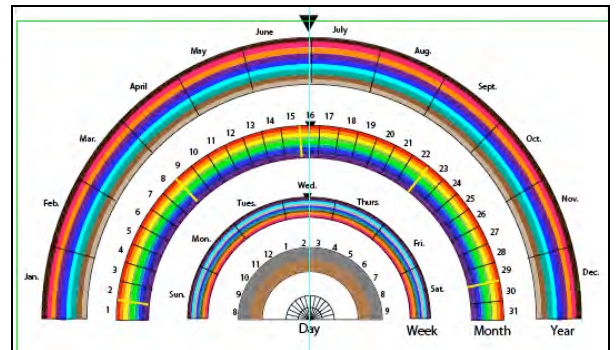


Figure 24. Sundial (v. 1)



Figure 25. Sundial – Day View (v.1)

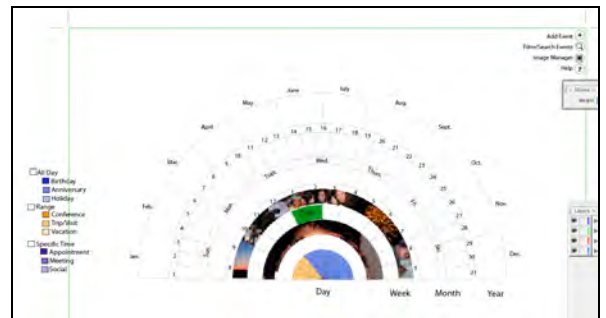


Figure 26. Sundial (v. 2)

At this point in time, I also worked on the color scheme for the Sundial metaphor. I decided to use the varying saturation of blue, purple, and orange to display the bands in the various view. I chose these colors because I felt that it best represented the colors of a sunset or a sunrise. In addition, I used a soft gray to display the default segments and the color black for text. The general overall look of the application I was aiming for was to be simple, minimalistic, and pleasing to the eye.

One of the challenges that I came across was figuring out what the Day View would look like in regards to overlapping events as well as the All Day events. I decided that I would only allow up to three overlapping events in the Day View. The decision was based on my reasoning that the user will not need to schedule more than three overlapping events. Figure 26 (above) was the solution that I came up with to deal with this challenge. Once the design was finalized and the details were worked out, I began the implementation phase.

#### *Implementation Phase:*

During the implementation phase, I began to work on building the graphics in Adobe Illustrator (Version CS3) which I would then import to Adobe Flash (CS3) and convert them into movieclips. Originally, I had intentions of building the demo in Adobe Flash (Version CS3) and Adobe Flex (Version 3.0). However, due to the graphic nature of the application and the lack of documentation and information between the hookup between Adobe Flash (Version 3.0) and Adobe Flash (Version CS3) at the time, I decided to only utilize Adobe Flash (Version CS3).

After this decision was made, I proceeded to then roughly draw up an Application Flow Diagram (see Figure 27 below) on how the interactions would work in the calendar application to assist me during the implementation phase.

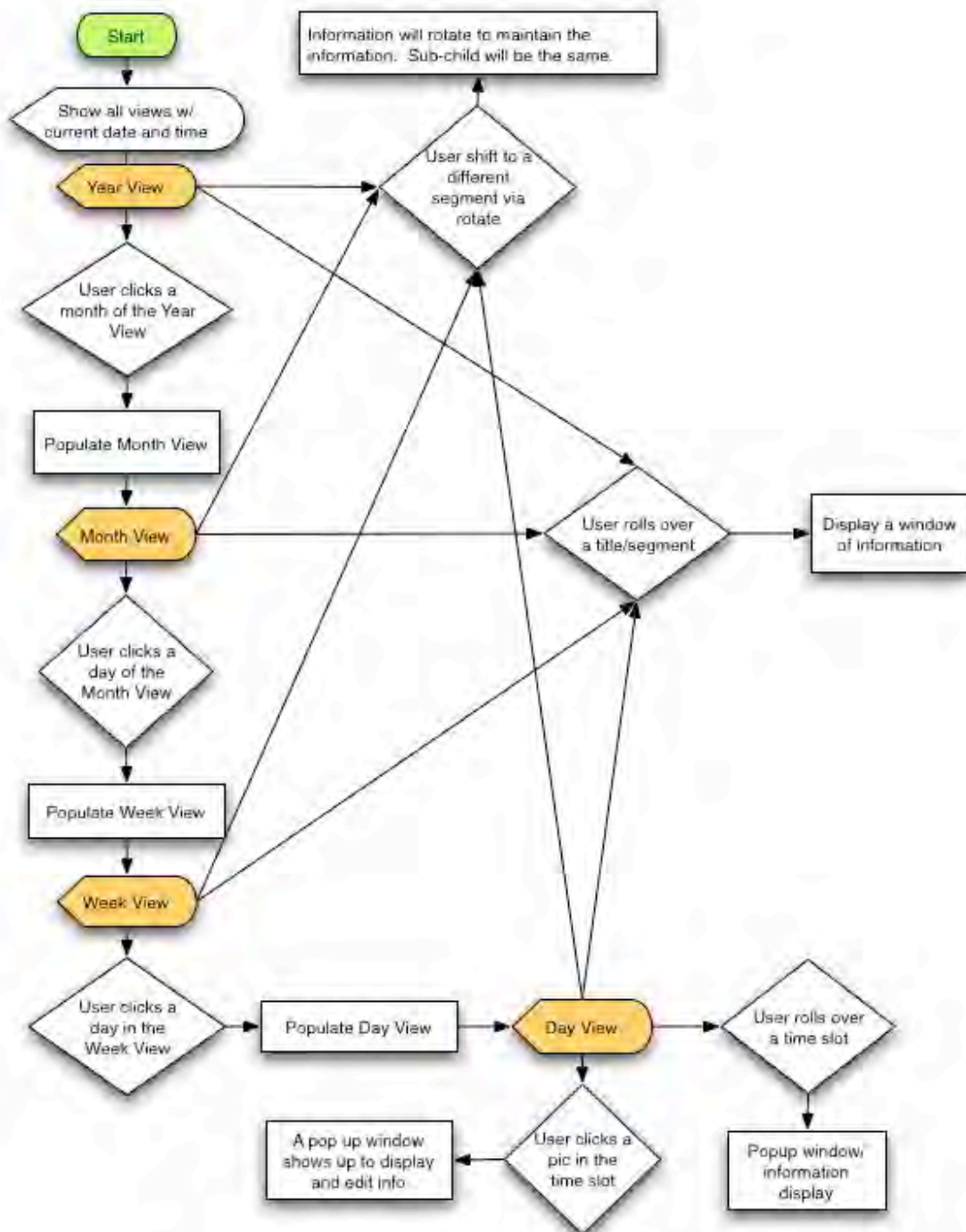


Figure 27. Sundial Application Flow Diagram

The demo is a combination of being built dynamically and hard coded. Initially, I had plan on building everything dynamic from the graphics to the sample data being loaded. However, due to certain limitations of how the movie clips were made, time constraints, and considering that the prototype is only a demonstration, I decided to switch to hard code in certain areas of the project. My reasoning behind this decision is that I knew that certain areas would be need to be rewrote if the prototype was to be build into an actual application.

#### WALK-THROUGH

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When the demo is first loaded, an overview of the whole application is displayed (see below Figure 28). By showing the whole overview to the user at the start of the application and then allowing the user to zoom and filter through views and events, the mantra of “Overview first, zoom and filter, then details on demand” is achieved. (Schneidermann, 1998).

The top left corner displays what the user is currently viewing. For the purpose of demo, the month of May is only displayed and the default date is set to May 22. The time is dynamic in that each time the demo is run, the current time is grabbed from the computer. The outer ring is the Year View, which displays twelve months at a time. The next ring going in is the Month View, which displays thirty-one days at a time. The one ring after that is the Week view, which displays only seven days at a time. Finally, the inner most ring is the Day View which displays twelve hours at a time and all displays the All day events.

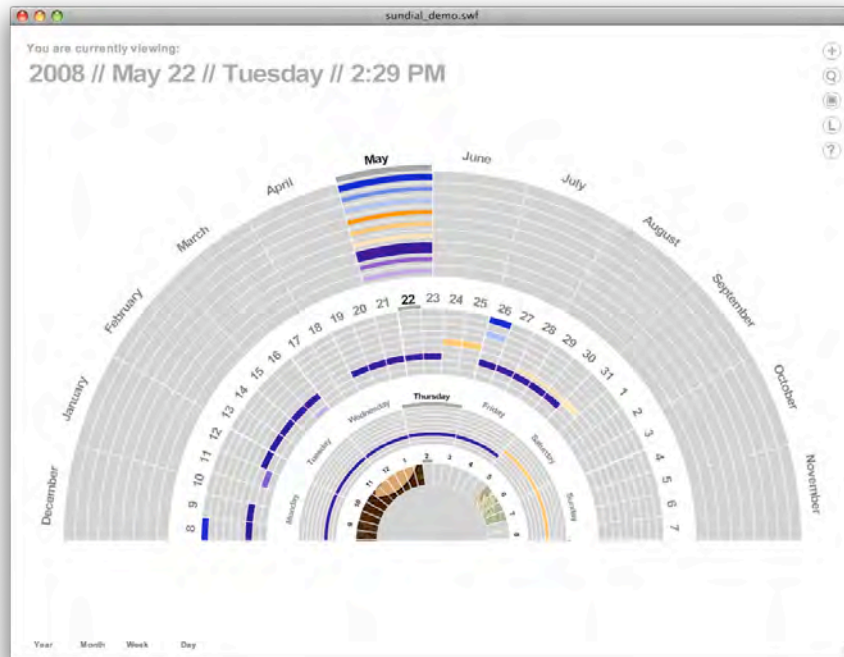


Figure 28. Overview Screen

The bottom left corner of the screen lists text buttons that are used for the navigation of the views. The top right corner of the screen is the toolbar, which contains five buttons. The buttons are: Add Event (see Figure 29), Filter/Search Event (see Figure 30), Image Library (see Figure 31), Legend (see Figure 32), and Help (see Figure 33).

The band in each segment represents a category. Each category has its own specific color. If there are no events for a specific category then the band is not displayed. In addition, the thickness of the band is dependent on the number events in the category. For example, if there were five events in the Appointment category versus the two events in the Birthday category, the Appointment band would be thicker than the Birthday band. The user can click the Legend Button to see what color represents what category.

The user can roll over a band that will display the number of events for the category that resembles a tool tip (see below Figure 34). Furthermore, by clicking the band, a popup window will display showing all the events in that category.

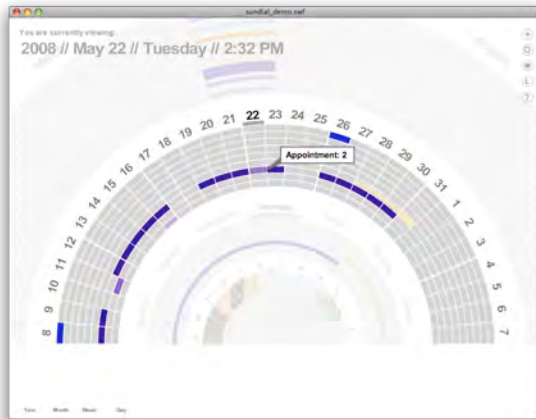


Figure 34. Month View

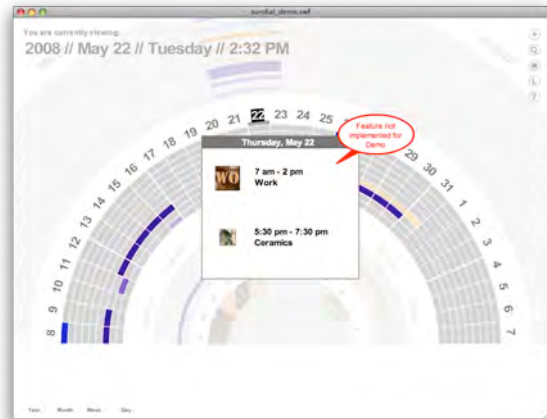


Figure 35. Month View – Popup window

By double clicking the label of a segment (for example the number 22 in the Month View – see Figure 35 above), a popup window will come up showing the event for that segment. In Figure 35 (above), the events are displayed for the 22<sup>nd</sup> of May. Events that have a higher priority will have a bigger icon then the rest. Single clicking on an inactive label (labels that are grayed out) will cause the sundial to rotate and adjust to display the correct information. For example, in Figure 34 (above), the current day that is showing the 22<sup>nd</sup> of May, if the user were to click the 26<sup>th</sup> of May, the Week View and the Day View will rotate to display the correct information for the 26<sup>th</sup> of May.



*Figure 36. Day View*



*Figure 37. Day View – Popup Window*

Figure 36 and 37 (above) shows the Day View. Only in the Day View are events represented by pictures and not bands. Upon clicking the event a popup window will display showing details for that event (see Figure 37).

## CONCLUSION

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After completing this project, there are many things that I would have done differently. The design and implementation process each had its own difficulties and challenges. Some things came up that I did not realize would happen. In addition, there were times that I felt that the scope of the project was too big for the time that was allotted.

During the design process, it was challenging to come up with various metaphors and to figure out how each metaphor will portray the calendar. Originally, I had planned for only two design iterations however I ended up having three. After the first revision of the metaphors, I felt that it was necessary to have a third design iteration. The reasoning behind

this was because of the quick evolution of ideas that were developing and needing the necessary feedback and guidance of my capstone committee.

There were times when I wished I were working on three metaphors instead of five. I was not able to fully devote enough time to each metaphor in the final iteration. This was troubling to me because I would have preferred to spend more time on designing each metaphor to portray the calendar right down to the details. I could only spend time on the general overview of the application. There were many things that I was not able to focus on such as exploring alternative interactions for the pop-up windows and the buttons. Another example, is investigating another way to view the image library and even the search/filter window.

Also, I was not able to focus on the rewards of interaction for the user. Questions such as how can I further engage the user and how can I reward the user for using the application went partially unanswered. For the Sundial metaphor, it would have been difficult to come up with something that would make sense to the user. If I kept with the Life is a Highway metaphor, I could have offered the user an alternative “highway route” or even have something similar to a billboard sign that could possibly display the pictures of an All Day event. There are endless possibilities to this idea.

During the final stages of the design process, it was then I started to run into problems when I was finalizing the computer sketches for the Life is a Highway metaphor. I was having difficulty in drawing some of the curves and after deciding to drop the idea of using perspective in the curves, the sketches eventually evolved into the Sundial metaphor. My decision was to use the Sundial metaphor was due to time constraints. I was working within a timeline and was doing my best to stay within that timeline. Unfortunately, time was a major factor in the decisions that were made from this point on.

One example of how time constraints played a role in my decisions was when I originally had plan for whichever segment of a view that was active was scaled larger than the rest. I had figured out how to do it for all the views except for the Day View. The Day View was more complex and was built differently then the other views. Therefore, I had to forgo that idea and instead used grey markers and fade out the inactive labels.

Even though the design process was challenging, the implementation part proved to be the most difficult for me. I had trouble defining what constitutes as a demonstration. I kept thinking that it had to be a functional prototype even though it stated in my proposal that it was only a demonstration. The reason for this was because I wanted the application to be built dynamically instead of strictly animations. I could have used only animation and it probably would have made my life easier in the long run however; I do not regret my decision.

Due to time constraints, I eventually switched over to hardcoding the application. Initially, this caused some internal conflict because I do not like to have to hardcode things because it tends to turn into poor coding. The bands of each view were hardcoded in as well as the events that were displayed in the Day View. Hardcoding the bands in the segments did not concern me because I knew that later on I wanted to rework how the bands would be displayed.

One of the difficult parts of the implementation process was the poor and sometimes lacking documentation in Adobe Flash (Version CS3). I originally had wanted to build the demo in Adobe Flash (Version CS3) and Adobe Flex (Version 3.0) but there was not any information available at the time. In addition, there were many things I had to learn the hard way. Here is a list of things that I've learned:

- 1) One cannot put a mask within a mask
- 2) When rotating text make sure the font is embedded
- 3) One cannot dynamically via code change a thickness of a stroke in a movieclip
- 4) Dynamic text cannot resize itself (unless it is hacked). For example, if you have three dynamic text boxes that are spaced out evenly and then all of a sudden one of the dynamic text box has less characters then the rest; it is not easy to move the other two boxes over to make up for the less characters.

By building some of the demonstration dynamically, I gathered a lot of insight on what it will take to build an actual working application. In hindsight, I would not change anything that I would have done. Even though, there were times I freaked out and got stressed I am glad I did the things that I did. I have gained a lot of knowledge of what it takes to design and implement. My skills as a coder have grown as well as my desire for developing my knowledge in the realm of information aesthetic visualization. Overall, I am happy with the outcome of the project and will continue to work on this idea and bring it to fruition.

## FUTURE WORK

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In order to implement this application, work needs to be done in the back-end of the application. Solutions will be needed on how the information is gathered and stored. Is the calendar information coming from a source such as Google Calendar™ (2007)? Or will it be stored in a database? The architecture of how the information is stored or gathered is crucial in this information. In addition, further development is needed on the calendar information. Are the decisions presented to the user to input the event enough? Also, what customization can be offered to the user such as the ability to add categories?

Further work will be needed on the interactions of the pop up window where the user is to input the information (Add Event window), the image library, and the search/filter bar.

Organization of the information of the Add Event window and the options that are presented to the user is important. One important question to consider is: should the user first select the category of where the event would fall and the fields in the window dynamically change depending on the category?

With regards to the image library, it can be seen in the demo how I began to explore the idea of a spiral that would allow the user to navigate in either a clockwise or counter-clockwise motion. Further development as well as some usability testing will be needed on this idea. How images are handled and stored is important. One idea is allowing the user to import an RSS (Really Simple Syndication) feed from an image gallery into the image library.

The search/filter window is interesting concept in that not only can the user search for an event but also select what events based on: category, priority, or recurrence. Further development will also be needed.

Once the questions have been answered and further development is done on the various pop-up windows, the next step would be to develop the front-end of the application. The application should ideally be implemented in Adobe Flex (Version 3.0) with the graphics being done in Adobe Flash (Version CS3). This application can either be a web application or a desktop application or even both if it is done in Adobe Flex (Version 3.0). An application programming interface (API) will need to be developed as such the application will be open-sourced to allow users to further develop and customize the application. One last thing that will be needed to implemented and designed is a set of default images in the image library that is available to the user to get started with.

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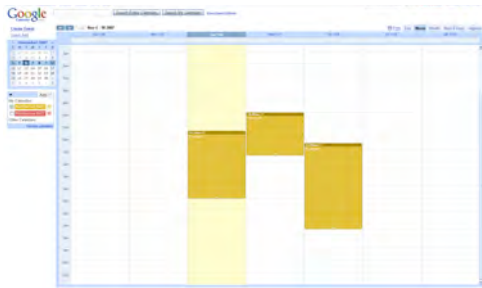
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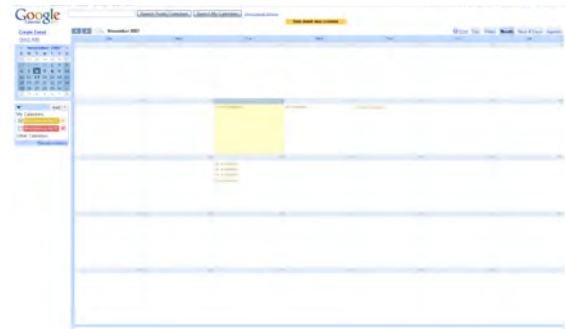
## APPENDIX

\*All figures can be found in full-size on the CD in the MS Final Write Up folder



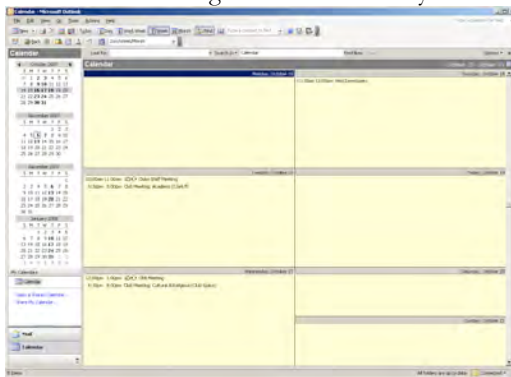
*Figure 1.*

Screenshot Google Calendar's weekly view



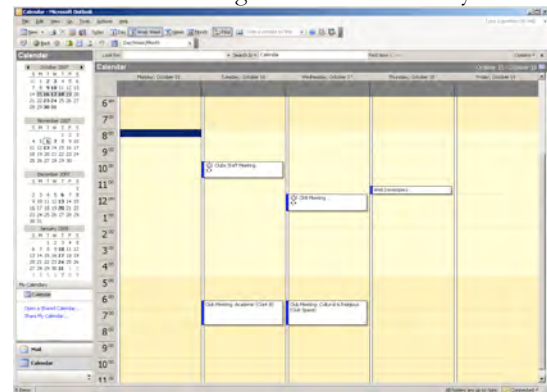
*Figure 2.*

Screenshot of Google Calendar's monthly view



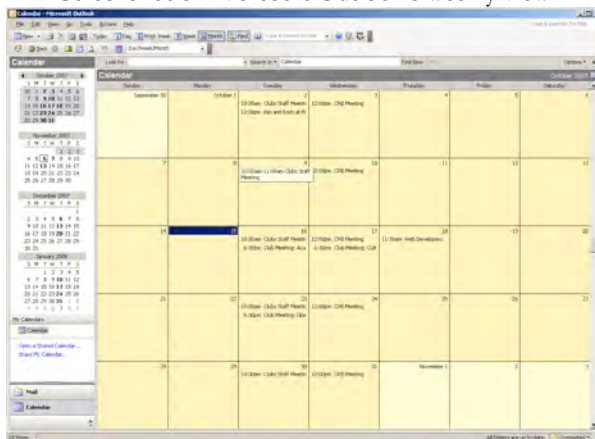
*Figure 3.*

Screenshot of Microsoft Outlook's weekly view



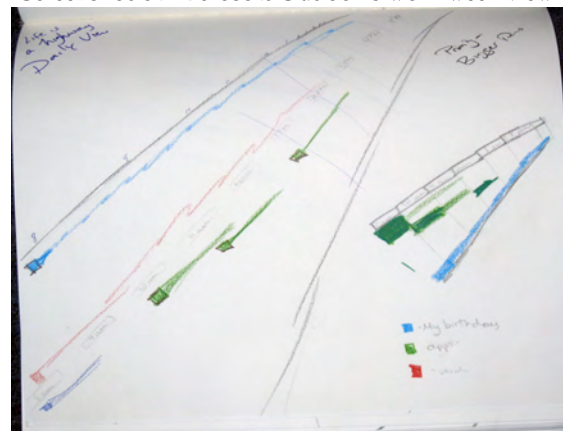
*Figure 4.*

Screenshot of Microsoft Outlook's work week view



*Figure 5.*

Screenshot of Microsoft Outlook's monthly view



*Figure 12.*

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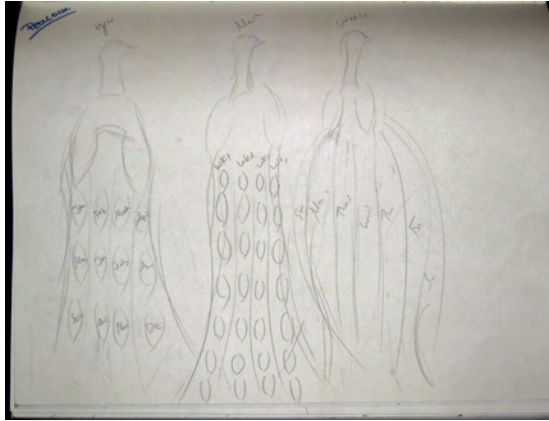


Figure 13.  
Sketchbook - Page 41

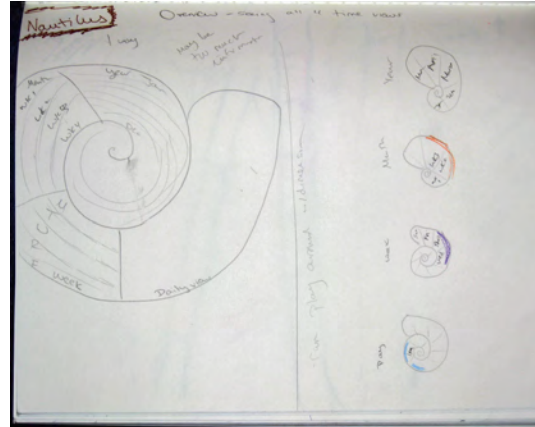


Figure 14.  
Sketchbook - Page 39



Figure 15.  
Sketchbook - Page 40

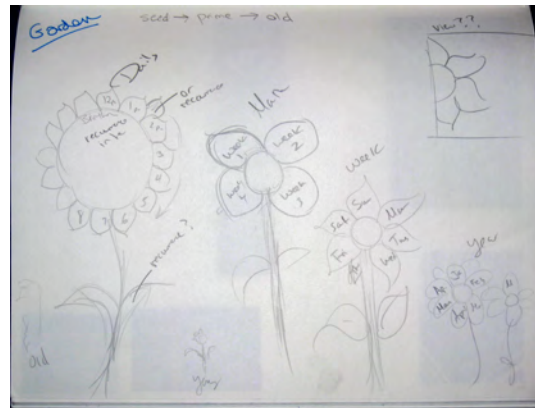


Figure 16.  
Sketchbook - Page 36

