

## Overview of Today's Presentation (Presented by Dan Young)

We are on the cusp of a revolution...

Mobile technology will change the way interact with information; it will change how we live, work, and communicate.

Tonight, we are going to explore mobile technology and look at the challenges of designing for this medium.

For many of you, designing for a handheld device may be something quite new. The point of this presentation today is not to overwhelm you with niche techniques or tangential details, but to paint broad strokes of the mobile space and present you with design considerations, that when used with your existing "best practices" will help you get started in this arena.

To accomplish this goal, I will be dividing the presentation into two parts:

Understanding Mobile Technology

What to consider when designing for small devices

### Part One: Understanding Mobile Technology

#### The revolution that was the Newton.

How many of you remember the first Motorola phones? 1990s

Now how many of you remember Apple's Newton? 1993

What we are seeing today is the final convergence of these two technologies; merging into a single device that will surpass everything else.

#### The difference between portable and mobile.

Portable Device: It is any intelligent device that can be easily moved from location to location.

A laptop is a portable device...

You can use a laptop at a fixed location: a seat, a table, a desk, not en route

Portable devices can rely on a traditional user interface, keyboard, track pad, etc.

Laptops are not mobile.

A mobile device is an intelligent device that can be used “en route” between point A and B.

A user can interact with the mobile device while they walk, run, bike, commute, sit, listen, etc.

Anywhere a person is, they can use a mobile device, but

This is an important point.

### **Personal Tool: Mobile devices are adopted by users, not adapted to...**

Portable devices are personal tools;

Mobile devices are an extension of a person, an expression of their personality.

For example, if, during a break in a meeting, a colleague asks if they can check their email on your laptop. Most people feel fine with this; it not an invasive request.

Now if that same person asked, “Can I borrow your cell phone/PDA to check my email?”, a certain level of discomfort is experienced.

A cell phone, much like a wallet or a purse, is part of one’s personal space. Therefore when you start thinking about how to get people to use a mobile device, you need to consider that you are asking them to adopt the device into their daily lives, not adapt to it.

Therefore, the take away is that you need to keep these fundamental differences front and center when approaching a mobility interface project.

### **Different types of mobile devices.**

There are five categories of mobile devices:

#### 1) Communications Devices

In North America, their primary purpose is for voice and text communications.

These include Motorola RAZRs, LG clamshells, etc.

These typically have numeric keypads, much like a phone.

In other parts of the world, people use their clam shell phones with the Internet at far higher rates. For some, it is their primary source of Internet access.

In Europe in 2006, 30% of cell users used it as their primary source of internet access; today it is much higher.

Prediction is that as cellular data plans begin to change, you will see more people using these types of devices to do many of the activities done on smart phone computers now.

When purchased, most people in the US do not activate their Internet services.

## 2) Smart Phones and PDAs

These are used for voice, text, email and Internet.

Examples include the iPhone, Blackberry, Palm Pre, etc.

These devices come in a variety of formats.

Some have keyboards, some are touch screens while others have a mixed format.

HTC manufactures a slew of devices that have both touch screens and sliding keyboards.

Typically, when purchased, users have data access and can use the Internet and email.

## 3) Entertainment Devices

In North America, their primary purpose is for recreation.

These include the Sony PSP, the iPod (not the touch), Zune, Gameboy, Nintendo DS

## 4) Handheld computers

These are primarily used for data collection, inventory and other more "blue-collar" types of tasks.

Examples include the Motorola MC70/75, Intermec CN3, Honeywell 9900--all devices you may never have been aware.

These are very job-specific and have a vast assortment of keyboard designs and layouts. Each one has a common lineage to Telxon.

Telxon was the "grandfather" of the modern handheld computer. They started shipping terminals in the 1980s and many are still in use today.

They were the ones to create the A-Z + F-Key layout. New machines use QWERTY, however a few legacy ones still have the old style.

## 5) Embedded and special use devices

These are devices that include things like a Playaway handheld and run on proprietary hardware.

If you are asking why I did not include NetBooks on this list, the answer goes back to the portable-mobile differentiation.

Later in this presentation, we will talk about the development process and device/platform selection as a major component in the user interface design.

## Different types of mobile OS

In close concert with the type of mobile device, you need to consider the operating system running on the device itself. This can either support your design efforts or limit what can be accomplished.

There are a few main OS environments that you need to know:

### 1) JAVA and the J2ME

Even though this is not an “OS” per se, it is a fundamental development environment for many of the clam shell-style of devices and a host of Nextel/iDEN style phones.

### 2) Blackberry OS

RIM is still the leader of smart phones. Their OS is the most mature on the market.

BlackBerry JDE v4.7 is a JAVA-based development environment for RIM products. RIM is testing v5.0 in beta and their new OS is just around the corner.

Flash support is still not fully there, however, it is suspected that there may be support in the v5.0 API and the associated OS. We shall see.

### 3) Mac OS X (for iPhone and iPod Touch)

Apple built their iPhone/iPod Touch on a UNIX foundation; the same one that drives their mainline OS.

XCode is the development environment for their platform.

As of 2.2, Flash is not supported.

#### 4) Windows Mobile/CE

Microsoft is Microsoft, however, on handheld devices, their OS has some strengths and weaknesses meaning that they do not have market dominance.

There are two main variants for Windows Mobile: CE and Windows Mobile.

Windows Mobile (all editions) are a streamlined version of CE. CE is a mini XP, for lack of a better analogy.

You can develop a wide variety of solutions, including Flash, on their platform.

It is a workhorse, however, it is not the most “user friendly” OS.

#### 5) Palm Pre (Web OS)

This is Palm’s biggest push. This OS replaces the aged Palm OS. It holds great promise and looks to be a cool device.

Developers will need to get Palm’s Mojo SDK to get started on this device.

As an aside, Palm will have this unit available on all networks in six to nine months.

#### 6) Google’s Android

There has been much hype on this, considering it’s Google.

You can develop for these devices as they become more readily available using Google’s Android SDK.

#### 7) Nokia’s Symbian OS

If only... The Symbian OS is one of the most advanced, stable and flexible platforms on which to run a mobile device.

You can support Flash and Java. Development in C++ is smooth and the stability is great.

The problem: in North America, it is not a popular OS.

The bottom line is that there are many more choices on which to develop, therefore to make the best selection, KNOW YOUR AUDIENCE.

## Part Two: Designing for mobile devices

Before I dive in too quickly, let me point out that there are truisms to designing a user interface that transcend work on a PC to the mobile arena.

The key thing to consider when designing for a mobile device is that you are actually designing for a system.

It is the unison of the hardware and software.

Unlike a PC, the two usually cannot be separated as easily.

Design the UI to take advantage of the device and the software.

Keep your best practices in mind as you listen to our approach to mobile design.

The first of which is knowing your audience.

### Knowing what they don't...

The most fundamental first step in working with the user interface on any mobile device is understanding what faculties the user may not have.

We are all knowledgeable people. We know how to use a computer, mouse and navigate screens. Many users do too (or at least some of you may think that)

The reality of the situation is that for most users, especially those who are not comfortable with technology, find mobile devices intimidating.

With multiple OS's, standardizations on such things like keyboard, touch screens, navigation functions do not exist.

One person who has an iPhone may not be able to help the person with the clam shell.

Peer-to-peer knowledge sharing is not something that can be expected.

Therefore, when considering how you are going to approach a project, you need to put yourself in the mind set of the least competent user.

The next thing you need to consider is the educational attainment of the user.

Can they read?

Can they read English (or the local language)?

Do they understand logical progressions (e.g. screen flows)?

(Remember, a small screen means sparse screen real estate, you can only do so much with navigation)

Will they be able to understand what they are viewing and doing?

We take these question VERY seriously since many of our end-users have issues with these. Therefore we spend a lot of time drilling down to what they can understand.

You should hear what our clients say when we tell them our approach.

Physical limitations are another major issue.

Visibility:

Small screens require better eye sight than a laptop or desktop.

You have to consider the ability of your users to read what's on the screen; make it too small and they have to stop what they are doing to view the content, make it too large and they have to keep paging through many more screens than are necessary.

Find the right size and balance that fits the ability of your target user.

Color selection will also be important--more on this later.

Dexterity:

Can they physically use the device?

Can your user press the keys? Are they too small?

We like to use focus group testing among employees to help gauge their ability to use a device and their affinity to each one.

These are critical questions.

Your target users limit what you can do with a mobile user interface.

They are who will be your weak link in your design. Never let these people out of your mind as you design.

### The user environment...

Simply knowing what the user knows or doesn't know is only where you start.

The next thing to consider is the environment in which a mobile device will be used.

Environmental constraints must always be at the forefront of your mind. Here are a few issues to consider:

#### Lighting:

Will a device be used indoors or outside?

Day or night?

Will there be glare?

How much contrast should be built into the icons, text and graphics?

#### Weather:

Is it a temperate climate or a hot one?

Rain, snow? Salt? Sand and dust?

Does the user need gloves?

#### Handling:

Rough environment or a placid one?

Can the device be dropped? Will it be dropped?

Will the user be wearing gloves?

- Pressure versus infrared touch screens
- Button sizes

The list of environmental considerations goes on and on and on...

You also need to put yourself in your user's shoes to see how they will use the device "in the field" as you set forth on your project.

### Selecting the right platform for a project

Obviously, project objectives will have a major influence on the types of devices that you can use to create a mobile solution.

Consumer-focused products will be limited to either clam shells or consumer smart phones.

Business products will be better suited on an iPhone, Blackberry or WM device.

Enterprise and industrial need a ruggedized platform.

Depending on the type of project, you start the design process by knowing which platform is your target--you be able to rough in the selection.

Once you have an idea of the platform, the next step is finding the right one.

At DXY, when we begin a custom dev project, we usually start by knowing the type of OS and device we are designing.

Of that set, we collect a few samples and see what our target audience thinks.

This is where we spend time doing mini-focus groups with employees or potential end users to see if they like the hardware.

Going back to an earlier comment, we want our users to adopt the technology; they should love it. If they have buy-in early or can provide us with input, we have a higher likelihood of selecting the right devices to increase this goal.

When our sample users test the device, we look for a few things:

Can they see the screen clearly...

Are the buttons the right size...

Do they understand what they are doing (navigation)...

Is the weight good? Too light? Too Heavy?

Does it fit their hands?

If you are testing a consumer device or PDA, your options are going to be more restrictive, nonetheless, have your target audience test the devices to see which ones they like.

Make the selection based on their needs, not the ones you may convince yourself you like.

### **Architecture: stay thin or keep things fat**

Making the right design choice effects the user experience

Network coverage should always be assumed to fail at the least opportune time.

How will your user respond when they cannot connect?

- Sitting waiting for carryout downtown and no "bars"

Thin client

Fat Client

### **Navigation Design: screen flows**

Main screen

Workflow design

Use of icons to design screen navigations

Colors of icons

Styles of icons

Contrast of icons

User feedback

Screen color changes

Clicks and other audible feedback

Verification feedback

### **Data Entry: tab or touch**

When working with devices that have a touch screen, you need to decide how to use the screen in the navigational and data entry workflows.

Blackberries, some Windows Mobile Smart phones and all clam shells lack touch screens.

Each requires tabbed navigation.

Blackberries use the scroller to go from field to field

iPhones and WM devices allow for non-linear touch navigation

This allows you to more accurately mimic a desktop user experience

WM even allows you to “right click” while on a section

- Use this as any contextual menu

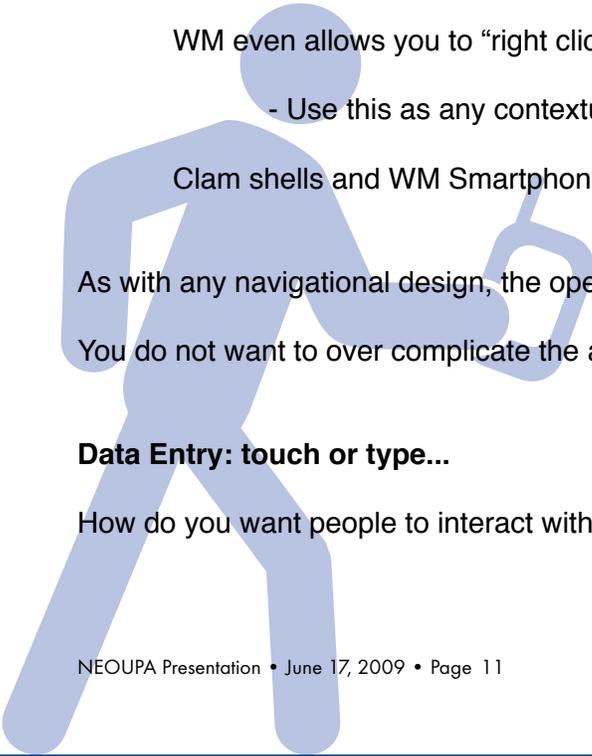
Clam shells and WM Smartphone editions don't have these features

As with any navigational design, the operative term is simplicity.

You do not want to over complicate the application...

### **Data Entry: touch or type...**

How do you want people to interact with data on screen?



Touch screens provide the fastest means of non-linear navigation

Two types of touch screens: pressure and thermal

WM and the pressure stylus

iPhone and the finger touch

Accuracy of touch screens depend on calibration, sensitivity,

Some systems allow for “cut and paste” functionality

iPhone’s getting this in Version 3

WM has it, but you have to enable it in the text fields on a screen

Clam shells and WM Smart Phones do not

Blackberries do have it too

Sometimes less accurate for fine entry than keyboards

Provides a more “human” way of interacting with technology

Keyboard entry provides a greater degree of reliability on data entry

Typing data on a Blackberry Curve will always be more accurate than an iPhone

Keyboard entry is more reliable with respect to data entry

Keyboards allow for function keys and other shortcuts.

When you are trying to determine which is best, I suggest experimenting during the early phases of design.

Time test users and see what they think.

Your results may require a combination of both.

### **Data entry: T9 or the keyboard...**

Depending on your project, your target users need to enter data.

If you are building a marketing game for a consumer phone, chances are the data entry is going to be light.

More emphasis will be on game play entry.

If you are building a portal to your company's database, you may need to facilitate more textual content.

More emphasis will be on text entry.

If you are doing repetitive data entry, you may want to "press and scan."

More emphasis will be on the function buttons or screens.

Each mobile device allows you a variety of ways to allow users to enter data. You do not need to use them all.

Use the one that is most appropriate for your project.

If speed of navigation and time is the most important factor, use the natural functions of the device to eliminate keystrokes.

Auto-text complete

Look-up tables; last data entered

Keyboard shortcuts and function keys

If accuracy is more important, use the features that preserve the accuracy of what is being entered.

On-screen keyboard

Disabling auto-complete of text

Spell Check features

### **Data Collection: GPS, inertia chips, barcodes, nearfield RFID, camera and video...**

Keyboards and touch screens are not the only means of collecting data from the user and the outside world.

GPS:

Most mobile devices either have or will have GPS receivers very soon.

Some use satellites; other triangulate off of cell towers.

Great tool to use in helping users incorporate their location into their task or the application at hand.

Apple even has a compass in the new iPhones

Aides people who walk with better step-by-step directions

Inertia Chips:

For years, planes have navigated the world with these chips. Now they are so cheap and reliable, they are becoming common in mobile devices.

You can use these to help determine when a user has a mobile device up to their face, may be walking (or in transit) to know how to display contextual data.

It can also be useful in adapting a program to their habits.

Nearfield RFID:

This technology has not reached our shores, yet...

It allows you to use your mobile device as a PayPass debit card or other ultra-secure memory storage device.

Can use it in lieu of credit cards, e-wallets, etc.

As a UI designer, this opens the door to linking a device with fixed devices in a retail or other environment.

Barcode scanning:

Most new mobile devices can use their camera to decode almost any type of barcode.

The cameras take a picture of the barcode and the device's processor translates the code into meaningful data.

Keep in mind that for most of these, the barcode reader is a wedge and not a full-fledged scanner--limits functionality in the interface.

Voice:

Devices can not only recognize voice, but they can talk back to the user.

Great for uses while driving, picking inventory, etc.

**Conclusion: Designing for Small Spaces**

**The revolution is what is next...**

Designing for small devices requires a keen understanding of the user, the task and the environment.

You have so much to work with that you must always take a minimalist approach; too many features is never a good thing.

Start small. Test the waters with your design.

Remember, people do not like change, bring them along slowly.

Mobile technology is disruptive. Be creative how you use it and you'll have major success.

