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# Visual design and usability in a web-based budgeting interface: a case study

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## Introduction

### *“Boring and ugly”*

In a recent conversation with a friend, the topic turned—as it often does these days—to finance. As college graduates with staggering student loan debt, we’ve found ourselves in a constant position of micro-management with our money. We bemoaned our similar lifestyles of barely making ends meet, and I mentioned that I had taken to checking on my accounts and spending totals daily through my bank’s online customer portal. She nodded, but made a sour face. “I know I have that option,” she said (I paraphrase), “but why does it have to be so boring and ugly?” At the time I didn’t have an answer, but hindsight is 20/20. Simply put, it doesn’t.

**Budgeting** is the intentional allocation of funds for (a) purpose(s) over a given period of time. For the purposes of this paper, budgeting is a forethought to spending in some generic category (e.g. “groceries” or “entertainment”). The amount for which an individual budgets serves as the absolute maximum allowable spending in that category. Budgeted funds do not need to be completely spent over the period for which they’ve been budgeted; rather, the excess funds accrue in an individual’s account, hopefully leading to a regularly increasing balance.

*For example:* An individual may **budget** \$40 at the beginning of the month to be spent (at maximum) throughout the month on items of clothing. If he spends only \$20, these funds remain in his bank account and serve as a basis for future budgets and/or savings.

### *The U.S. Bank Fellowship*

#### **Getting started**

The subject of this case study is a web-based budgeting interface concept I developed through a fellowship with U.S. Bank (as part of the University of Minnesota’s Industrial Affiliates Program). This project was decided upon through conversations with U.S. Bank’s usability team member John Neenan, who expressed the bank’s strong interest in such research and stressed its importance as a competitive strategy.

John insisted that such an interface would be a key part of maintaining customer loyalty (by offering the best services on the web), increasing the number of accounts customers are comfortable opening (because the interface would allow customers to manage them easily), and attracting new customers (because they would have the “edge” on the competition). It was in part because of John and his team’s firm belief in the value of such research that I agreed to pursue it.

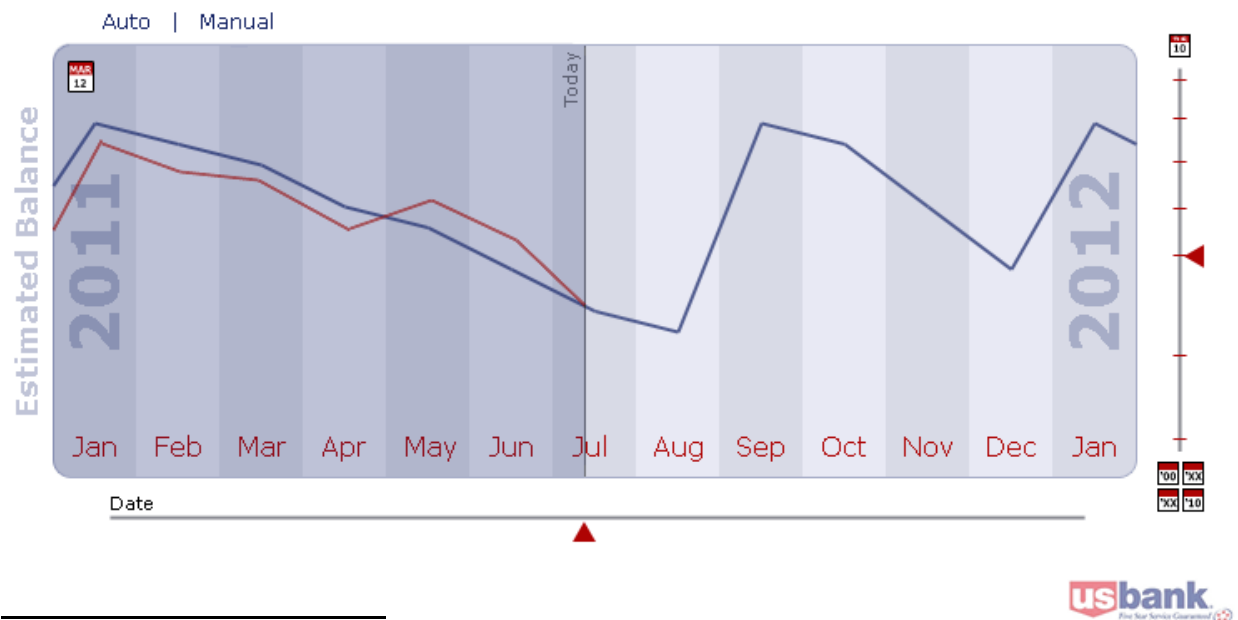
## The interface

Before any actual designing was done, John provided me with several previously developed personas (created by previous fellow, Dawn Armfield) to work with. Of these six personas, one stood out as particularly relevant to my research interests: “Leaking Larry,” a hypothetical college student whose primary source of funds is student loans. Not only was I able to apply my personal student experience to the development of an interface for such an individual, but his simplistic finances with few regular bills allowed for a focus on varied, unpredictable expenses (like coffee, entertainment, clothing, etc.). These unknown, variable expenses were of great interest to John and his team, and quickly became a focal point of the research due to their influence.

The concept was developed in the form of static, high quality JPEG<sup>1</sup> images (henceforth referred to as “screens”), and the screens depicted were meant to capture each major action of a user as he or she navigates through the major components of the interface. These screens depicted a variety of viewing modes (present, past, future, 1 year, 1 day, 1 week, 1 month, 6 months, 5 years, 10 years) and options (automatic and manual adjustment, addition of known income/due dates).

These screens can be viewed in Figures 1.1-1.12 below. Because Word 2007 resizes the images and does not support their original resolution, all figures in this research paper will be slightly less than ideal. For this reason, I have included the complete set of full-resolution concept images [here](#).

Figure 1.1. Present (one year), U.S. Bank interface concept



<sup>1</sup> JPEG is a common standard of image compression (with low, medium, and high quality modes). This format allows for large, full-color or grayscale images to be compressed to a smaller file size without too noticeable a loss of image quality. This is accomplished through exploiting natural limitations of human eyesight (e.g. limiting colors lost to those hues that usually go unnoticed) (Lane, 1999).

Figure 1.2. Past (one year), U.S. Bank interface concept

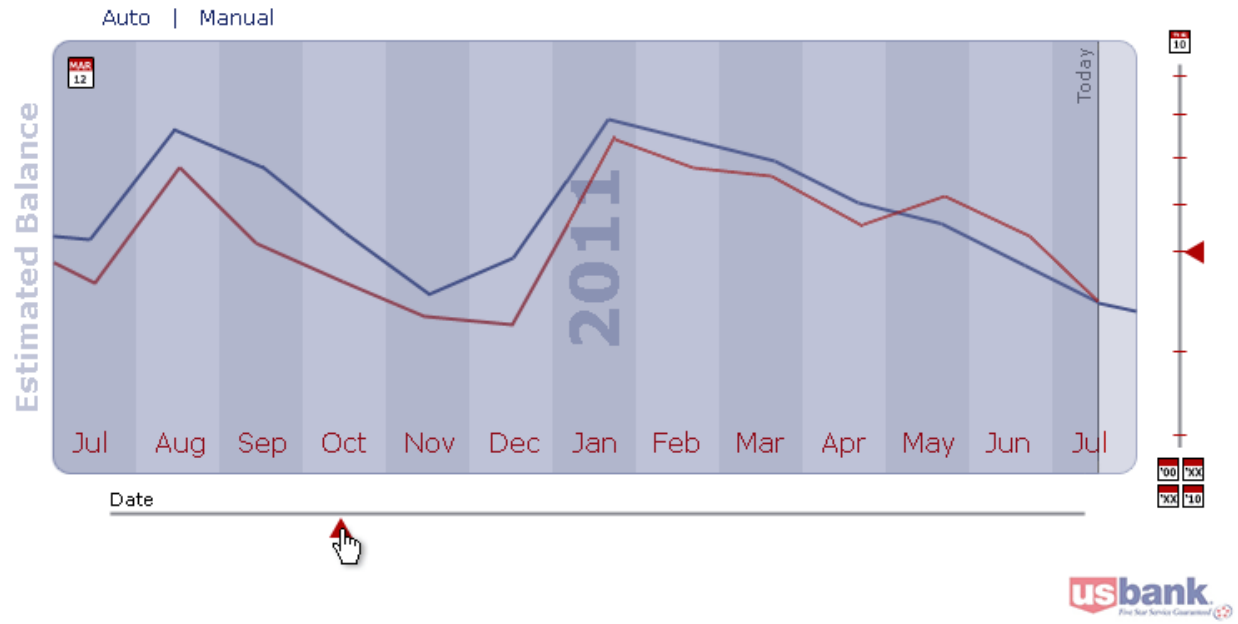


Figure 1.3. Future view (one year), U.S. Bank interface concept

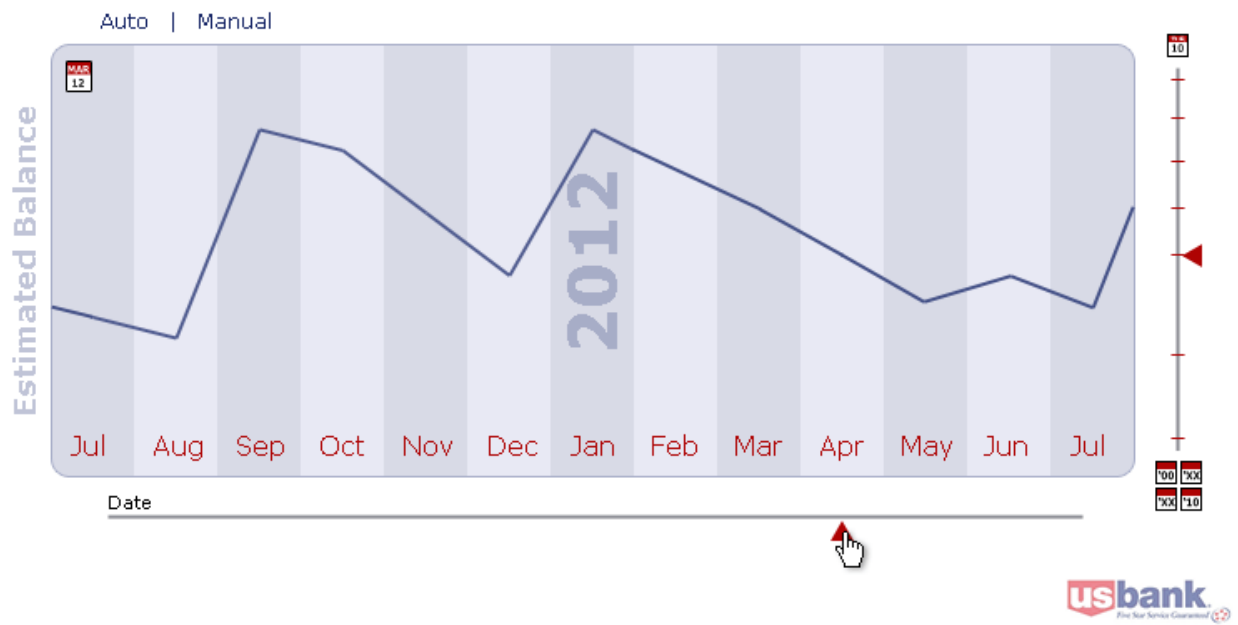


Figure 1.4. One day view, U.S. Bank interface concept

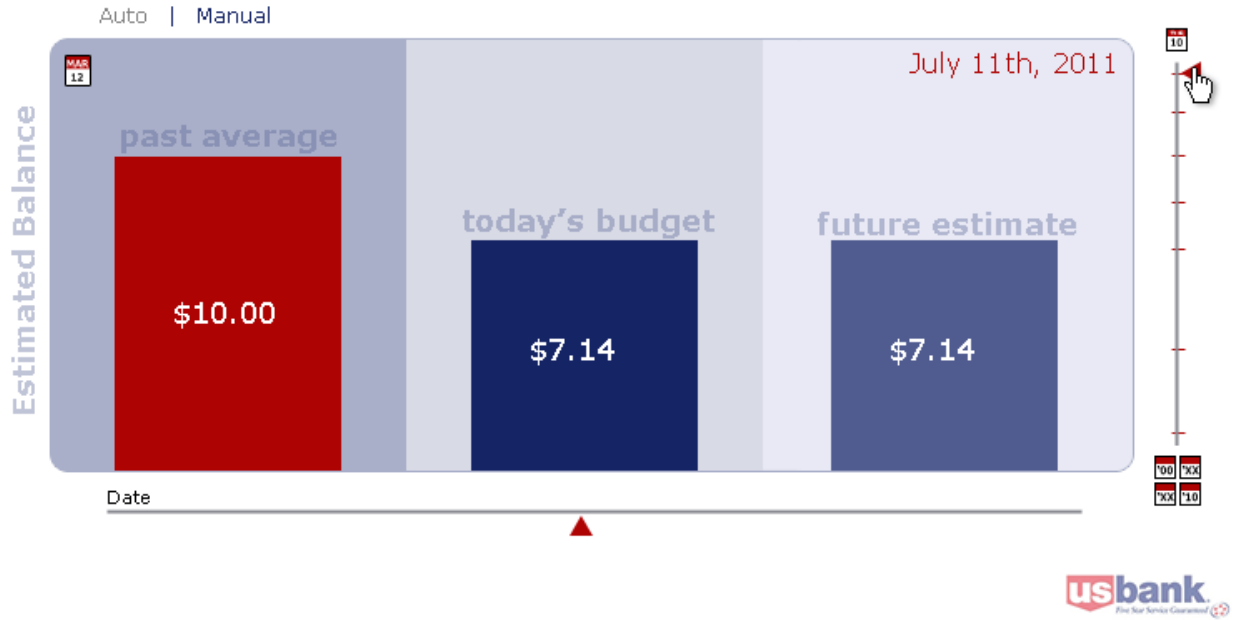


Figure 1.5. One week view, U.S. Bank interface concept

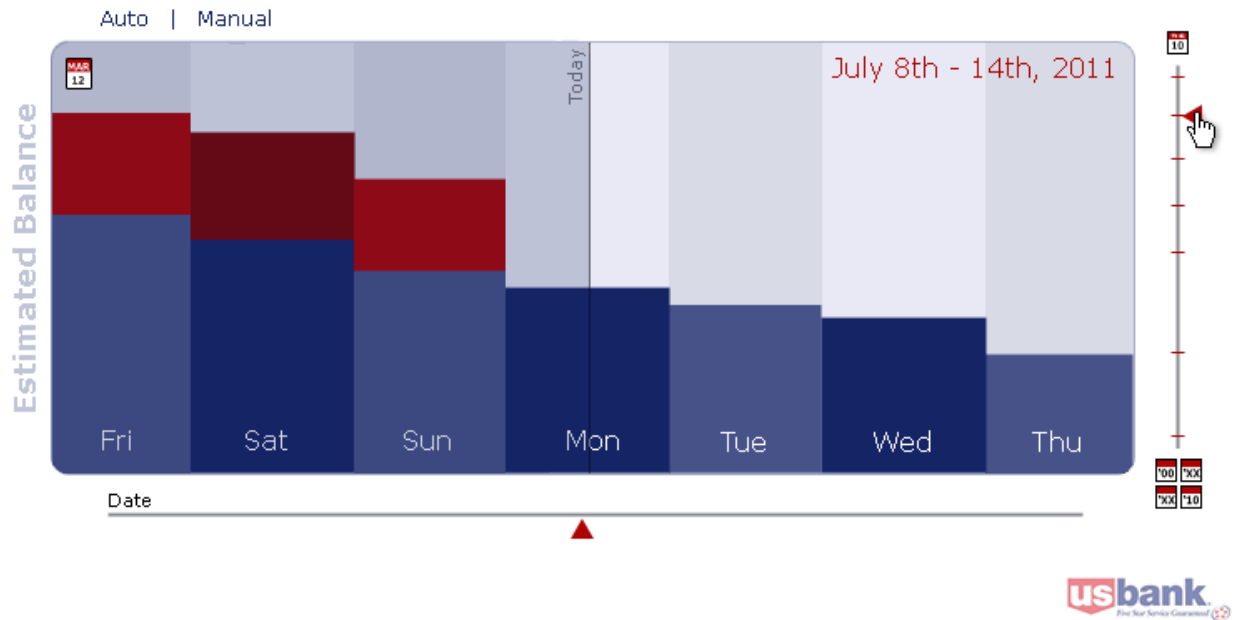


Figure 1.6. One month view, U.S. Bank interface concept

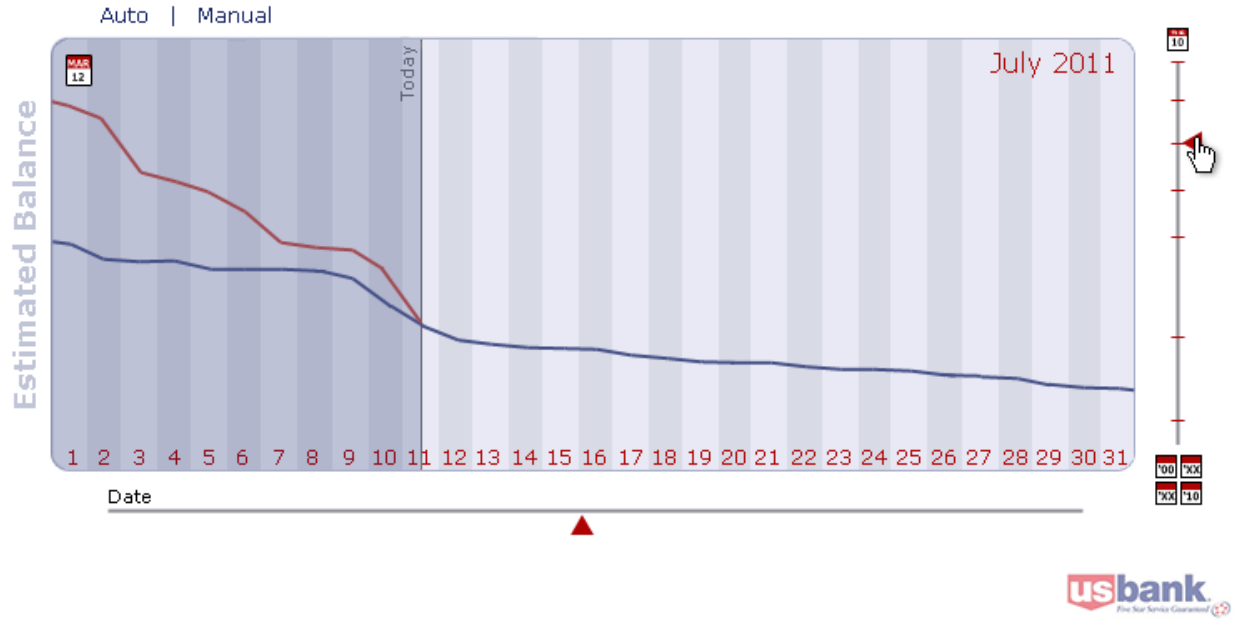


Figure 1.7. 6 month view, U.S. Bank interface concept

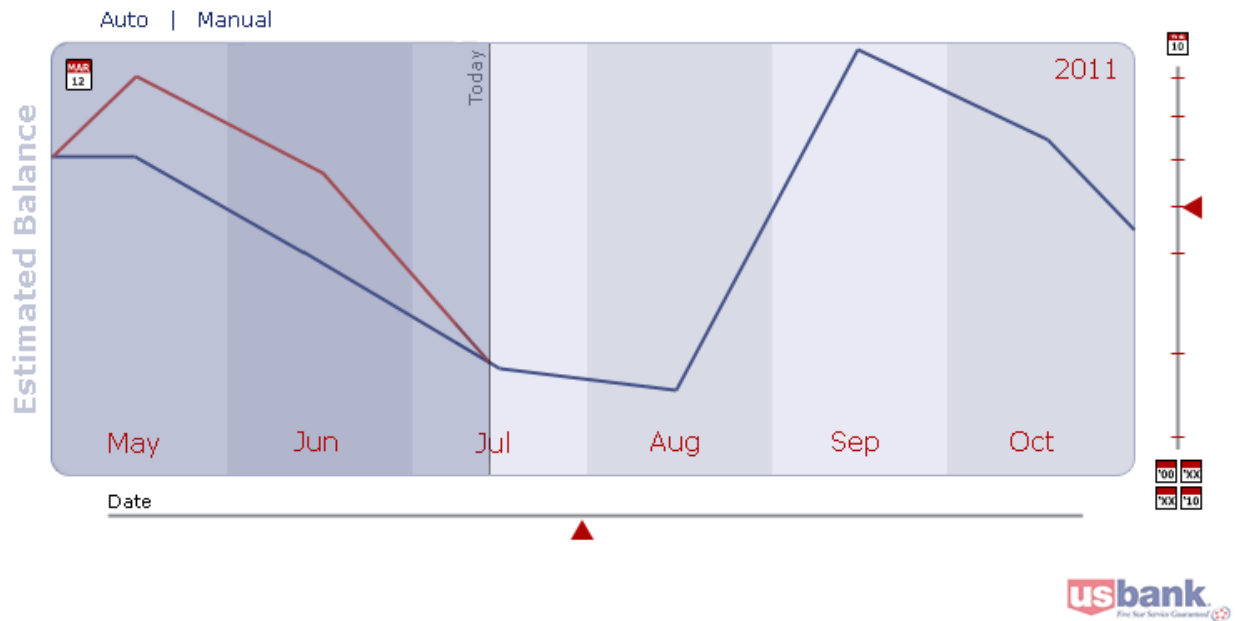


Figure 1.8. 5 year view, U.S. Bank interface concept

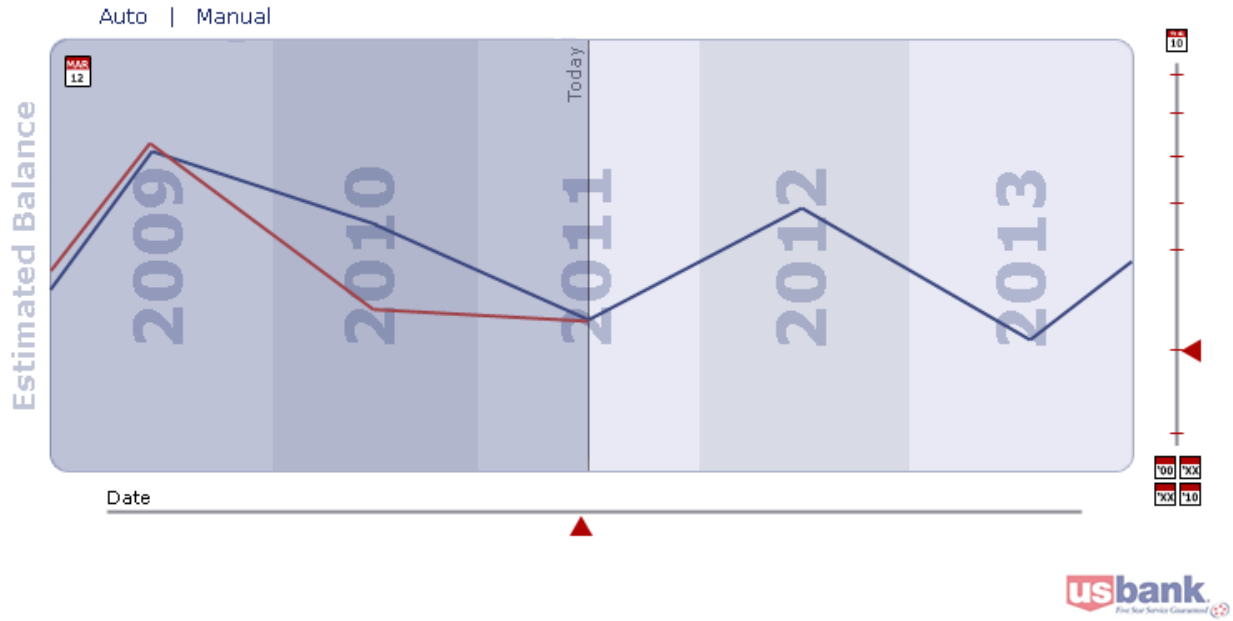


Figure 1.9. 10 year view, U.S. Bank interface concept

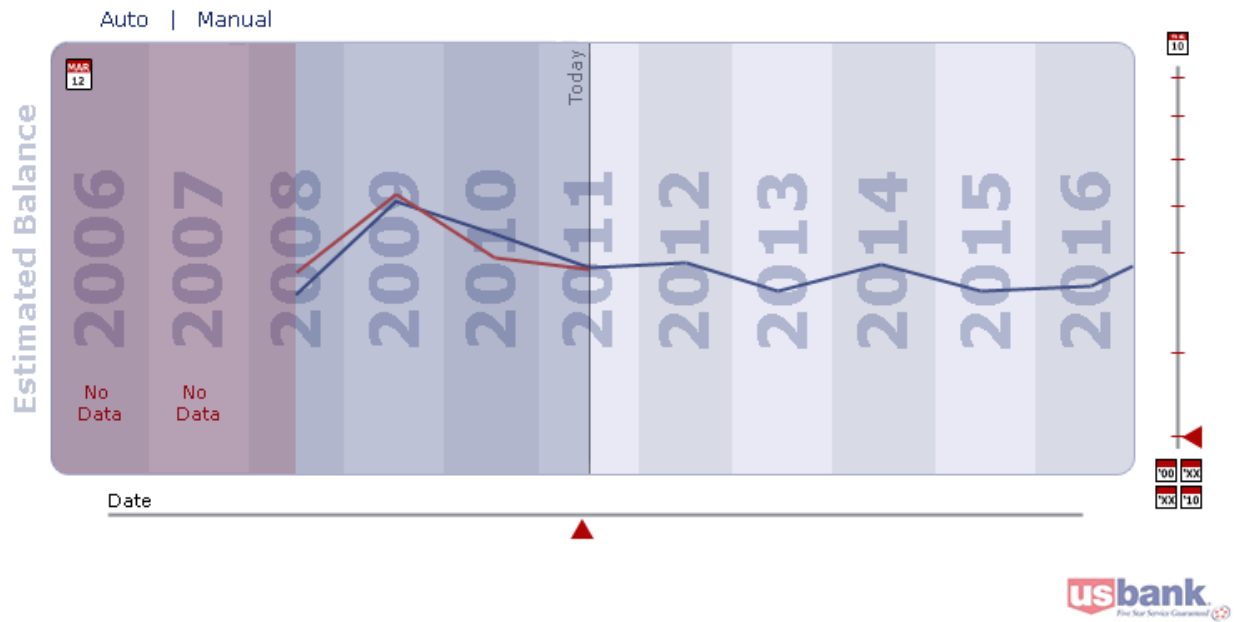


Figure 1.10. Automatic adjustment mode, U.S. Bank interface concept



Figure 1.11. Manual adjustment mode, U.S. Bank interface concept

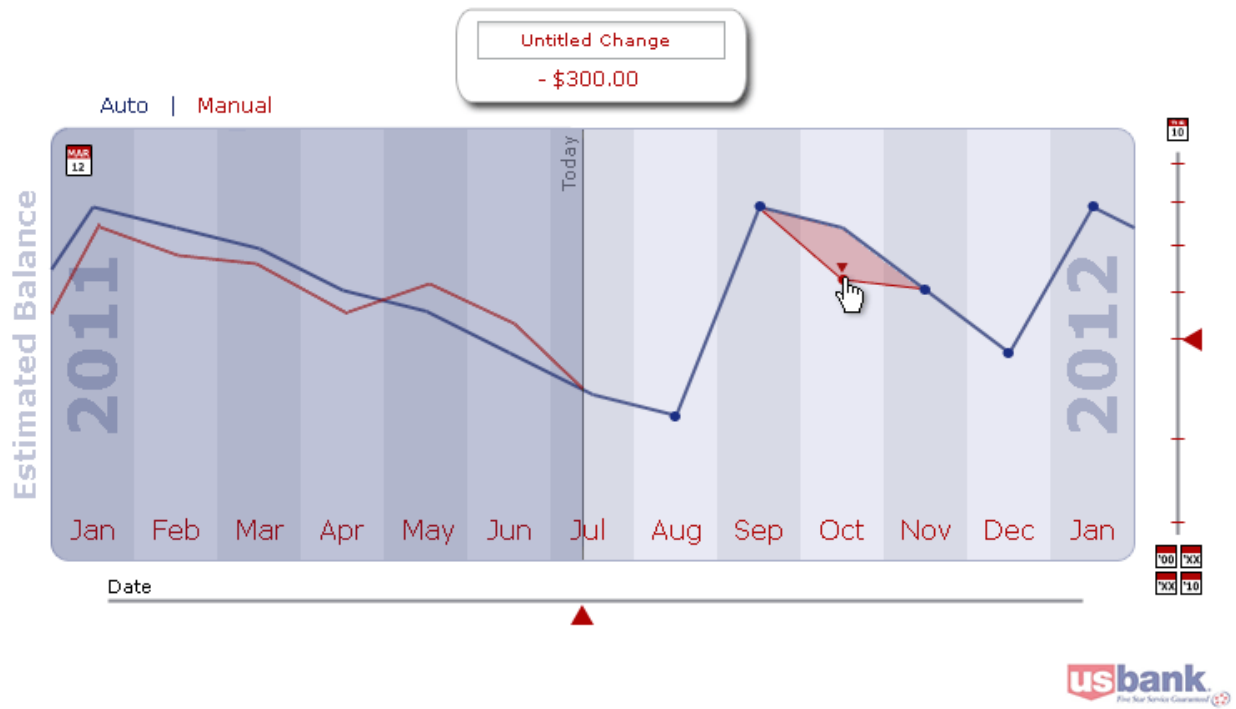
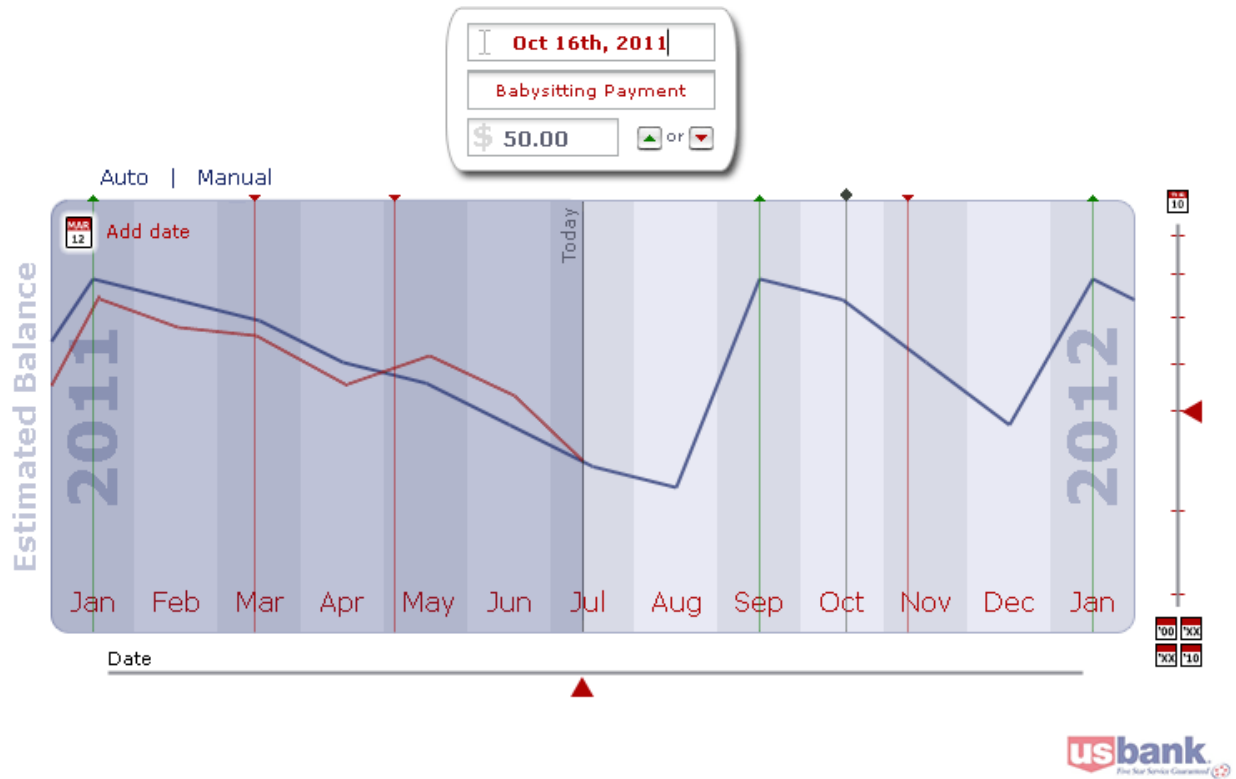


Figure 1.12. Income/due dates mode, U.S. Bank interface concept



Naturally, it can be difficult to see the direct importance of banks offering their own web-based budgeting interfaces at the present time. Sure, they would be nice for customers to have, but is not likely to be a “deal-breaker” for those already banking (or considering banking) with an institution whose other amenities serve their needs well. Having this budgeting option may have some *theoretical* importance to those in the banking industry, but realistically this interface concept plays to two arenas of *practical* importance: the financial education of young college students and the subsequent marketing opportunities that abound.

### Practical importance

#### Youth education

The “Leaking Larry” persona not only allowed me to consider daily variable spending as the U.S. Bank team wished, but also allowed me to treat the interface as an opportunity to educate young people on the importance of regular, active financial management.

Other financial education efforts have been started by various organizations in the past ([AssetPlatform.org](http://AssetPlatform.org) is a good example) with three primary outcomes: customers have begun to embrace mainstream financial institutions, purchase new, appropriate financial products, and save and invest

more (Servon & Kaestner, 2008). If such education efforts were focused on the student demographic, this final outcome could lead to more college students considering important asset-building finance management for their futures.

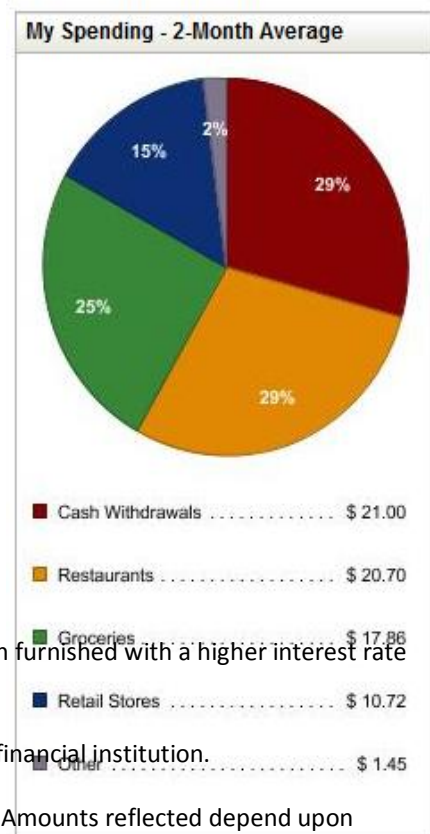
### Marketing

One of the affordances of an interface that is meant to be used daily is that it is prime internet “real-estate” for marketing material. In the case of students, this online space could display advertisements or links to information about opening savings accounts, CDs<sup>2</sup>, applying for/consolidating student loans, etc. A study of three major Greek retail banks revealed the potential for e-banking services to aid in “relationship marketing,” the process of “attracting, maintaining...and enhancing customer relationships (Argyriou, Melewar, & Meadows, 2006).” Strong consumer-firm (or customer-bank) relationships could mean more business as customers develop trust in their financial institution and begin to open more accounts and take advantage of new services (Liang & Chen, 2009).

### Third party options

With the exploding popularity of web applications, financial institutions have begun to offer customers somewhat minimal representation of their finances online. These generally take the form of some kind of simple graph (bar, line, or pie) that indicates the trends or percentages of spending in certain automatically generated categories. Wells Fargo, for example, offers a tab labeled “My Spending Report,” accessible from one’s main account summary.<sup>3</sup> Clicking this tab takes the user to a page that displays a report for the last two months, plus the period from the beginning of the current month to date. This page lists the accounts included in the report, shows tables for the inflow and outflow of money, provides the net amount, summarizes spending by payment type<sup>4</sup>, and displays a colorful pie chart with roughly estimated percentages of spending by category (Figure 1.13).<sup>5</sup>

Figure 1.13. Wells Fargo summary



<sup>2</sup>“Certificates of Deposit”—savings kept in the bank for a fixed term and often furnished with a higher interest rate than that of savings account.

<sup>3</sup>This example stems from personal experience, as Wells Fargo is my current financial institution.

<sup>4</sup> Payment types include credit card, check card, other checking, and bill pay. Amounts reflected depend upon which types of payment a given customer has access to through Wells Fargo (i.e. “credit card” refers only to spending from a Wells Fargo credit card).

<sup>5</sup> Categories include cash withdrawals, restaurants, groceries, retail stores, and “other” (as seen in Figure 1).

An [online demo of account services](#) from Chase (JPMorgan Chase) shows that customers have no strong visuals, and no options for budgeting. The majority of the interface focuses on the past history of the customer's accounts, displayed in simple summary tables (Figure 1.14).

Figure 1.14. Chase account services display

Pay Bills   Paperless Options   Account Alerts   Chase Mobile

**Bank Accounts** Total balance: \$9,127.35

Account	Available balance	Present balance
<a href="#">My Checking (...1234)</a> ▶ Activity ▶ Statements ▶ Pay bills	\$6,207.31	\$7,526.31
<a href="#">Joint Checking (...3456)</a> ▶ Activity ▶ Statements ▶ Pay bills	\$622.08	\$612.08
<a href="#">Our CD (...4567)</a> ▶ Activity	N/A	\$1,176.14

[Chase Debit Card Overdraft Coverage<sup>SM</sup>](#)

**Debit Card Rewards<sup>1</sup>** [Show Rewards](#)

[Bank of America's online portal](#), unlike the others, *does* offer a section called “My Portfolio” which includes a basic budgeting section. Though the Word 2007 formatting has decreased the quality of detail in Figure 1.15, we can see that the budget interface itself is rather clunky, using typical form fields in a common table format. This is rather surprising considering that as of 2003, Bank of America's online portal was the most heavily used of all financial institutions' systems (Brooks & Forelle).

Figure 1.15. Bank of America's “My Portfolio” budget interface, as viewed in a demo video

**Budgeting & Reports** Feedback

Reports   Budget   Transactions   Net Worth

View: [Set Budget Goals](#)

**Set Monthly Budget Goals**

You may set up individual budget goals by category or set an overall budget. You will be able to view your performance against these goals on the Budget vs. Actual Spending chart.

Category	Spending This Month	Average	Monthly Budget Goal
<input type="checkbox"/> <b>Expense</b>			
Service Charges/Fees	\$5.95	\$4.96	\$ <input type="text"/>
<b>Total Spending</b>	<b>\$5.95</b>	<b>\$4.96</b>	\$ <input type="text"/>
<input type="checkbox"/> <b>Income</b>			
Investment Income	\$100.00	\$100.00	\$ <input type="text"/>
Other Income	\$100.00	\$100.00	\$ <input type="text"/>
<b>Total Income</b>	<b>\$200.00</b>	<b>\$200.00</b>	\$ <input type="text"/>
<input type="checkbox"/> <b>Transfer</b>			

**Net Worth**

Total Net Worth<sup>1</sup>: **\$336,901.02**

Change **6/30/09 - 7/22/09**  
+\$3,418.07 +1.2%

[View Detailed Chart](#)

**Add & Manage Accounts**

[Add more accounts](#)  
[Manage accounts](#)  
[Create/edit account groups](#)

**Find Transactions**

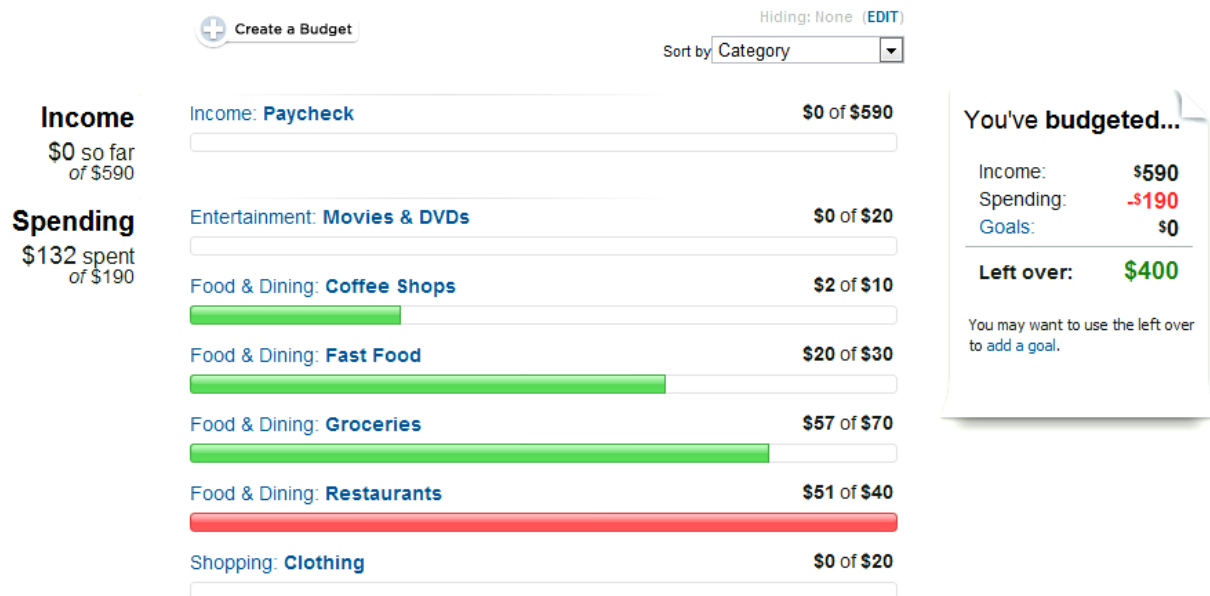
Search transactions in all My Portfolio accounts:

Perhaps most disheartening here is the fact that banks don't appear to have considered key aspects of design and usability in the creation of their online customer portals. In contrast, dozens of free web-based budgeting applications have cropped up that offer a much more visually pleasing view of one's finances. For examples, take a brief look at the design of two such applications:

## Mint

This is one of the most popular and publicized options for free web-based budgeting<sup>6</sup>, and with good reason. Figure 1.16 shows the highly attractive, modern, and simplistic style of [Mint's monthly budgeting widget](#).<sup>7</sup> Budget limits are visible for each user-defined category (as indicated by the "create budget" button), and warnings become clearly visible when overages occur.

Figure 1.16. Mint.com monthly budgeting widget



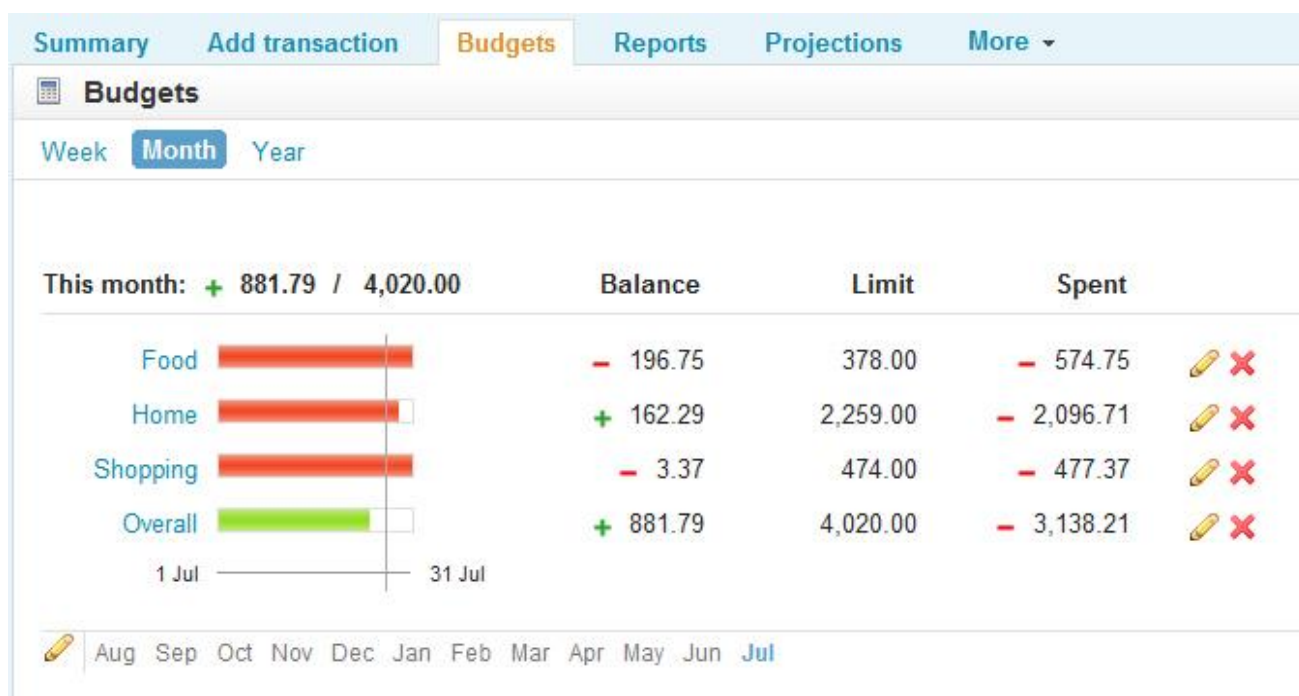
## Buxfer

A lesser-known budgeting interface, [Buxfer](#), offers a similarly appealing interface to that of Mint (Figure 1.17). The combination of tabbed organization, color, icons, and white space make this interface look great without losing the ability to view one's finances in great detail.

<sup>6</sup> Mint was recently acquired by Intuit, the company that provides the financial software programs Quicken and TurboTax (Intuit, 2009).

<sup>7</sup> The term "widget" essentially means "gadget." In an online context, it is commonly used to describe small embedded applications on a web-page. This particular image of this widget has been cropped out of a much larger single page which includes other financial widgets.

Figure 1.17. Buxfer budgeting interface



As we can see, there is a gap in design and forethought between services offered by major financial institutions and those offered by third parties. For those looking for a free, easy, hands-on way to learn to manage a regular budget, these third-party options certainly seem enticing.

Typically, some of the earliest adopters of such web-based technologies are college students (Jones, 2002). These students are a massive source of potential business for financial institutions, and banks could pull in this audience by offering high-quality integrated budgeting and account systems. The addition of marketing to these sites could then lead these new student customers to expand their business with—and maintain loyalty to—their bank of choice. With these potential gains in mind, financial institutions would be wise to consider the development of their *own* attractive and usable budgeting services to attract new business and gain a reputation as responsible companies that care about their customers' financial knowledge and well-being.

### Research question

Using my prior fellowship work on the U.S. Bank visual budgeting interface concept as a case study, I will examine several key elements of visual design (look and feel, layout, icons and text) and usability (consistency and simplicity) that lead to an aesthetically pleasing and easily usable application.

To state the main question of this research more explicitly: *how can concepts of visual design and usability be applied to the development of a financial institution's web-based budgeting interface?*

## Background

### *The rise of e-banking*

It is true that it can be difficult to “keep up with the times” in our expanding technological world, but financial institutions have bridged these gaps before. As we know, banking was once a strictly offline experience. In the early to mid 1990s, banks began making the digital move by supplying customers with software that would allow them to manage their finances at home through an internet connection. Then, in 1996, Atlanta Internet Bank became the first financial institution to exist solely online without the need to install additional software—though it was backed financially by a physical “real-world” bank in South Carolina (Girard, 1996). This decade marked the beginning of new territory for banks—one in which they could reach new demographics via the internet (including the disabled and home-bound), and provide customers with banking services from the comfort of their homes.

A 2006 study of United States access to and use of online banking revealed that approximately 72.3% of all respondents had access to online banking, 20.8% utilized online banking, and of that group about 44.5% identified online interactions as their main means of doing financial business (Bell, et al., 2009). These proportions may initially seem unimportant, but according to the Bell study the growth in adoption of the technology has been phenomenal: nearly a 48% increase in use between 1995 and 2007. If these trends continue, the majority of consumers could be banking online within the next decade—especially as the children of the “digital age” grow into financially difficult territory as college students. As this balance shifts, banks should be ready to attract this demographic with the promise of online money management training through a web-based budgeting application.

The inclusion of budgeting interfaces on financial institutions’ web portals could be especially lucrative in our current period of economic distress, when financial advisors are counseling the public to budget carefully. In my review of the sample web portals for the country’s five largest banks<sup>8</sup>, only *one* (Bank of America) was found to have the ability to budget.<sup>9</sup> This pales in comparison to the growing number of quality third-party budgeting applications now appearing online. If banks can provide their own quality budgeting option, they could offer the competitive edge by offering young people a method of learning to budget while gaining valuable marketing access to the student demographic.

Though there is literature available on the development of online banking (Bell, et al., 2009; Brooks & Forelle, 2003; Girard, 1996), little has been said regarding Human-Computer Interaction (HCI) in connection with financial institutions’ existing or future online services. This may be because banks would prefer to work retroactively and wait for the demand to rise, because the cost of HCI

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<sup>8</sup> JPMorgan Chase, Bank of America, Citibank, Wells Fargo, and U.S. Bank (Federal Reserve Statistical Release, 2010).

<sup>9</sup> This was determined by examining online demonstrations of each bank’s customer portal and searching for any budget-related options.

consideration is too high, or simply because the gap between worlds is too large at present. Whatever the case, it must be said that any future online banking services would benefit from strong elements of visual design and usability.

### *Visual design: the graphical imperative*

**Visual design** refers to the use elements that are perceived visually and affect the meaning, aesthetic, and feeling of the piece. For this research, visual design is comprised of four main elements: look and feel, layout, icons, and text. These four elements were chosen specifically for analysis because they are the foremost parts of the design as a user interprets it.

**For a brief rationale (further details on each element can be found in their respective sections):**

*Look and feel* is the first thing a user will encounter upon viewing the design, providing initial impressions of it.

*Layout* is secondary to look and feel, affecting the white space and grouping of the design in ways that are key to the user's understanding.

*Icons* are vital in presenting certain information graphically rather than through potentially arduous text. They act as "shortcuts" to their meaning.

The world of finance is numeric by nature, and such data is especially powerful once translated through clear visual representations (Tufte, 2001). If it can be assumed that the youth of the "digital age" will grow into regular users of online banking, it may also be assumed that these individuals will be highly multi-modal. The consideration of visual design and its consequences is not merely a pleasantry for such individuals, but a requirement (Metros, 2008).

Throughout the literature (Albers, 2006; Brinck, et al., 2002; Gerstner, 1986; Hornbaek, 2006; Kress & van Leeuwen, 2006; Lewis & Polson, 1996; Lidwell, et al., 2003; Lynch & Horton, 1999; Mourlas & Germanakos, 2009; Tufte, 2001; Tufte, 2006; Williams, 2008; Wroblewski, 2002) dozens of specific elements of visual design are discussed, but not always in a standard way. Some authors tend to group elements under broad headings, while others prefer to consider them separately. For the purposes of this research, four chosen elements have been either grouped or separated as seemed reasonable to use in analysis of the previously developed U.S. Bank interface. Those elements include *look and feel*, *layout*, *icons*, and *text* (a brief rationale for the importance of each of these elements has been included as part of their definitions in the following sections).

#### **Look and feel**

**Look and feel** refers to the subset of design elements that provide the customer with

an first impression of its “personality.” For the purposes of this research, this group of elements includes color, shape, and branding.

*For example:* The website [Happy News](#) has a clear mission—to bring positive, compelling news to its readers on a daily basis. Therefore, the look and feel of the page is light and cheerful, with bright yellows and greens. The addition of a classic yellow “smiley” face and sun-ray shapes in the header add to the desired personality (see Figure 2.1).

Figure 2.1. Happy News website logo (with slogan)

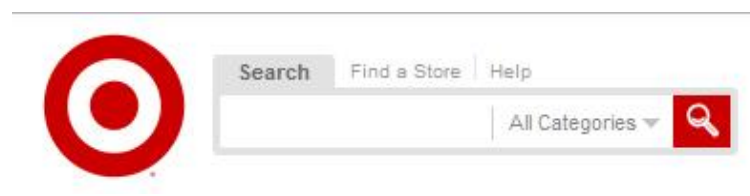


Perhaps nothing is more immediately important to a design than its overall aesthetic. It is in the first visual scanning of a design that users develop a feel for the “soul” of the piece. The concept of “look and feel” is one that encompasses this identity, taking into account the basic elements of the interface that will form a first impression, elicit emotion, or relate to a user’s values (Wroblewski, 2002).

**Branding** is the use of company related logos, colors, themes, slogans, etc. to convey a brand message or establish a brand personality. A *brand* can be loosely defined as the identity of a company and/or its products/services (Aker, 1991).

*For example:* Target Corporation is one company in particular that prefers the strong presence of their **brand**. Throughout [their website](#), Target utilizes their “Target Red” color in conjunction with their familiar bulls-eye image (see Figure 2.2).

Figure 2.2 Target bulls-eye and search bar, with “Target Red” accents



Color and shape in particular have strong abilities to affect emotion in any design, due to the inherently psychological nature of perception. Interactions between colors can be especially powerful in creating emphasis or “excitement,” as in contrasting warm colors with cool colors (Albers, 2006). At least from a strongly Western perspective, bold colors such as red and orange tend to elicit triumphant, grandiose, rich, warm feelings and thoughts. Similarly, curved symmetrical shapes insinuate comfort and order, while pointed asymmetrical shapes are “edgy” and disjointed (Gerstner, 1986). Armed with the

knowledge that sensory perception is so powerful, these kinds of values-based connections between color, shape, and content can serve to both emphasize the interface and suggest desired opinions of the company in ways that branding alone cannot.

What branding *can* accomplish on the web, however, is to convey more directly the company's brand values and create more personal relationships with users (Rowley, 2009). This is at least partially accomplished by the way in which branded information is arranged in the layout of the interface.

## Layout

**Layout** refers to the placement of elements in a design. This includes not only the directional placement (above, below, right, left, etc.), but also the proximity of elements to one another. These spatial arrangements can affect the meanings and relations a user infers from the design.

Typically, the relative placement of elements in a design implies the degree of relatedness between them. The layout of graphic and informative components in an interface provides a sense of "flow" that the user will follow naturally and become comfortable with as he or she continues to use the tool (Wroblewski, 2002). The layout identifies general regions of the page that the user will want to mentally "bookmark," such as navigation, and provides a sense of "place" through its consistent use (Lynch & Horton, 1999).

## Icons

**Icons** are graphical representations of ideas, commonly used as hyperlinks or for navigation. They are often used to replace text for space-saving or aesthetic purposes.

For example: 

Icons aid the user by acting as simple graphical means of signifying abstract concepts. When exploring how individuals interpret meaning from visuals, Ferdinand de Saussure posited that language is arbitrary; that representation is not truth, but merely the imagining of a concept in a representational dimension (De Souza, 2004). By this, de Saussure means that the image provided to a user is subjective, and that he or she will interpret it based upon a combination of its context and his or her own personal experience.

In this way, the designer of an icon actually directs the user's understanding of its function. This implied control highlights the importance of proper icon design and use. On the surface level, the style and prevalence of icons can contribute to the previously discussed personality of the piece in a stronger way than textual labels.

## Text

**Text** refers generically to the symbols, words, sentences, language, and/or terminology used in the creation of any work. For the purposes of this research, text as a part of visual design includes the font family, emphasis, color, and justification of the words used.

*For example:* each word and character of this paper—including its size, color, and font face—is considered part of the set of **textual elements** used in developing this work.

Textual content itself may be no match for icons, but text can convey information in a more error tolerant fashion than arbitrarily assigned images.

When a design is **error tolerant**, there is a low risk of the user being accidentally confused or misled. If a person desires to go from the homepage of a website to a page containing contact information, an error tolerant design will have a navigation system that is clear and straightforward, thus leading the user to the contact information as desired. A faulty design may cause the user to click the wrong link or read the wrong information, leading to problems rather than serving the user's initial purpose.

Though no design is truly intuitive, an error tolerant one feels like it has a lot of common-sense.

Despite the generally straightforward nature of text in comparison to images, the effectiveness and legibility of text *are* affected greatly by the designer's choice of typography (Lynch & Horton, 1999). Therefore, it is important to select fonts that are appropriate to the context in which the text is being used. A professional work, for example, may be more aptly served by basic, conservative fonts such as Arial, Verdana, or Times New Roman. A more whimsical piece with entertainment value can increase its emotional appeal with more expressive fonts, such as **Comic Sans** or **Impact**.

It is also essential for a designer to consider that an abundance of explanatory text can be overwhelming to users, and that the user will benefit from the maximization of data-related area ("data-ink") and the minimization of clutter ("chartjunk") (Tufte, 2001).

**Chartjunk** is a term coined by design expert Edward R. Tufte that refers to an excess of lines and clutter that distracts from the most important parts of the design.

By resisting the urge to simply throw content at users in the form of words, a designer can significantly reduce the amount of confusion involved, thereby making the interface both better-looking and more ultimately usable.

## *Usability: the importance of ease*

**Usability** is the degree to which a design is functional, efficient, easy to learn, easy to remember, error tolerant, and subjectively pleasing to the viewer (Brinck, et al., 2002). In this research paper, the overall usability of an interface design is measured by the prevalence of elements that theoretically lend themselves to the ease of use.

**For a brief rationale (further details on each element can be found in their respective sections):**

*Consistency* creates mental linkages between similar information for quick familiarity.

*Simplicity* lends itself to usability and navigability by minimizing the number of extraneous elements that could lead to errors.

*Accessibility* is important in considering the needs of a diverse audience.

A usable interface will be easy on the eyes and won't leave its users frustrated or confused. Simple as it seems, determining the specific qualities that will make an interface usable can be difficult, because measures of usability are neither standardized nor entirely obvious (Lewis & Polson, 1996). Scholars continue to argue for the inclusion of new measures, including "hedonic" design qualities like fun, originality, beauty, and flow (Hornbæk, 2006). Despite this variability, much of the current literature—Lidwell, et al. (2003) and Rude (2006), for example—focuses in on three key characteristics of good usability: consistency, simplicity, and accessibility.

### **Consistency**

**Consistency** is the degree to which similar elements are similarly expressed across different displays of information (Rosson & Carroll, 2002). This helps to create mental connections within users' minds as to what to expect from the interface, decreasing the time and effort it takes for them to locate similar information and functions.

Users will be more confident in their ability to navigate an interface if elements appear consistent throughout, creating a familiarity with the interface through resultant unity and rhythm (Lynch & Horton, 1999). This includes not only the placement and visual design of elements, but also the conventions used for terminology, alignment, size, input types, labels, groupings, hierarchies, and navigation (Wroblewski, 2002). The creation of familiarity with so many different elements is such a simple, natural way to decrease the learning curve of any web-based interface.

## Simplicity

**Simplicity** is the degree to which an interface avoids unnecessary, extraneous “clutter,” theoretically leading to more efficient navigation and use. For this research, simplicity focuses on the use of minimalist design to improve the readability and navigability of an interface.

Any design benefits from the thoughtful application of *Ockham’s razor*—the simplest of equal designs is the most ideal (Lidwell, et al., 2003). “Ideal” in this case would be the most readily understandable, usable, and aesthetically pleasing design.

To illustrate this concept, compare the following two tables—one cluttered and complex (Figure 2.3), one clean and simplified (Figure 2.4):

Figure 2.3. Poorly designed, complicated table

ACCOUNT NAME	TRANSACTION TYPE	TRANSACTION AMOUNT	PREVIOUS ACCOUNT BALANCE	ACTION POSTED TO ACCOUNT	ACCOUNT BALANCE
PRIMARY CHECKING	Withdrawal	\$30.10	\$1,572.36	-\$30.10	\$1,542.26
SECONDARY CHECKING	Deposit	\$50.00	\$520.00	+\$50.00	\$570.00

Figure 2.4. Simplified, efficient table

Account	Transaction	Balance
Checking 1	-\$30.10	\$1,542.26
Checking 2	+\$50.00	\$570.00

This is arguably the most important rule for those concerned with usability, because the inclusion of extraneous elements can lead to errors in understanding, navigation, and overall function. It has become common to use minimalism in the design of web interfaces, employing techniques such as layering that allow for the intake of “just enough” information without being overwhelmed (De Souza, 2004).

## Accessibility

**Accessibility** is the degree to which a wide variety of users can view and use a design without difficulty. Good accessibility reduces unintended discrimination against browsers, systems<sup>10</sup>, and individuals of different backgrounds, ages, and abilities.

*For example:* Embedded images on the web can (and should) be coded with “alternate text” that is descriptive of the image itself.<sup>11</sup> If a visually-impaired woman uses an automatic reading software to read the screen for her, this text will be read by the software. This gives her **access** to all available content.

## Methods

To understand how visual design and usability can be applied to the creation of a quality web-based interface for financial institutions, I will look specifically at how each of the elements described in the following sections were used in the previously developed U.S. Bank interface concept. Because the concept was developed in the form of static images rather than a fully programmed application, no formal usability testing can be done. Therefore, this analysis will be primarily theoretical.

It is important to note that there may be occasions upon which the interface does not hold up to the described standards or ideals for design or usability. Because this project was completed as a student fellowship over the course of a single year, it is reasonable to expect that I have myself glossed over some important rules of design. Consequently, the purpose of this retrospective analysis will be to examine the successes *and* failures of the previously conceived interface in an effort to determine hypothetical best design methods and considerations.

### *Visual Design*

On the surface level, I will first examine the foremost important elements of the general appearance of the interface. These elements will include:

- **Look and Feel:** the overall color, shape, and tone of the graphics, including any connections to values, brands, or emotions that may affect how the interface is interpreted by the user
- **Layout:** the arrangement of graphical and textual items on and around the interface, including the use of white space

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<sup>10</sup> Computers with different processing speeds, free memory, operating systems, plug-ins, etc.

<sup>11</sup> In HTML, such an image tag might read: ``

- **Icons:** use of familiar/explanatory images to suggest or explain certain functions or ideas
- **Text:** font types, sizes, justification, and emphasis, as well as the overall amount of text

### *Usability*

Next, I will delve into the more abstract elements of the interface—those which, while not immediately obvious, contribute to the ease of use. These include:

- **Consistency**
  - **Graphical:** the consistent use of icons, colors, and shapes
  - **Textual:** the consistent use of fonts, styles and terminology
- **Simplicity**
  - **Navigation/movement:** ease of navigation via buttons, icons, and links, as well as the amount of scrolling or moving required
- **Accessibility**

## Discussion & Analysis

### *Visual Design*

#### Look and Feel

##### *Theory*

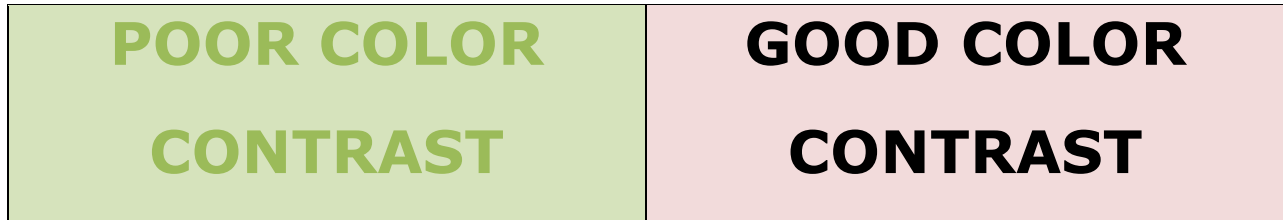
For many, finances are a commonly named source of stress and confusion. The look and feel of an ideal budgeting interface should therefore comfort its user above all things. This can be accomplished through the use of calming colors, soft shapes, open white space, and minimalism.

A design comprised of predominantly cool and neutral colors can give the desired personality of calm and intellect to the interface, but warm colors can add a personable, cheerful touch (Wroblewski, 2002). It is important that a designer consider the intended “feeling” of the interface before deciding upon a color scheme. If a small local bank prides itself in its interpersonal relationships with its customers, a greater dose of warm color may be called for. For less emotional appeal, neutral tones (e.g. brown, tan, and cream) and colorless shades (white, grey, charcoal, black) can be used, although this tends to create a monochromatic effect, which can reduce contrast.

If used properly (see Figure 3.1), contrast can be a powerful tool for improving readability, emphasizing important information, and directing the user’s eye through emphasis. For readability purposes, it has been said that a dark-on-light design is easier on the eyes, but if the personality or function of the piece somehow benefits from the use of light colors on a dark background, it should be done sparingly and

with great care (Williams, 2008). For large amounts of text that a user will spend a good amount of time reading and examining, poor contrast can lead to eye fatigue (Nielsen & Loranger, 2006). This same principle can be applied to graphical displays; a graph that contrasts neatly with the background can clarify and highlight the customer’s data, keeping it strong and “centered” in the user’s mind.

Figure 3.1. Poor versus good color contrast

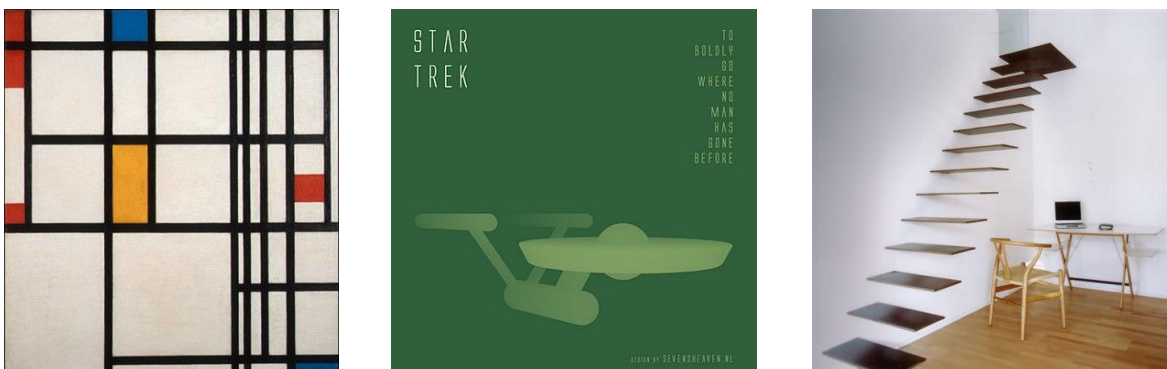


Often, the look and feel of a design is dictated by the company through its branding. In the case of web-based budgeting, it is likely that the financial institution will prefer that the interface integrate neatly with the design of their current website. Clearly this creates some limitations, but the addition of brand colors and motifs (or image themes) can serve as a sort of built-in personality—one that does not have to be *created* by the designer, but merely *exhibited* in the interface.

The softening of the generic background shapes may help to strengthen the focus on the data in the foreground, as well as add to the welcoming personality of the piece. This “softening” refers to the use of curved lines and shapes rather than “hard” edges and pointed corners. Pointed shapes are often interpreted more harshly, possibly leading to feelings of strictness and limitation (Gerstner, 1986). This is not to say that pointed shapes and typical 90-degree corners *cannot* be used in a design, but merely to mention that there are potential subconscious/primal elements to the feelings a user has as he or she experiences a design.

Overall, the look and feel of the interface should be rather minimal. If done properly, this should maximize white space (the blank, unused area around text, images, and other major elements) and minimize the amount of “ink” used that is not data-related (Tufte, 2001). This should ensure that any representation of the customer’s actual financial information is clear, readable, and brought to the foreground. Figure 3.2 shows three general examples of minimalism: two from art, and one from interior design.

Figure 3.2. Examples of minimalism in design



## U.S. Bank Interface

In the U.S. Bank interface concept, the use of branding is apparent through the application of color. The U.S. Bank logo “sets the stage” for the theme in the lower right-hand corner, and the color scheme is comprised of related (though slightly de-saturated) reds and blues. This obviously conveys the traditional American personality that the bank uses in its media, including the [U.S. Bank website](#).

The red and blue colors also suggest a combination of strength and serenity, respectively, though the primary rationale for these colors is brand related. The choice to use less vibrant shades of these brand colors was intended to keep the interface low-key and easy on the eyes (reducing strain on the user). In retrospect, the inclusion of some brighter accents or warmer colors (a brighter red, perhaps) may have improved the design by providing better contrast between hues.

The corners of the large main panel of the interface are curved, keeping the edges of the design soft. This panel is perhaps the only clearly obvious shape, though the background panels are actually separate shapes in the original Adobe Photoshop PSD file. These dark and light background shapes serve as markers and dividers, allowing the user to keep units of time separate in his or her mind more easily.

To keep an air of minimalism, thin, grey, horizontal (bottom) and vertical (right) navigation slider bars have been used to increase the desired white space (highlighted on the default view in Figure 3.3).

Figure 3.3. Default (present, one year) view with minimal navigation sliders highlighted



## Layout

### Theory

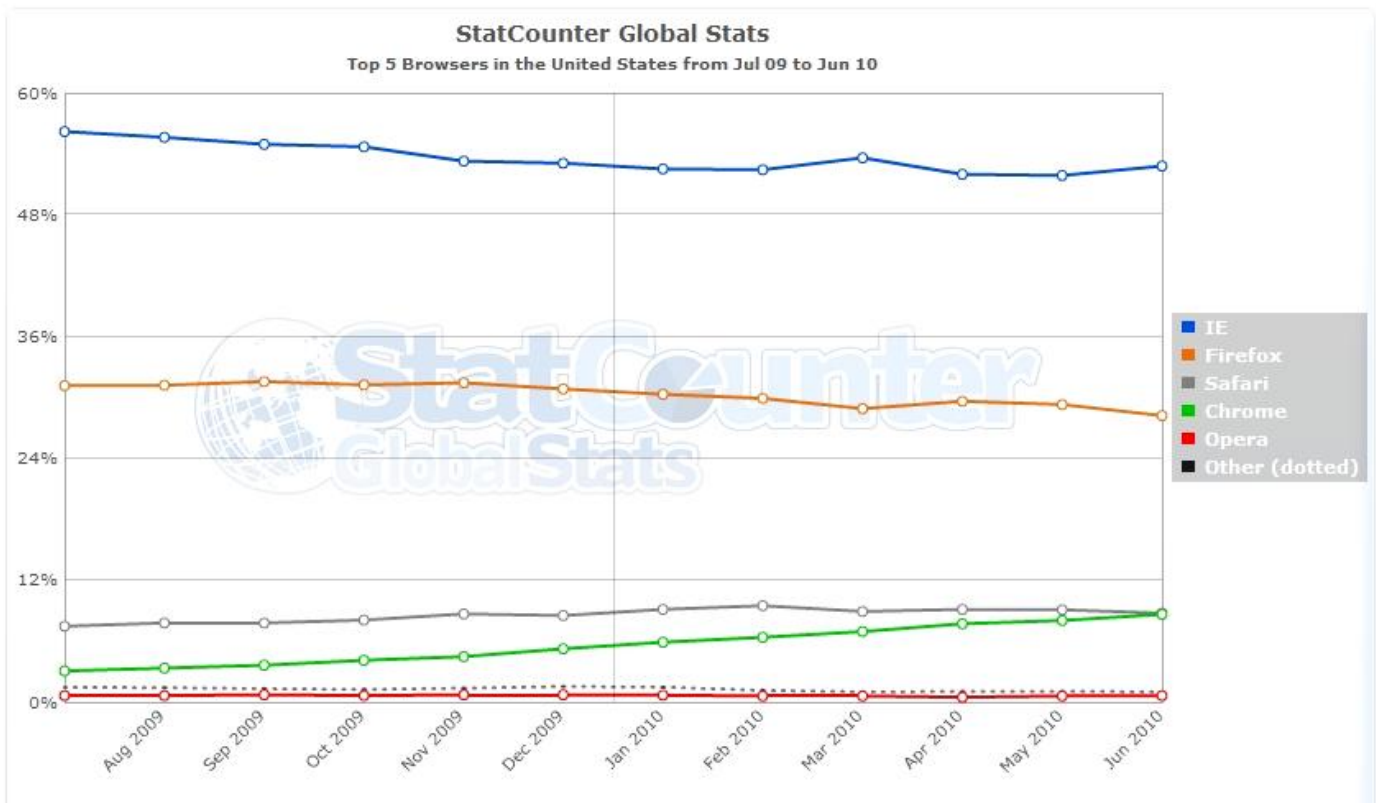
As mentioned in the introduction, the layout of the elements in the interface will help determine how the user interprets their relatedness and function. Robin Williams states this explicitly with her

“principle of proximity”—those elements which are related should be made close to one another, if possible (The Non-Designer’s Design Book, 2008). As one might guess, those elements which are largest and nearest the center of the design will be the first and foremost elements the user will see and interact with (Wroblewski, 2002). For this reason, the majority of important information (the user’s budgeting data, especially) should be as centered as possible. Proximity can create mental linkages between elements that increase the overall information value and unity of the piece.

Unity between the textual, numeric, and graphical components of the design should ultimately create the most appealing and usable interface—each of the forms serves as equally valid “evidence” for the information being conveyed (Tufte, 2006). Often it seems the desire is to display quantitative information in a plain table format. This tends to create an imbalance in favor of text and numerals. It also merely displays the data and does not allow trends to be elegantly and naturally revealed. Following this, data may be more comfortably understood when the layout is fluid rather than static and overwhelming.

When considering the programming specifics of the application’s layout, it is important to remember that different users can have different resolutions and browsers. Such differences may have effects (however subtle) on the layout of the interface if this variability is not considered (Wroblewski, 2002), including the clipping/distortion of images, misalignment of text, and failure of embedded objects (e.g. links and scripts). Figure 3.4 shows the most used browsers in the United States have been Internet Explorer 8, Firefox, Chrome, Safari, and Opera over the past year (June 2009 to July 2010). Companies that develop applications exclusively for Internet Explorer may reach 50-60% of U.S. internet users, but are effectively cutting off 40-50% of potential users and/or clients.

Figure 3.4. Line graph of the top five browsers in the U.S. from July 2009 to June 2010



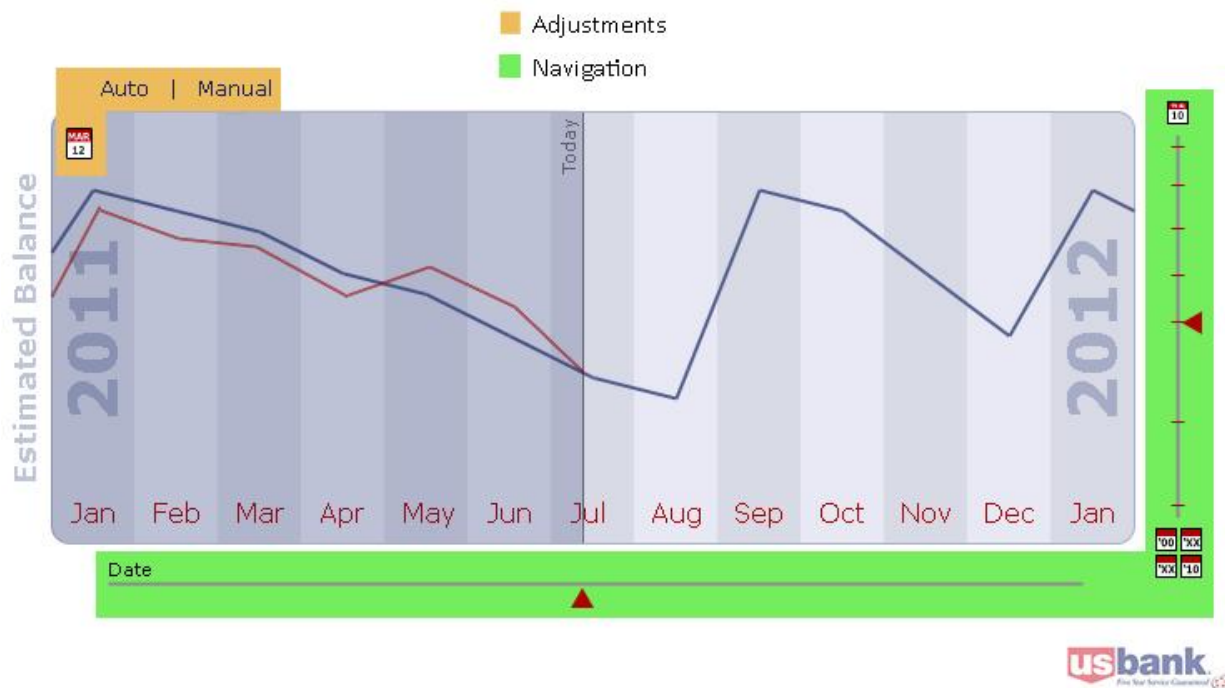
## U.S. Bank Interface

The U.S. Bank concept remains fluid in two ways: through the use of a sliding navigation bar that allows the user to move back and forth in time (instead of viewing it all at once), and through layering information via on/off toggle links. Rather than attempting to compile all possible data onto one screen, these options allow the user to focus on one particular set of dates for one particular set of information.

In the U.S. Bank concept, the majority of the space is given to the large, blue-toned central panel. The information that is the primary focus of the interface—a customer’s budget and spending—is then provided within the bounds of that panel. Line graph data is displayed against an actively adjusting “estimated account balance” axis that keeps the data roughly around the vertical halfway point. This keeps the visual balance of the screen centered more naturally around the information without losing the instinctual alarming effect of a sharply rising (or falling) line.<sup>12</sup> This also keeps the most important data (the user’s budgeting/account data) centered on the interface.

Because there are so few items actually on the interface at once, the proximity between elements is tricky to gauge. Generically, though, navigation elements tend to be gathered toward the bottom right of the interface, while adjustment methods are gathered at the top left (Figure 3.5).

Figure 3.5. Default (present, one year) view with navigation and adjustment method areas highlighted



<sup>12</sup> This adjusting axis would be based upon programming that allows for a simple recalculation of the financial data.

## Icons

### Theory

In general, it is unnecessary to incorporate high resolution images or photographs into a budgeting interface, because the majority of information is communicated through much simpler means of financial data-representation (e.g. line and bar graphs). Because of this difference from many other types of design, icons will be the primary source of graphics in the interface. Instead of cluttering the area with large graphics or explanatory text, the designer can communicate the same information through a smaller, more appropriate graphic. To give a very basic example: instead of writing out “deposit” and “withdrawal,” the designer might use a set of + and - symbolic icons, or a set of ↑ and ↓ arrows.

The development of icons bridges the gap between the producer and the recipient where there is a lack of face-to-face interaction. The lack of opportunity for direct user-centered design means that the designer of an icon must draw on his or her own experiences with icon recognition to accurately represent the intended (often abstract) concept. The natural subjectivity of representation and meaning-recognition also challenges the designer of such icons to find common themes amongst a variety of observers’ socio-cultural discourses (De Souza, 2004).

Budgeting generally functions along two conceptual axes: time and scope. One might be interested in viewing past budgets and spending, the present situation, or future plans. Likewise, one may choose to examine any of these periods at a wide range of decades or the narrow span of weeks or days (a single day, even). Therefore, the majority of the icons will likely be used to represent these spatial and chronological ideas.

One of the difficulties in creating icons to suggest such similar time-based concepts (past, present, future, decade, month, week, day, etc.) is in making them distinct from one another. Consider the images one might conjure when given the prompt “time”: clocks, calendars, the relative movement of celestial bodies, etc. How does one take concepts such as “day” and “decade” and represent them visually in ways that are not only recognizable but distinct from one another? This struggle was addressed in the development of the U.S. Bank interface concept.

### U.S. Bank Interface

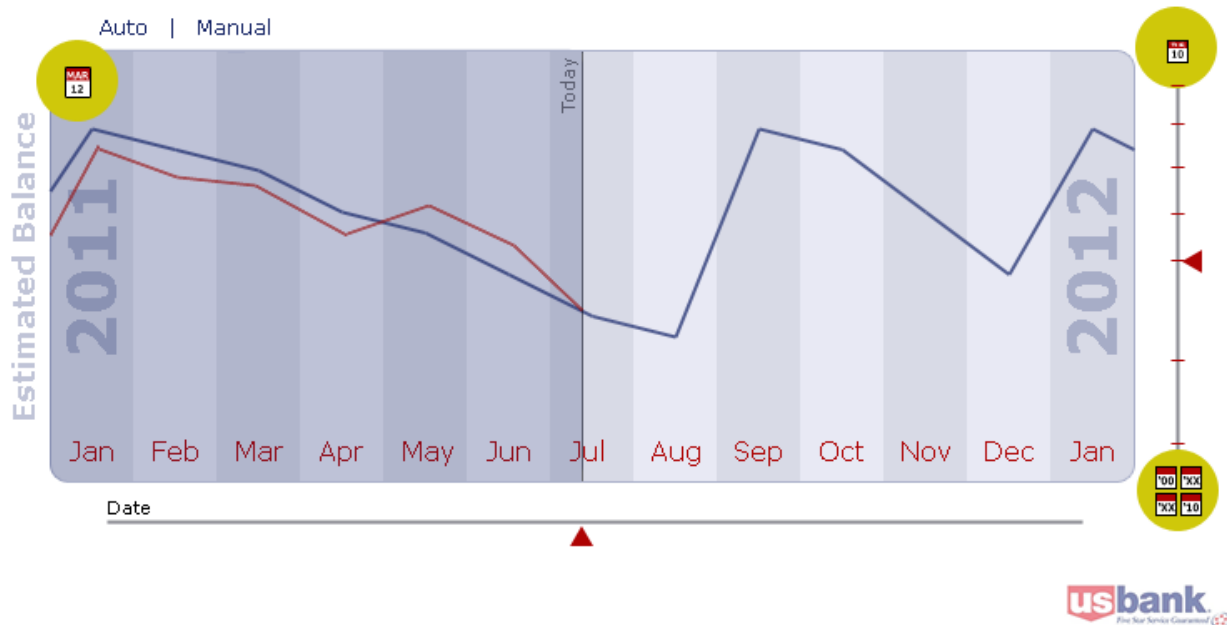
In the U.S. Bank interface, time-related icons are the only kind of icons used.<sup>13</sup> Figure 3.5 shows three strongly similar time-related icons from the U.S. Bank interface concept. One (upper left) is used as an icon for adding specific dates of interest to the budget (e.g. income dates, payment due dates), another

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<sup>13</sup> This was not so much an explicit choice as something that resulted from *previous* choices. Because the interface was already very minimal, the only elements that truly required the use of an icon were those that could not be accurately described in one or two words.

(upper right) is used on a navigation slider to represent the scope of a single day, and the last (lower right) represents the scope of a decade on the other end of the same slider. Though these images serve different representative purposes, we can see that they may be difficult to distinguish out of context.

Figure 3.5. Interface default (Present, one year) view with time-related icons highlighted



The lower right icon is meant to depict the scope of a decade, thereby indicating that if the user drags the sliding arrow down to the lowest mark on the navigation bar, he or she will be able to view budgeting and spending habits over a span of 10 years. This icon was quite difficult to develop in a way that users would immediately understand. Even within its original context as part of the vertical navigation bar, users may struggle to pick up on the intended meaning. Throughout its development (as well as the development of the other time-related icons), I sent rough copies of the images—alone and within the context of the interface—to friends and family members for some rough usability testing. These “testers” were asked to look at the picture in both cases and relay their meaning to me. The general consensus was usually that the image represented a scope of “several years,” though none identified it as a full decade. In an attempt to clarify, I added “00” and “10” to the icon, but due to its size most users still identified its meaning vaguely.

In a discussion with U.S. Bank usability team member Julie Horns, it was decided that this icon was near enough to the desired idea to serve the basic purposes of the navigation bar. After all, the context of the navigation bar means that once the user slides the arrow down to the lowest point, he or she will be able to see that the widest scope available is that of a decade. Beyond this point, the specificity of the icon is made almost irrelevant—the user already knows what it means.

## Text

### Theory

Labeling an interface is important to the user’s understanding of its function, but it can be difficult to get all necessary ideas across without cluttering perfectly good white space with text.

Just as the contrast between colors affects personality and readability, the contrast between text styles (even in the absence of color) establishes a natural visual hierarchy in types of information, as displayed below.

**Title**  
Subtitle  
**Header**  
Main body  
*Emphasized term*

Beyond simply creating a hierarchy, the choice of fonts in an interface can greatly influence the readability and personality of the piece (Williams, 2008 and Wroblewski, 2002). Williams defines three particular relationships between typefaces:

**Concordant**, in which all fonts are in the same family with little variation, often creating a rather formal or dull appearance

**Conflicting**, in which fonts are similar but not related, creating a vague conflicting effect that will subtly catch the reader’s attention

and

**Contrasting**, in which obviously unrelated fonts are used to emphasize content and excite the reader.

Obviously, a purely contrasting choice of fonts will be jarring rather than soothing in this case, and should be avoided if at all possible. Perhaps the best choice in a financial context is to use a concordant scheme. The simplistic nature of an all-similar choice of fonts should keep the mental “noise” to a minimum without taking away from the hierarchical structure provided by color and emphasis. This noise—or “chartjunk,” as Tufte would call it—can also be minimized through the use of sans-serif fonts. *Serif* fonts are those that include a small “end cap” at the end of each stroke (Times New Roman, for example). A sans-serif font lacks these ends, as in Calibri, the font currently being used (Williams, 2008).

There is some discussion regarding whether serif or sans-serif fonts are most readable on-screen, and scholars often cite studies (Weildon, 1995; Burt, 1959) that suggest the superior legibility of serif fonts. A literature review by interaction designer Alex Poole, however, shows that much of the literature (Bernard et al., 2001; Tinker, 1932; Tullis et. al, 1995; De Lange et al., 1993; Moriarty & Scheiner, 1984;

Poulton, 1965; Zachrisson, 1965, Coghill, 1980) concludes that there is no actual difference in legibility (Poole, 2005). Furthermore, he argues, modern design techniques and considerations will lead to equally legible typefaces, and that the choice is purely aesthetic. Beyond the choice of serif or sans-serif, it is ultimately the desired personality of the piece that will dictate the font used (as described in the introductory section on text).

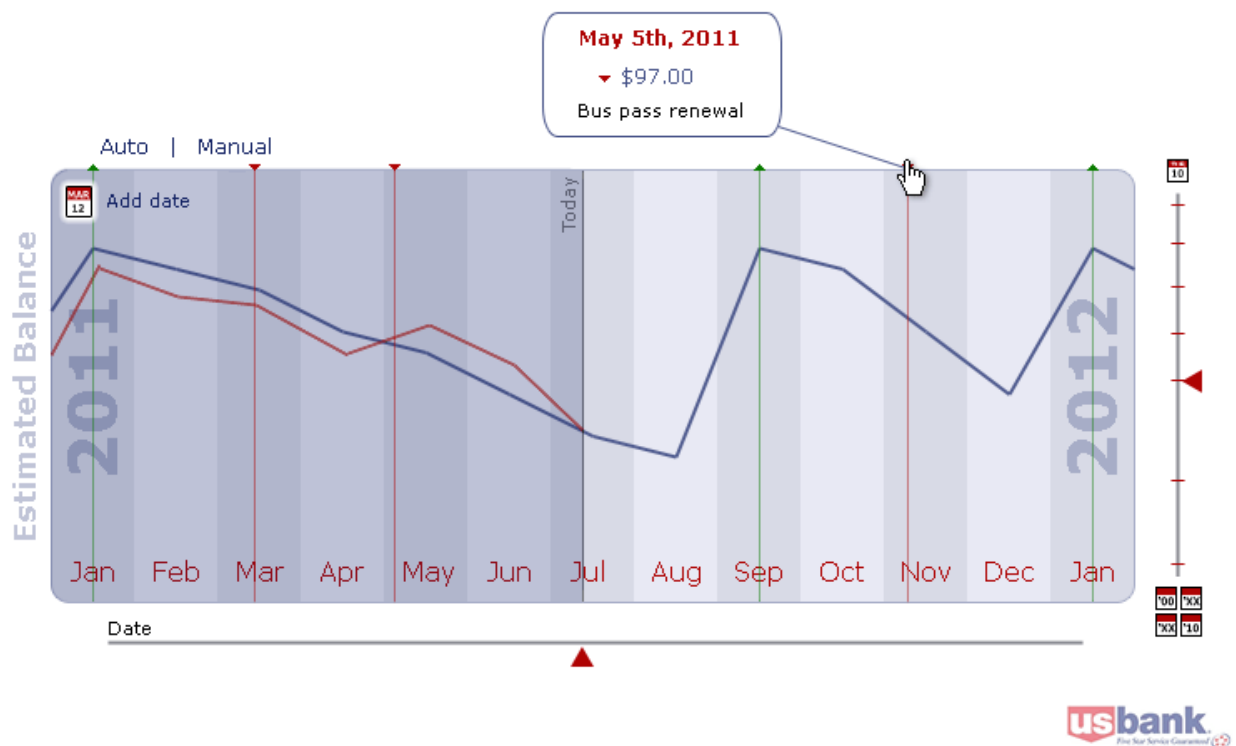
Of course, textual elements are not simply defined by their style or emphasis—arguably the biggest role is played by the terminology it represents. The terms chosen by financial institutions and designers to describe certain concepts must be, above all, understandable to the user. Elite language—or “Jargon”—should be avoided whenever possible (examples of such financial jargon are given in the following section).

### U.S. Bank Interface

In the development of the U.S. Bank interface concept, my initial design assumption was that the user would be able to mouse-over a graph line and obtain a pop-up displaying the amount. As the designer, I had taken the opinion that the simplicity of the design was most important. I had also assumed that because the highs and lows of finances fluctuate so regularly, the user would be put off by constantly changing axis labels. Upon sharing my work, however, reviewers and peers consistently suggested the inclusion of a more obviously labeled “estimated balance” axis. This experience hopefully illustrates the importance and difficulty of deciding which information warrants textual representation, and which does not.

In Figure 3.6, we can see the differing styles for a box of pop-up information on the “income/due dates” screen (where theoretical users of the U.S. Bank interface can view and add specific dates of monetary inflow and outflow).

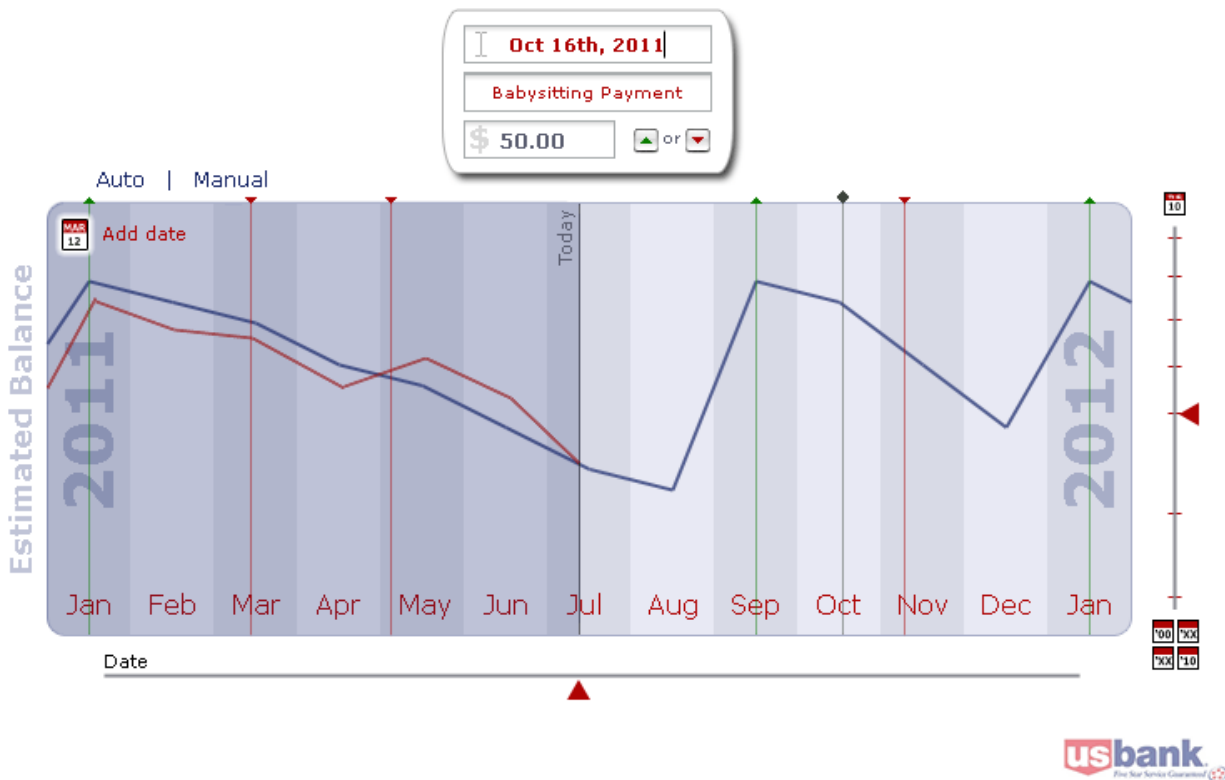
Figure 3.6. Mouse-over pop-up box on “income/due dates” screen



When the user examines the box, he or she will likely seek out the date, to be certain that it matches the intended date. To simplify this task, the date has been bolded and made red. This style contrasts drastically with the lighter, non-emphasized text in the box, which should more readily draw the eye to this information (without relying solely upon its placement at the top). Similarly, the text style for the dollar amount contrasts with the information label (“Bus pass renewal”).

The primary font face used in this case is Verdana, but the size ranges from 10 to 40pt depending upon the use. Figure 3.7 shows one of the screens used for adding a known income date (payment for a babysitting job, in this case). In this screen, 10pt Verdana has been used for the date title, “Babysitting Payment,” While the other extreme, 40pt font, has been used for the year markers on the interface background (“2011” and “2012”). The sole use of the Verdana font face at different sizes qualifies as a *concordant* type scheme, which—in retrospect—may actually have made the design slightly less appealing.

Figure 3.7. Font size differences, as displayed in the “income/due dates” mode



With regard to terminology as textual elements, esoteric words (even the term “financial institution” could be considered esoteric, in this case) and banking jargon (e.g. “agent bank,” “compensating balance,” “debt instrument,” etc. [Bankingterms.biz, 2010]) have been intentionally avoided throughout the interface. This addresses a broad audience of potential users, and adds to the usability of the

interface by reducing the difficulty in understanding the ideas within.

## *Usability*

### **Consistency**

#### *Theory*

A budgeting interface with layered elements that can be toggled on and off means plenty of opportunity for similar parts. If these parts are expressed in similar ways throughout the interface (and/or throughout a bank's site), this should increase its usability and decrease the user's learning curve (Lidwell, et al., 2003) Opportunities for consistency are abundant in the design of web-based applications, as it can be applied to any and all graphical and textual elements, as well as actual function. In the initial stages of the application's actual development, consistency can (and should) even be applied to strings of programming language. All of these applications should make the interface more error tolerant, predictable, and easy to troubleshoot.

Lidwell, et al. describe four types of consistency:

**Aesthetic**, which relates to the consistency of appearance (e.g. using similar "look and feel" components)

**Functional**, which draws on a user's previous experience as to what things mean and what actions to take

**Internal**, in which elements are similar to one another across different parts of the design

and

**External**, in which elements are consistent with other parts of the "environment." In this case, the environment may be the rest of a financial institution's website.

By using one main display with layered information that can be toggled on and off, the majority of aesthetic, functional, and internal consistency is made implicit.

#### *U.S. Bank Interface*

This interface concept takes advantage of implicit consistency by utilizing the previously described layering technique. The majority of the display remains the same as a user navigates through its various modes and options, while other information is simply displayed as necessary.

I have examined the consistency of this concept using Lidwell, et al.'s four types of consistency, as follows:

**Aesthetic** consistency is high, due to the fact that very little of its appearance actually changes as a user navigates through the interface. The main elements of visual design (colors, shapes, icons, fonts, etc.) have been kept mostly consistent throughout the design so as not to confuse, distract, or mislead users. There are a few exceptions, of course, including a change from line to bar graphs when zooming to view budgets for the narrowest time periods (weekly and daily), and occasional slip-ups in text colors and font sizes.

**Functional** consistency is moderate. Users will likely recognize a line graph and the functions of slider and hyperlink navigation systems, but other interface elements may be less comparable to past experiences, such as the interpretive time-related icons.

**Internal** consistency is strong, supported naturally by the way the interface navigation has been designed. Because only the display changes regularly (and of course there is the occasional “pop-up” dialog box), the majority of the navigation and “action” elements (e.g. links, toggles, buttons, etc.) remain perfectly consistent.

**External** consistency of the concept cannot be measured perfectly, as the interface does not currently exist within the context of the U.S. Bank website. When compared to the current U.S. Bank site design, however, the concept is fairly visually consistent—though the hues of red and blue differ slightly. Navigationally, however, the design differs quite a bit from the usual set of static links used elsewhere on the site. This type of consistency was not considered much during the initial concept development process, because my final product was not meant to be fully developed for use, but rather to serve as a very preliminary exploration of the web-based budget interface idea. External consistency was also difficult to perfect in this case due to the knowledge that the main site will eventually be redesigned—likely before an interface such as mine becomes a reality.

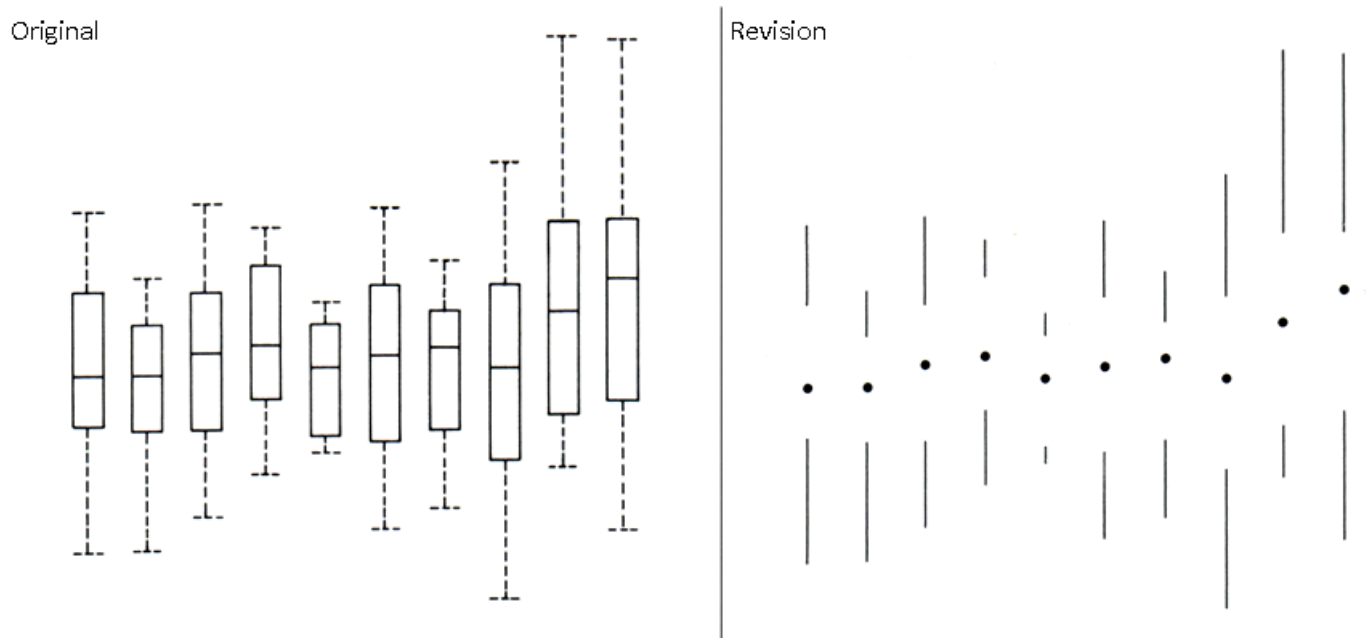
## **Simplicity**

### *Theory*

As mentioned in the introduction, simplicity (for the purposes of this paper) is essentially synonymous with minimalism. A minimalist design—both visually and functionally—reduces the number of distractions and possibilities for error through the initial “hiding” of functions that are not vital to the interface. This fits with the popular “80/20 rule” of design, which states that 20% of a design’s variables result in 80% of its effects, approximately (Lidwell, et al., 2003).

Graphically, simplicity allows the interface to *reveal* the data and its trends rather than just display it (Tufte, 2001). To illustrate this, let’s take a look at Figure 3.8, Tufte’s redesign of what’s called a “parallel schematic plot”:

Figure 3.8. Original versus redesigned versions of a parallel schematic plot, by Edward Tufte



In the revised version on the right, all of the plot's intended data (mean, upper and lower quartiles, etc.) are still present, but are less encumbered by excess lines. As a result, it is easier to see trends in the data by mentally connecting the dots and comparing the changes in line length and white space. The excess lines and "boxy" shapes of the original plot do not lend themselves to such natural observations as well as this simplified revision. As we can see, simplicity has strong ties to minimalism in the look and feel of a design, but its uses are not merely aesthetic and data-revealing—simplicity also provides a more natural learning environment.

By reducing verbiage and other cluttered, clarifying elements, the design is made more iterative (Rosson & Carroll, 2002). This allows the user to become comfortable with the interface through a more hands-on, active learning experience. This, Rosson and Carroll argue, connects the user to the information and structure of the piece through requiring them to interact with it continuously.

The omission of excessive lines and explanatory elements should also naturally reduce the number of errors a user encounters. One place that can be difficult *not* to over-crowd is the navigation area of a web-based design—how does one decide which links and information to include? Furthermore, how can a designer keep the links simple to navigate and easy to understand? This was the most major difficulty I faced in the development of appropriate navigation for the U.S. Bank Interface.

### *U.S. Bank Interface*

In developing this interface, I wanted to be certain that the data would stand alone and be revealed simply to the user rather than be encumbered by the extraneous lines, labels, and other information that line graphs often fall prey to. At the same time, it was important to depict the axis units in a way that would be clear and noticeable. The long, alternating light- and medium- blue panels in the background of the central panel accomplish this without introducing harsh lines that would disrupt the flow of the eye and thereby distract from possible trends in the data.

The vertical axis of the data is the estimated account balance line, which currently does not have visible units on the graph (due to my presumption that a mouse-over pop-up display would have sufficed, as discussed in the “text” section of the analysis). This axis might be improved by including a single “average balance estimate” line. This would serve as a baseline for visually estimating the value of a point along the line, thereby revealing to the user how their budget fluctuates around this average over time.

To address the need for a simplistic, easily (almost intuitively) understandable navigation system, I chose two sliders that work along the two common budgeting axes of time and scope. In this way, I felt users would be able to view a rather complex set of data at a variety of levels without having to wade through some of the more static methods of navigation (e.g. hyperlinks, drop-down menus, or forms).

The restriction of the scope slider to specifically identified levels of “zoom” simplifies the navigation system further on a functional level. If this slider had been unlimited, much of the display would be redundant due to the mostly identical nature of the display at each level of scope (with the exception of the one week and one day views). These preset scope junctures (1 day, 1 week, 1 month, 6 months, 1 year, 5 years, 10 years) were chosen because they tend to be “chunks” of time that people use when they speak about finances. These junctures were also solidified through conversations with Julie Horns and rough usability testing by friends and family.

## **Accessibility**

### *Theory*

As you may recall from the introduction, accessibility can be briefly described as “the degree to which a wide variety of users can view and use a design without difficulty.” Typically, we design for the majority because it is the audience with which we are most familiar, and in doing so we can often say that a design addresses most of its the users (because they *are* the majority). However, there should be some concern for fairness, which in many cases means making a design readily accessible to those with physical or mental differences from the majority (e.g. the visually impaired, deaf, paralyzed, etc.) (Nielsen & Loranger, 2006). Many of the adjustments made for such impairments are made externally via software (e.g. automatic readers) or special equipment for the user (e.g. motorized/computer integrated chairs and prosthetics), but designers should consider how to make their products compatible with such implements.

Accessibility does not just consider those with physical or mental impairments, but also to those whose

computer systems and internet access may be limited (Nielsen & Loranger, 2006). An interface that involves a large amount of script (e.g. Java), plug-ins (e.g. Flash), or high resolution images may work well on a fairly new, well-maintained, regularly updated computer with high-speed internet access, but be rather error-laden on a lesser system. Users limited in this way may experience frustratingly long loading times, broken images<sup>14</sup>, etc.

Problems with accessibility can also occur with textual elements of the design. One issue could involve the size of the font—certain screen resolutions may make the text too small to read or too large to look good. More importantly, font faces can differ between systems. Usually, if a person’s computer does not support a specific font, it will be automatically replaced by the operating system with something similar. If there is no available replacement, however, the user may see only illegible characters (e.g. □□é□¥□□). To be safe, designers can choose from several common fonts that are supported by the majority of Mac and PC systems, including: Arial, Helvetica, Comic Sans, Courier, Geneva, Georgia, Impact, Lucida, Palatino, Tahoma, Times New Roman, Trebuchet, Verdana, Monaco, MS Sans Serif, MS Serif, New York (Perez, 2008).

Accessibility limitations are exacerbated by the concept of the “digital divide,” a rift between the social, educational, and economic *haves* and *have nots* (Rosson & Carroll, 2002). While this rift may be less noticeable when scaled down from a global scope to the United States, it is still a present and legitimate barrier to information and communication technologies (ICT). At the county level of scope, U.S. citizens’ access to ICT has been most strongly linked to their place in the workforce (scientific and technical employees were more likely to use ICT), income, access to federal grant funds, college education, and ethnicity (Pick & Azari, 2008). If the most disadvantaged<sup>15</sup> can gain access to a computer, it is unlikely that it will be state-of-the-art.

In any design, it is practically impossible to develop all the elements to meet the needs of every potential user. Rather than straining to be inclusive of all audiences at the risk of degrading other elements of usability and visual design, this problem can be addressed by providing optional means of adjustment. In a design where the text may be too small for some visually impaired users, for example, one option is to provide a means of increasing the relative size of the text (Nielsen & Loranger, 2006). Nielsen and Loranger argue that accessibility will only become more important as the technologically advanced generations age and the prevalence of visual impairments among users increases proportionally (Prioritizing Web Usability, 2006).

### *U.S. Bank Interface*

Accessibility is something I likely did not consider enough in my development of this interface. Naturally,

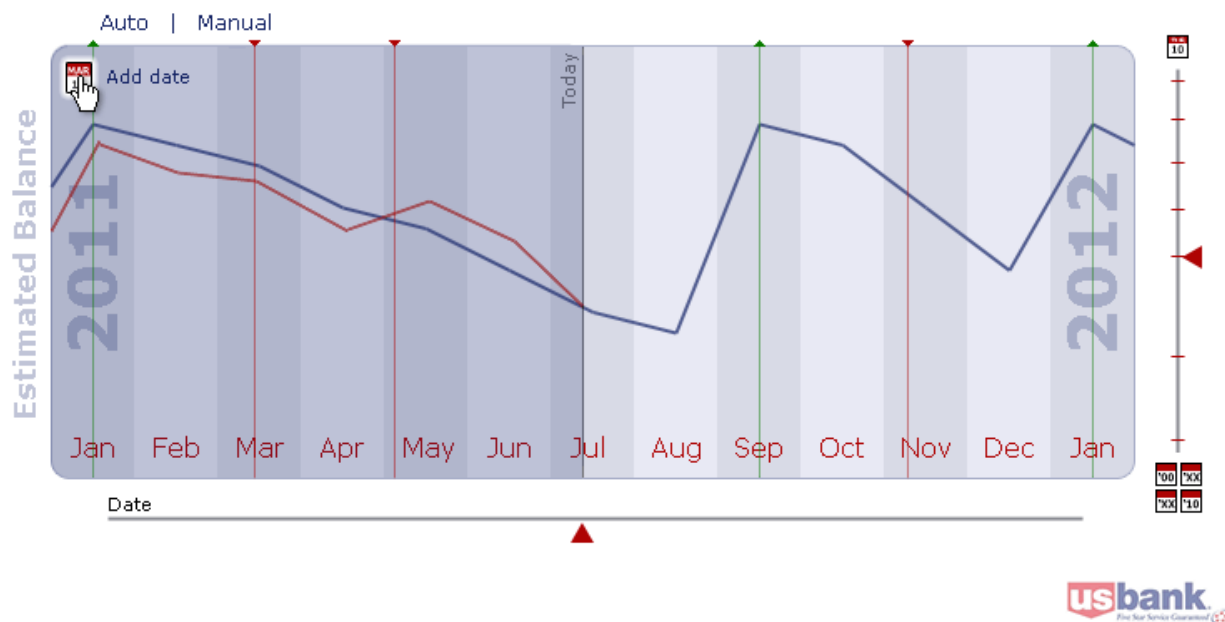
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<sup>14</sup>A “broken image” is one that is not found or does not load properly (Icon: ).

<sup>15</sup> The poorest individuals in society and the disabled, typically (Nielsen & Loranger, 2006).

my design was biased toward my own abilities and the abilities of the majority of persons I know. One accessibility-related criticism reviewers had about this interface relates to the “special dates” mode, in which the user can add known dates of payments and income. As seen in Figure 3.9, the colors used to represent income and payments are green and red, respectively. This, reviewers and peers pointed out, could be an issue for those users who are red-green colorblind (at any degree).

Figure 3.9. Red and green income/due date lines, as displayed in the “income/due dates” mode



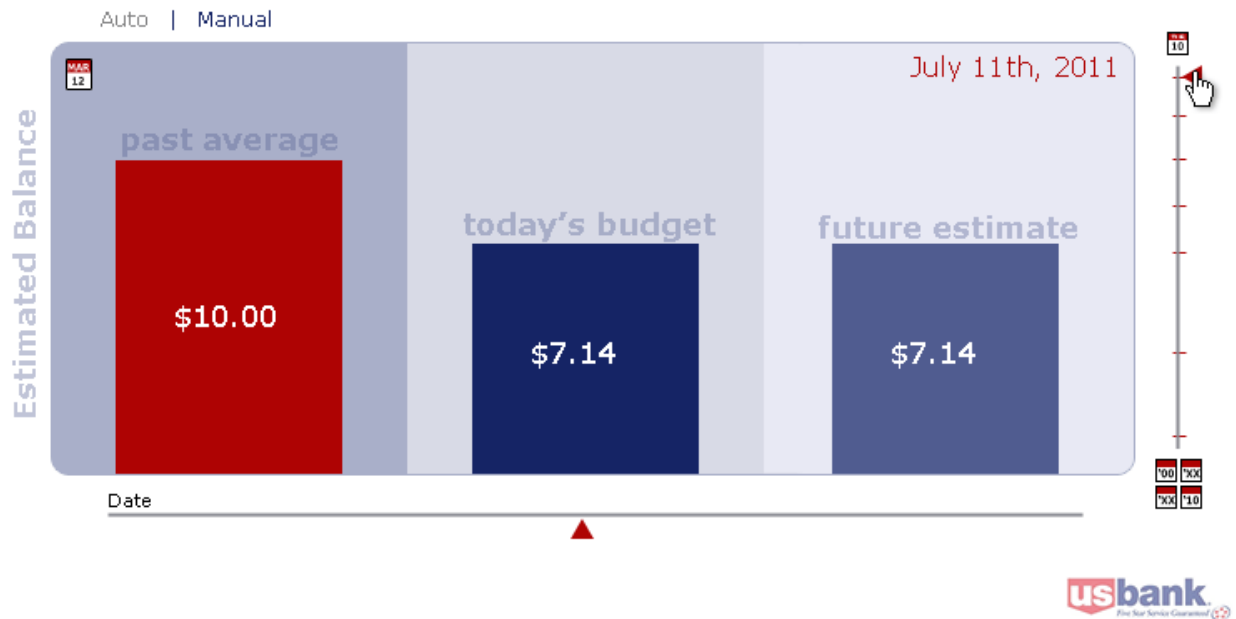
I attempted to address this accessibility issue somewhat through the addition of the “up” and “down” arrows at the tops of each line, but this would likely still be difficult for a colorblind individual to navigate. This example is meant to illustrate the importance of considering possible disabilities beyond the immediately obvious (full or partial blindness, physical impairment, etc.).

When it comes to the obvious impairment of blindness, it is difficult to say for sure whether this interface concept passes the test. Because the concept was developed in a static image format, it cannot be tested with automatic reading software to determine its accessibility in this sense. I can, however, speculate as to its robustness—which is low. An automatic reader may be able to make the user aware of the labels on the page, but much of the display is graphical and cannot be read by the software. There are also no images with Alt-text for the software to read, so the user would not be able to understand what sighted users can experience. While this accessibility issue is unfortunate, a “visual budgeting interface” is, of course, designed with at least partially sighted users in mind.

A particularly positive feature of accessibility present in the U.S. Bank interface is the potential for mobile device applications. This opens a channel to those who travel often or have difficulty accessing a computer on a regular basis. One account view in particular—the one day view—easily lends itself to a mobile format. In Figure 3.10, we can see that the one day view has three bars: “past average,” “today’s

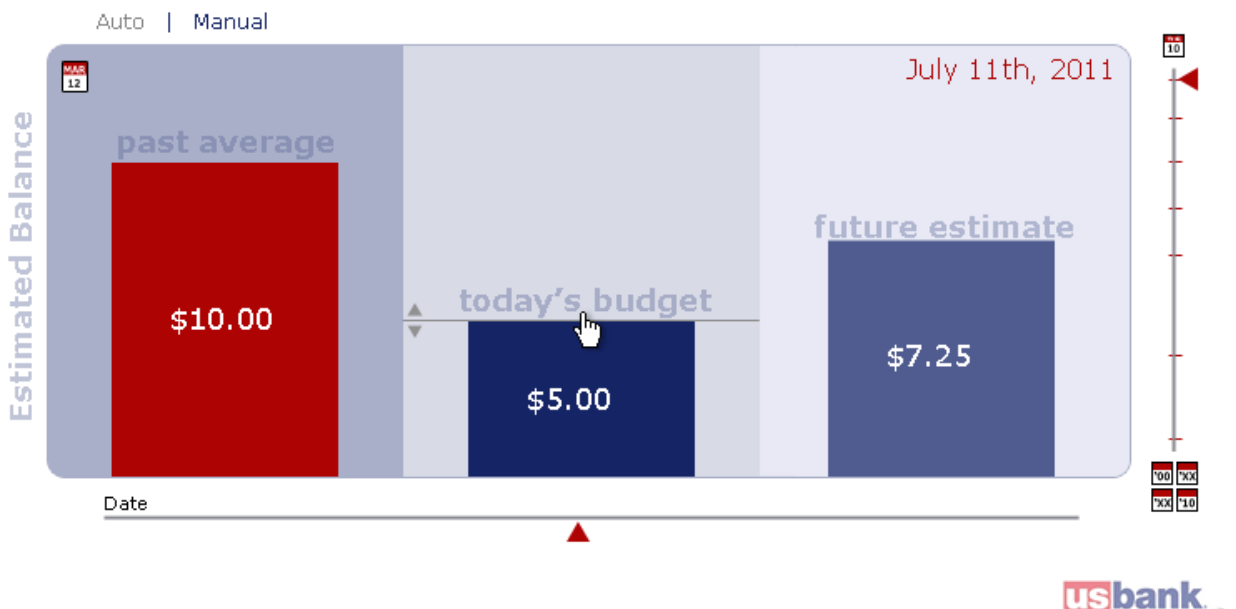
budget,” and “future estimate.”

Figure 3.10. One day view’s three bars: past, today, and future



The idea behind the functioning of the one day view is that the user can quickly get an answer to the question: “how much can I spend today?” The “today’s budget” bar provides that answer based upon the user’s current budget plan (set up in either the automatic or manual adjustment mode), while allowing the user to view his or her average daily spending history, as well as how much they will have to spend each day for the rest of the month—if they stick to today’s budget. Figure 3.11 shows that a user can easily click and drag the “today’s budget” bar to adjust the spending allowance for the day, thus affecting the “future estimate” daily spending allotment (if the user budgets *less* for today, he or she will have *more* for tomorrow).

Figure 3.11. One day view adjustment, U.S. Bank interface concept



U.S. Bank’s current iPhone/iPod Touch application, “U.S. Bank Mobile Wallet,” provides very limited services to users, including the ability to make transfers and view account balances, transactions, rewards and/or offers. To date, this basic application has received a mediocre score of 3 out of 5 stars in the Applications Store with 1,394 ratings. One reviewer even points out serious accessibility issues from the point of view of a traveler:

*“This is an app for a MOBILE device. It should do 2 things: access accounts and find nearby ATMs/branches. This does the first, but not the second. The mobile website won’t even find nearby ATMs, as it requires you to enter a ZIP code. If I’m traveling, how likely is it I know the local ZIP code? Why not a mobile app that will use your phone’s location to figure out where an ATM is?”*

Unfortunately, the addition of mobile applications to a budgeting interface does not necessarily bridge the gap of the digital divide—if an individual is unable to afford or obtain a computer with sufficient internet access, how likely is it that he or she can afford or obtain a mobile device with such access? This is an issue that remains to be addressed.

## Conclusions

Clearly, the U.S. Bank interface concept does not meet all standards of the theoretically “ideal” web-based budgeting interface. What it does illustrate, however, is the difficulty involved in balancing good aesthetics with usability within a given time period, budget, and skill set.

## Limitations

One obvious limitation of this research is the influence of U.S. Bank in the development of the interface. The use of branding was implied by this relationship, and thereby limited the color options of the design. Additionally, regular “check-in” conversations with Julie Horns (a member of the U.S. Bank usability research team) led to design choices that were highly influenced by the preferences and opinions of the team. Because this team is highly experienced in the field, I was compelled to integrate the majority of Julie’s suggestions, and received mostly favorable<sup>16</sup> results.

The persona used to develop the interface has inherent limitations as well: specifically that the concept is useful primarily to students who are not concerned with building assets. The present concept is pared

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<sup>16</sup> As defined by the ideals of visual design and usability presented in this analysis.

down to managing a very basic set of finances that does not include such account types as savings or CDs. Application of the developed interface concept to other types of individuals and accounts would require additional forethought and programming that has not been addressed in this project due to its very specific focus.

Additional limitations of this research include time and personal experience. The fellowship project was completed over the course of one academic year, leading to a rather rough end product in comparison to those developed professionally. As a first year student at the University of Minnesota, I was not only new to the world of financial management and regular budgeting, but a novice in the concepts of visual design and usability (this is still true, though now at least I have a basis in these ideas). Naturally, my lack of expertise in these fields has limited my research ideas to those already expressed by others. Even so, I have attempted to apply the work and conclusions of the experts in these fields to my fellowship project in a way that adds some useful suggestions for further combining the fields of e-banking and web design.

### What's next?

It is difficult to predict where financial institutions will place future efforts, especially when the economy is volatile and banks may have greater concerns than expanding technologically. Currently, the banking industry seems to be most interested in expanding e-banking in ways that make accounts and services more available to the public. Perhaps the foremost technology that banks seem interested in is the mobile phone application. Currently, all of the top five national banks (JPMorgan Chase, Bank of America, Citibank, Wells Fargo, and U.S. Bank) offer an application for the iPhone/iPod Touch<sup>17</sup>. As smart phones continue to grow in popularity, developers will need to continue to update these applications to meet the demands of their highly mobile customers.

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<sup>17</sup> Determined by searching Apple's "Applications Store" from an iPod Touch. These applications generally include the ability to view account balances and activity, make transfers, pay bills, and contact customer service.

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