Homework 2

Problem 1: Thinking about user interface design

Blackberry Pearl

Context:
The Blackberry Pearl is used in a wide variety of circumstances. Business users are one of the main members of the target audience. To fit their needs, the Pearl was designed with a large keyboard with a well thought-out key arrangement to facilitate fast email typing.

The Pearl is also geared towards typical electronics consumers. These people enjoy multimedia so the phone includes a music player, video player, and camera phone.

Strengths:
One strength of the Pearl is the good use of buttons on the side of the phone. Mobile phones often get a bad rap for being hard to use. The buttons on the side of the phone make things easier by launching applications without the need to navigate menus. They are also easily programmable to suit the users needs.

Another strength of the Pearl is the way that it adds words to its predictive text dictionary automatically whenever it sees them from email, text messages, or from browsing the web. This is the pinnacle of good design: things work automatically without the user even knowing about them. On other phones whenever I would have to type a foreign last name or technical term I would have to change modes to turn off the predictive text but with the Pearl there is no need to.

A final strength of the Pearl its trackball. The trackball gives users fine grained control over selecting items, and also lets them skip over large groups of items quickly. These qualities of the trackball make it very easy to peruse email. Since the trackball also gives horizontal control, it makes browsing calendar entries (which require vertical movement for change time periods, and horizontal movement for changing days) easy.

Weaknesses:
One weakness of the Pearl is the implementation of the alarm feature. First the feature is hidden beneath layers of menus even though the feature is very popular. The interface on the alarm menu is complicated. The Pearl complicates the traditional alarm system by ringing every weekday at the set time by default. This caused me a problem when I set the alarm for 10am on a Friday afternoon. The alarm didn't go off since the option "Active on Weekends" was set to off. Also when the alarm is ringing, pressing the red
end call button doesn't turn it off as I would expect but instead snoozes the alarm. To
snooze the alarm the user must scroll on the trackball and then click using it which is
much more error prone.

This weakness could be fixed by making the alarm feature a top-level menu item,
simplifying the interface to be similar to a traditional digital alarm clock, and letting the
red end call button turn off the alarm.

The settings menu on the Pearl is incredibly complex. For example it allows the user to
change the host routing table and lists settings such as "IP/Ports:
206.51.26.192:19791:19790". This makes it hard to determine if a feature exists or not. I
recently upgraded from a Motorola Razr to this Pearl and had to check countless menus
to determine if sending contacts by bluetooth was possible. To fix this problem, a
number of settings should be eliminated or hidden behind a password protected settings
area. This will make using the phone easier for the 99.9% of people who don't need to
change the host routing table or disable process SMSC.

Another weakness is the location of the microsd slot behind the battery. Microsd is used
for storing media such as music and videos. I often want to change the music on my
phone, but this requires taking out the battery. This problem is made even worse by the
very long phone start up times when the battery is reinserted.

1983 Kenmore Microwave

Context:
A microwave is used by all the members of a household that are old enough to cook. The
microwave is used by inexperienced cooks along with masters, so it must require little
expertise to use. It is used several times a day so the product must be robust. Elderly
people often use a microwave so it must be easy to use with arthritis or other conditions.

Strengths:
Since this particular microwave is old, the interface is very simple and doesn't include
any extra features. This means users have less choices available and can find what they
are looking for quickly. Also instead of including a feature where you type in the size of
a drink and it will automatically decide what time and power to heat it, this microwave
just lists on the front common items and the power level used to heat them.

This microwave has a very large handle. Today's microwaves often hide the handle as
part of the lip of the door or force users to push a button in for the door to pop open. The
large handle makes the microwave usable for people with disabilities.

The microwave makes good use of its display to also show the time. Although this is not
the primary purpose of the microwave, displaying the time works well within the context
it is used: in the kitchen where there usually isn't a clock visible.

Weaknesses:
This microwave requires users to push the "Time" button before entering the desired
cook time. This is an incredibly pointless step since every time someone uses the
microwave, they must enter a time. What makes this even worse is the location of the
button in the middle of the top rows of buttons. There is also button labeled "Time of
Day" in the upper left corner of the keypad area. This makes it easy to accidentally hit the
"Time of Day" button. The addition of this button into the cooking process makes the
microwave much harder for non English speakers to use.

The buttons on this microwave do not stick out from the surface they are on and require
much force to register a press. This could be improved by added physical buttons which
are not only easier to press, but also give feedback.

Another weakness of the microwave is that the power of the microwave is only listed on
the back of the microwave. The cooking time of any dish depends on the microwave
power and when I use an unfamiliar microwave I must move the microwave to see the
power. This could be fixed by putting the microwave power specification next to the
model name in small text.

Nike Athletic Watch

Context:
This digital watch was designed to be used by athletes when working out. To fit the
needs of that audience it has a 100 lap stop watch which can show best, worst, and
average lap speeds, and an interval count down timer. Since running is the primary sport
that the watch caters to, the angle of the display is slightly tilted which requires the
runner to not have to turn his hand as much to see it. The people in this user group are
likely to be active people, so the watch was designed to work up to 100m below water.

Strengths:
The watch has a large alphanumeric display. This is very useful since it notifies users of
what mode they are in by showing "TIME", "DATA", or "RUN". The display also can
show two times simultaneously which is useful while running for displaying cumulative
time and current lap time.

Another strength is that when the mode button is held down for 2 seconds, it will
automatically return the user to time mode. Since telling the time is the most essential
feature of a watch, this design makes sure that the time is easily accessible.

When in stop watch mode, after the lap button is pressed, the time of the last lap shows in
the largest possible text for the next 7 seconds. This is good because right after a lap has
finished, the watch gives you the information you are most likely to care about (your
latest lap time).

Weaknesses:
One weakness of the watch is that it is symmetrical. That makes it hard to identify the
orientation by touch in the dark. I do this often when in bed to check the time when my
watch is on my nightstand and must continuously fumble and press the wrong button. To fix this problem I would add a small bump, similar to the bump on the j and f keys on a keyboard to the face of the watch for easy tactile identification.

The "light button" of the watch is overloaded with the "reset button". This means that every time I wish to reset my stopwatch, I must hold the reset button for 3 seconds waiting for the light to turn off before the watch actually resets. I would add an independent button for light. The previous version of this watch did that.

This watch allows the user to change time zones by holding a button for about .5 seconds while in the "TIME" mode. This design is prone to users accidently hitting it. A better solution would be to let users change time zones when they are in the same mode as they use for setting the time. This would also make more logical sense.

**Problem 2: Learning to listen to users**

Jason Lang

Jason Lang has problems when he goes to use the computers in the basement of Grainger. They use Sun Microsystems keyboards which have a different layout. One example is that the Ctrl and Caps Lock keys are switched. When he goes to do keyboard shortcuts such as Ctrl+Z for undo, he always presses the wrong thing, gets frustrated and confused, and loses a few seconds.

The problem occurs because the keyboard is different than the typical standard. A simple change that would alleviate that problem would be to use the normal layout. This is an interesting problem though because Sun's keyboard is actually designed better since the Ctrl key is used much more often than Caps Lock and the key next to the letter A is easier to press. This is a case of standardizing on a suboptimal solution.

Whenever Jason goes to save a file from the internet using Internet Explorer, the Save As dialog always comes up with the default location in the temporary internet folder. This frustrates him since he never wants to save in that location and must do many mouse clicks to change to where he wants to save the problem.

The problem here is a bad default choice. A better solution would be to set the default to be the last location files were saved.

When Jason wants to use many University of Illinois services, he is presented with a password login page. The first page asks for the username, after submitting the username a new page appears which asks for the password. Finally after submitting the password, the user is brought to the page they were looking for. Jason thinks that having two separate pages for entering username and password is a waste and it should only be one page. He mentions that the user won't have to wait for two pages to load in this case.

I agree with Jason's diagnosis and think the login page process should just be one page with fields for both username and password. One way the current page may have occurred is if it was based off of Linux sign on screens which ask for username and
password one at a time. This is inappropriate for a webpage due to the extra overhead of two requests. This likely occurred due to someone copying a design without fully understanding the thought that went into it.

Scott Jensen
When Scott Jensen tries to make changes to his computer it takes him a long time. This is because his new computer has Windows Vista and the control panel is completely different than in Windows XP. Even in classic mode things are different and grouped differently. It took him over 15 minutes to figure out how to disable and reenable his network connection because he couldn't find it in the control panel, and when he did it would always try to bring up the new connection wizard instead of letting him change it.

This problem occurred because the interface violated his expectations. People's habits are hard to break and even when the new interface to be introduced is superior, there will often be complaining. One possible solution is to have a search just for changing settings. This type of interface is used for Eclipse settings since there are hundreds of options and they would be hard to find just by browsing.

Scott gets very annoyed when he goes to shut down his computer, but it just goes sleep. When he goes to shut down the computer and sees the universal power symbol (a circle with a vertical line on the top) he assumes it will turn the system off as other uses of the symbol do.

A simple solution to this problem would to have the red button shut down the computer since that is the action that most people associate with that symbol. Another option is to have the shutdown menu be similar to Windows XP where every button has a caption.

Scott hates it when sites he uses require him to have a strong password. He mentioned sites that require his passwords to have a symbol such as @ or ! in his password. He doesn't care about security for many of these sites and wouldn't like to use the same weak password for all of them, but is thwarted by that requirement.

The OpenID shared identity service was designed so users wouldn't have to create different usernames and passwords for each site. The sites he uses should adopt OpenID.

Val Krc
Val doesn't like MS Office 2007 because of the ribbon. She says it takes longer to do nearly any task since she doesn't know where things are. As a result she reverted back to Office 2003.

It is very important to be conscious of users feelings when choosing an interface. Even if studies show that after using the new interface for 10 hours they are more efficient, it might be better for the company to consider leaving the old interface to prevent negative user sentiment.
Windows will automatically do an update and restart Val's computer. When she walks away, sometime she walks back and finds to her dismay that the computer was restarted and she lost all of her open programs. She would like it if Windows asked her if she'd like to restart her computer instead of giving her a countdown and restarting if she doesn't respond.

Windows could be changed to not automatically restart and install updates. However, there is an economic cost to the change since less computers will have the updates and more will be hacked and infected with viruses. It would be a good idea for Microsoft to do a study comparing the cost of forcing everyone to restart their computer to install updates with the costs to re-architect their operating system so that updates don't require a restart.
Problem 3: Power Law of Practice

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The learning constant is $0.1176$. This means for every doubling of the number of trials, the task completion time is expected to have an $11.8\%$ reduction.

In the beginning the subject used the index finger to push all of the keys. As he gained more experience he started using other fingers as well, and that made his times faster.
import java.io.BufferedReader;
import java.io.IOException;
import java.io.InputStreamReader;
import java.util.Vector;

public class TypingTimer {
    public static final int NUM_TRIALS = 25;
    public static final String PHRASE = "zyxwvuts";
    
    public static void main(String[] args) throws IOException {
        Vector<Long> trialTime = new Vector<Long>();
        
        while(trialTime.size() < NUM_TRIALS) {
            System.out.println("Trial #" + (trialTime.size() + 1));
            System.out.print("Please type the following phrase: \"" + PHRASE + "\" using only one hand. Press enter to begin");
            BufferedReader br = new BufferedReader(new InputStreamReader(System.in));
            br.readLine(); // Read dummy line
            
            long start = System.currentTimeMillis();
            String input = br.readLine();
            long end = System.currentTimeMillis();
            
            if (input.equals(PHRASE)) {
                System.out.println("It took you: " + (end-start) + " miliseconds\n");
                trialTime.add(end-start);
            } else {
                System.out.println("You made an error, retry\n");
            }
        }
        
        System.out.println(trialTime);
    }
}
Problem 4: Choice Reaction Time
Using $a = 545$, $b = 420$ as experimentally determined for Microsoft 2.0 mouse. Assuming each menu item is 10x wider than it is tall

4a) Using Fitt's law:

Average menu item is 6 items away.
$MT = a + b \log (\frac{6}{10} + 1)$
$MT = 830ms$

4b) Average dynamic menu item is 2 items away.
Average static menu item is 8 items away.
$ID_{\text{dynamic}} = \log (\frac{2}{10} + 1) = .263$
$ID_{\text{static}} = \log (\frac{8}{10} + 1) = .848$

50/50: $MT = a + b * (\frac{1}{2} * .263 + \frac{1}{2} * .848)$
$= 778ms$

75/25: $MT = a + b * (\frac{3}{4} * .263 + \frac{1}{4} * .848)$
$= 717ms$

90/10: $MT = 680ms$

I am confused about the term "choice time" since the user already knows where and what he/she wants to click.

The minimum time for the dynamic window is:
$MT = a + b * .263 = 655ms$

The probability split that would cause the maximum choice time is 50/50 with a time of 778ms.

If I was confused about the term and we actually are talking about selection time, then the selection time for the dynamic menu $RT = a + b \log(4) = a + 2b$ and for the static menu $RT = a + b \log(8) = a + 3b$.

4c) Since Hick’s law assumes logarithmic time to scan choices, the real world performance tasks must behave the same way. For example, if the items in a menu were not in sorted order, the user must read every option and thus the logarithmic assumption doesn’t hold. [http://en.wikipedia.org/wiki/Hick%27s_law]