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Capstone Project Proposal: Information Aesthetic Visualization: Exploration of the Calendar

STATEMENT OF PROBLEM

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. Desktop calendars such as Microsoft Outlook (Version 2003) (see Figure 3-5) and web calendars such as Google Calendar™ (2007) (see Figure 1 and 2) 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

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).

LITERATURE SEARCH

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.

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 helps provide resources for developing metaphors to represent complex data. In addition, he provides a variety of examples and demonstrates how each set of examples relate to the field of information visualization and each to other.

There are many resources on visualization techniques and methods which will aid me in developing my designs. Colin Ware wrote a book about perception which lists a variety of techniques for the field of information visualization (2004).

Edward Tufte wrote a few books in regards to displaying information such as "Envisioning Information" (1990), "Visual design of the user interface: Information resolution, interaction of design elements, color for the user interface, typogragphy and icons, design quality" (1989) and "Beautiful Evidence" (2006).

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).

There are currently many applications that attempt to address the visual presentation of data. Visual Complexity (Lima, 2007) is a website that showcases an assortment of visualization projects. These projects will serve as inspiration and as a resource during my design process.

PLAN OF WORK

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

During the design phase, I will explore various metaphors for the calendar (e.g. Time has a circular motif or "Life is a Highway"), develop ways to filter and display data which will coincide with the metaphor, investigate and research a variety of visualization techniques by looking at current projects, and delve 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 will be explored in depth using a variety of methods. Some methods to be considered during the design process are: art design guidelines such as the elements and principles of design, typography, and graphic design techniques which can be found in the book "The Elements of Graphic Design" (White, 2002); Thissen's book "Screen Design Manual" (2003) offers techniques in interaction design; and the book "Information graphics: innovative solutions in contemporary design" (Burke and Wildbur, 1998) will be one resource for information design.

The first design phase will result in five disparate designs based on a different metaphor. Once completed, I will present my designs to a few selected people and gather feedback. The second design phase will result in revising and possibly synthesizing the 5 designs. In addition, I will once again present my ideas, gather feedback, and if need be revise the ideas.

There will be a max of two design iterations. Upon completion of the second design phase, I will select one design to implement based on criteria that I have set and with input from my capstone committee. The criteria for the final design are: 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 has been selected, the implementation phase will begin. Pending the final design, the prototype will either be implemented in Adobe Flash (Version CS3) or Adobe Flex (Version 2.0). 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.

- ❖ Sketchbook
- ❖ Process Blog
- ❖ Final documentation
- ❖ Functional Prototype that will let users:
  - ➤ Events
    - Input events
    - Set recurring events
    - Set priority events
    - Categorize events (e.g. birthdays, sports, anniversaries, etc)
  - ➤ Displaying events – filtering, viewing
    - Time-based
      - Year
      - Month
      - Week
      - Day
    - Event-based
      - View all
      - View recurring
      - View priority
      - View category
    - Simple search toolbar

- ❖ Winter Quarter:
  - ➢ Week 1: Design phase: Develop task analysis and 5 designs
  - ➢ Week 2: continuation of Week 1
  - ➢ Week 3: continuation of Week 1
  - ➢ Week 4: continuation of Week 1
  - ➢ Week 5: Critique of designs
  - ➢ Week 6: Revise Ideas
  - ➢ Week 7: continuation of week 5
  - ➢ Week 8: continuation of week 5
  - ➢ Week 9: Critique of designs
  - ➢ Week 10: Final revision and selection of final idea
  - ➢ Finals: Implementation phase: Develop framework
- ❖ Spring Quarter:
  - ➢ Week 1: continuation of framework
  - ➢ Week 2: Start building prototype
  - ➢ Week 3: work on prototype
  - ➢ Week 4: work on prototype
  - ➢ Week 5: work on prototype
  - ➢ Week 6: work on prototype
  - ➢ Week 7: Finish prototype
  - ➢ Week 8: Final Report
  - ➢ Week 9: continuation of Week 8
  - ➢ Week 10: Capstone Defense
  - ➢ Finals: continuation of Week 10

WORKS CITED

Adobe Flash (Version CS3) [computer software]. Adobe Systems Incorporated.

Adobe Flex (Version 2.0) [computer software]. Adobe Systems Incorporated.

Burke, M., & Wildbur, P. (1998). *Information graphics: innovative solutions in contemporary design.*
New York : Thames and Hudson.

Facebook. (2007). Retrieved November 19, 2007, from http://www.facebook.com

Google Calendar™. (2007) [web application]. Google. Retrieved November 19, 2007, from
http://www.google.com/calendar.

Harris, J., & Kamvar, S. (2005). *We Feel Fine.* Retrieved November 19, 2007, from
http://www.wefeelfine.org

Judelman, G. (2004). Aesthetics and Inspiration for Visualization Design: Bridging the Gap
between Art and Science. *IV '04: Proceedings of the Information Visualisation, Eighth
International Conference on (IV'04)*, 245-250.

Lau, A., & Moere, A. V. (2007). Towards a Model of Information Aesthetics in Information
Visualization. *IV '07: Proceedings of the 11th International Conference Information
Visualization*, 87-92.

Lima, Manual. (2005). *Visual Complexity.* Retrieved November 19, 2007, from
http://www.visualcomplexity.com

Mackinlay, J. D., Robertson, G. G., & DeLine, R. (1994). Developing calendar visualizers for
the information visualizer. *UIST '94: Proceedings of the 7th annual ACM symposium on
User interface software and technology*, 109-118.

Microsoft Outlook (Version 2003) [computer software]. Microsoft Corporation.

Shneiderman, B. (1998). *Designing the User Interface: Strategies for Effective Human-Computer Interaction Third Edition.* Addison-Wesley.

Thissen, F. (2003). *Screen Design Manual: Communicating Effectively Through Multimedia.* Springer.

Tufte, E. R. (1989). *Visual design of the user interface: Information resolution, interaction of design elements, color for the user interface, typogragphy and icons, design quality.* IBM.

Tufte, E. R. (1990). *Envisioning Information.* Graphics Press.

Tufte, E. R. (2006). *Beautiful Evidence.* Graphics Press.

White, A. W. (2002). *The Elements of Graphic Design: Space, Unity, Page Architecture, and Type.* Allworth Press.

ADDITIONAL RESOURCES

Bederson, B. B., & Shneiderman, B. (2003). *The Craft of Information Visualization: Readings and Reflections.* Morgan Kaufmann.

Card, S. K., Mackinlay, J., & Shneiderman, B. (1999). *Readings in Information Visualization: Using Vision to Think.* Morgan Kaufmann.

Chen, C. (2006). *Information Visualization: Beyond the Horizon.* Springer.

Deller, M., Ebert, A., Bender, M., Agne, S., & Barthel, H. (2007). Preattentive visualization of information relevance. *HCM '07: Proceedings of the international workshop on Human-centered multimedia*, 47-56.

Few, S. (2006). *Information Dashboard Design: The Effective Visual Communication of Data.* O'Reilly Media, Inc.

Fogarty, J., Forlizzi, J., & Hudson, S. E. (2001). Aesthetic information collages: generating decorative displays that contain information. *UIST '01: Proceedings of the 14th annual ACM symposium on User interface software and technology*, 141-150.

Gershon, N., Eick, S. G., & Card, S. (1998). Information visualization. *interactions*, *5*(2), 9-15.

Knight, C., & Glaser, J. (2005). *Graphic Designer's Guide to Effective Visual Communication: Creating Hierarchies with Type and Image*. Rotovision.

Munster, A. (2006). *Materializing New Media: Embodiment in Information Aesthetics*. Dartmouth.

Noble, I., & Bestley, R. (2001). *Experimental Layout*. Rotovision.

Raskin, J. (2000). *The Humane Interface: New Directions for Designing Interactive Systems*. Addison-Wesley Professional.

Robertson, G. G., Card, S. K., & Mackinlay, J. D. (1993). Information visualization using 3D interactive animation. *Commun. ACM*, *36*(4), 57-71.

Spence, R., & Press, A. C. M. (2000). *Information Visualization*. Addison Wesley.

Triggs, T. (2003). *Type Design: Radical Innovations and Experimentation*. Collins Design.

Vande Moere, A. (2005). Form follows Data: the Symbiosis between Design and Information Visualization. *International Conference on Computer-Aided Architectural Design (CAADfutures'05)*, 31-40.

Ware, C. (2004). *Information Visualization, Second Edition: Perception for Design*. Morgan Kaufmann.

Weber, M. (2007). *The Layout Look Book*. Collins Design.

Wigan, M. (2006). *Basics Illustration: Thinking Visually*. AVA Publishing.
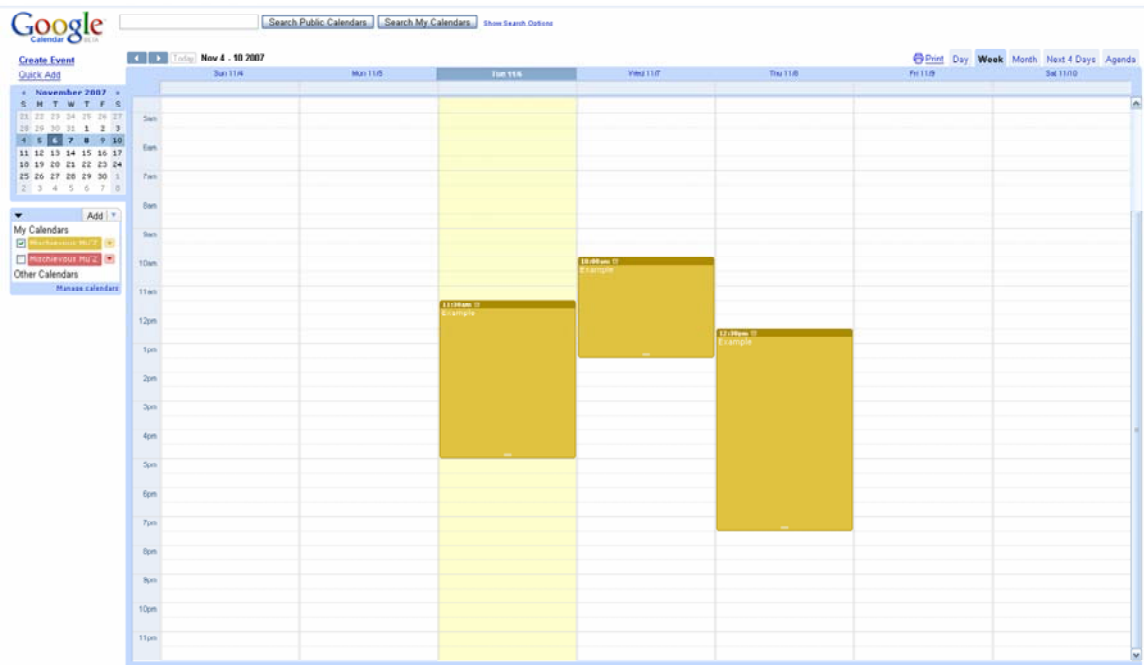
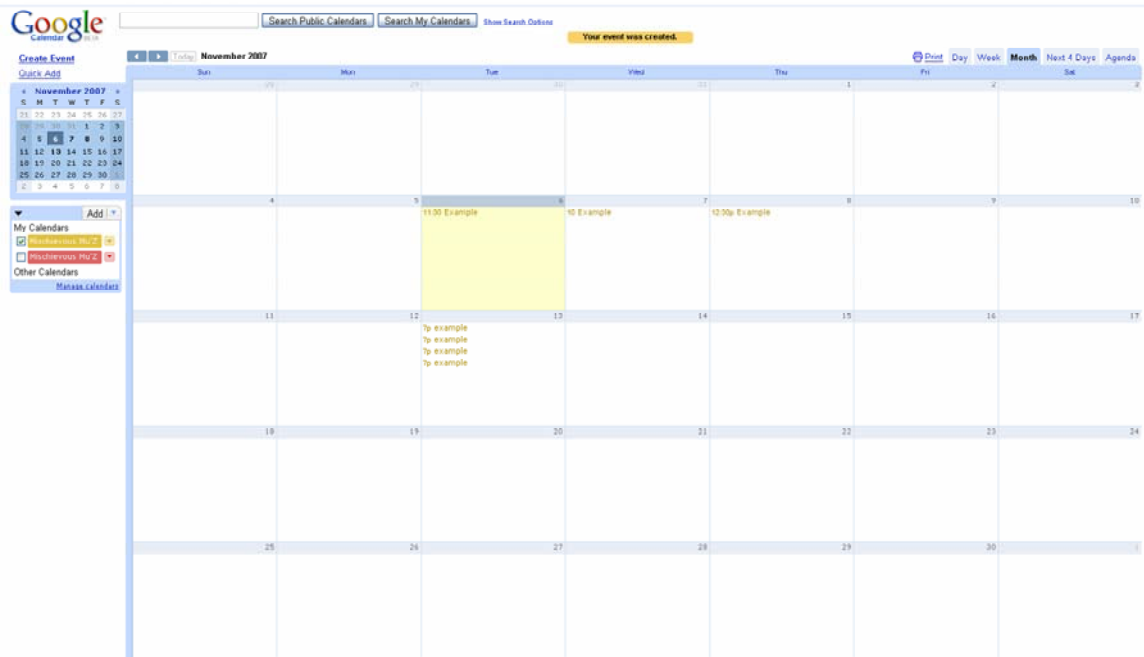Figure 1. Screenshot Google Calender's weekly view

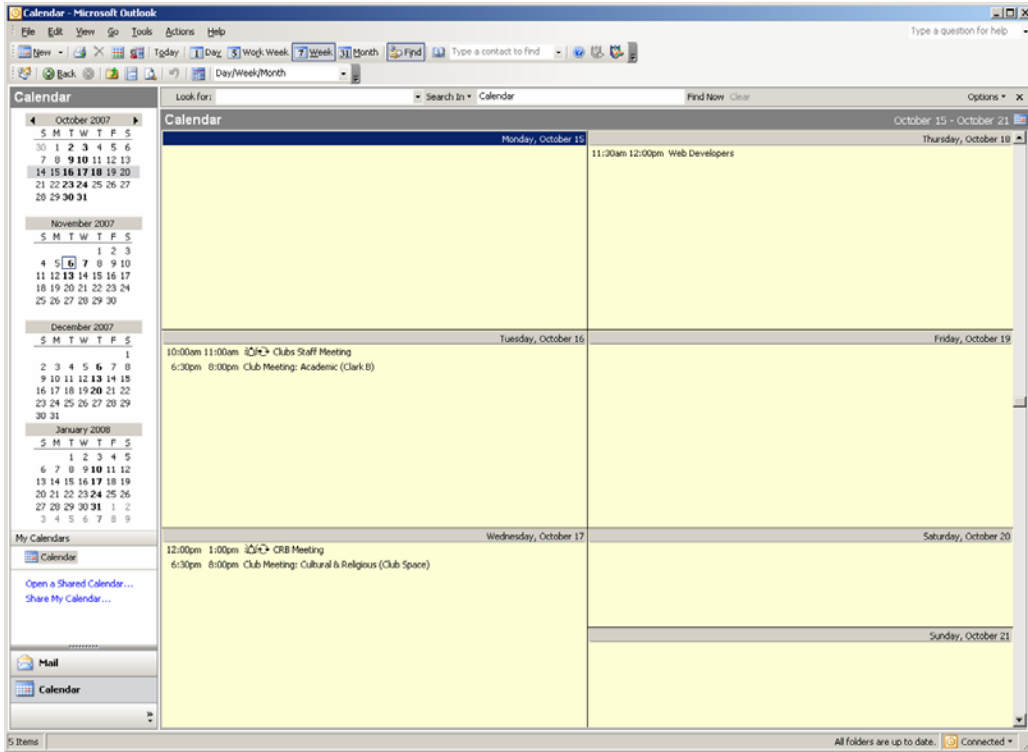Figure 2. Screenshot of Google Calender's monthly view

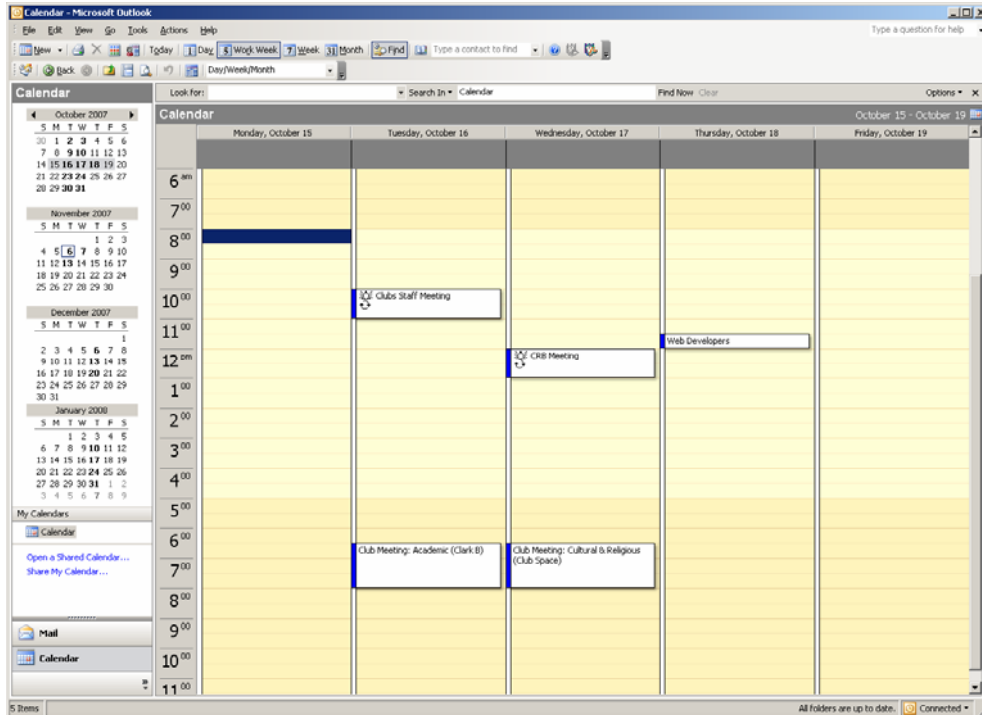Figure 3. Screenshot of Microsoft Outlook's weekly view

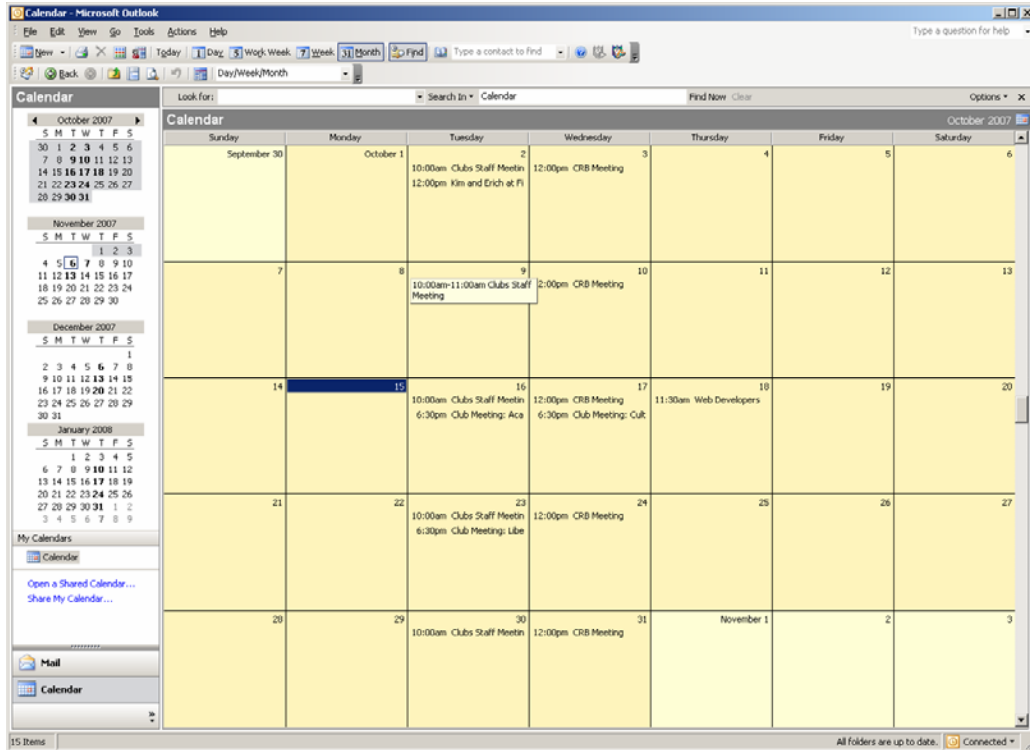Figure 4. Screenshot of Microsoft Outlook's work week view

Figure 5. Screenshot of Microsoft Outlook's monthly view