

MobileIXD's User Experience Principles For Mobile Software Products

DRAFT

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Designing a mobile software product often requires difficult decisions and uncomfortable compromises. Indeed, there may in fact be no “right”, but there are assuredly a lot of wrong ones! Learning the following principles will help you create a better mobile experience for your customers.

As you read, remember the following statement as a guide:

The individual performs a task using a device with an interface in a mobile context.

1 The individual...

1.1 Who is the individual?

Research aids in accurately knowing who the current or potential users are, what they expect and what they need. Market and user research overlap. Loosely stated, **market research** defines the product that the existing or potential market wants, and **user research** defines the product the market needs.

Research can answer the following questions with data rather than conjecture:

- What are the market demographics?
- What are the attitudes of the market toward your product?
- How do individuals in that market use similar versions of the product you are creating?
- What product issues impact the five main factors of usability: efficiency, effectiveness, level of engagement, tolerance of errors and ease of learning?

Combining the results of both market and user research provides a well-rounded picture. When considering research:

- You may be able to get a quick start by talking with any product management or marketing colleagues in your company. Additionally, there may be relevant reports available on the Internet or an academic or trade database

- If the product is new or there just has not yet been research conducted, then there is an opportunity to work with other research professionals within your organization that may be better equipped to conduct the research and share the results
- If you have the inclination, skills and education (self or otherwise), conduct your own market or user research
- Research does not need to be constrained to the beginning of a project (and likely has little value to the current project if saved for the end); conducting ongoing research is encouraged

The methods and tools used to integrate research results into the design will differ depending on work style (e.g., wireframes, prototyping, etc.) and development processes already in place (e.g., waterfall, iterative, Agile, etc.). Consider using design personas, such as those detailed in “The Persona Lifecycle: Keeping People in Mind Throughout Product Design” by Pruitt and Adlin and/or usage-centered design - a methodology created by Constantine and Lockwood, as means to ensure that the research results are broadly reflected and applied throughout the product design and development process. A number of other resources can be found in the Appendix at the end of this document.

1.2 Reduce Cost

Most mobile device users in the US do not have a service plan allowing unlimited data. Individuals with a data plan in the US and other countries may have accounts that allow only a certain amount of data per billing cycle or be on a pay-as-you-go plan.

On the other hand, you may be creating a product targeted at enterprise users, where the employer or government picks up the cost of providing their employees with mobile data service.

- Be as sensitive to cost when designing the product as your users are
- Conduct research to understand how much cost impacts usage
- Remain cognizant that both product features and the details of the technical implementation can affect the cost
- Do not push unwanted data to the device
- Ensure the state of connectivity is clearly visible
- Avoid automatic polling for content updates without user acknowledgement
- If the communication protocol allows for it, bundle updates and other system-level commands and functionality in such a way as to reduce the overall number of data chunks being sent and received. If the protocol does not allow for it, consider using a different one or creating one that does - cost matters!
- Use “look-ahead” data caching (e.g., downloading not only the current page but also the pages it links to) with caution, or at least enable it after user acknowledgement

- Avoid or reduce the need to send or receive user interface elements, such as icons or backgrounds by including them as part of the product - the trade-off of product size vs. cost (and time spent by the user waiting) is typically worthwhile
- When in doubt, error conservatively, and figure that cost is a major determinant of overall usage

1.3 Optimize for convenience

Does the product provide value quickly, within a timeframe relevant to the user's tasks and goals?

One expectation regarding personal devices is convenience, especially in regards to making and receiving calls. Manufacturers have focused on convenience by using voice tags, speed dial and searchable address books. Similarly, text messaging is made convenient by inclusion of predictive text input or a full keyboard and one-press viewing of received messages.

- Ensure the convenience of using your product matches or exceeds existing similar kinds of products, when applicable
- Factors influencing convenience can include
 - One-press and/or voice entry
 - Location on or from the main menu
 - Status of content or service provided by the product on the idle or main screen
 - Organization of content and the manner in which it is delivered
 - Customization by the user
 - Speed, either actual or the appearance of

1.4 Maximize utility and enjoyment

Is the product the tool that best suits the user's tasks and goals? The product needs to provide more utility than any alternatives to be successful.

Is it enjoyable to use? Enjoyment can range from the experience of sending an email successfully, to using emoticons or colored fonts in an instant messaging conversation, to getting a high score in a game.

- Understanding what users want and need through research is critical to maximizing utility and enjoyment
- Usable products are typically more enjoyable to use. However, enjoyment extends beyond pure "usability" such that a less usable product may, through visual or tactile design, marketing, being a status symbol or providing a social brand identity, be more enjoyable to use

1.5 Account for culture and usage

When creating products for a global market, important cultural differences and sensitivities must be accounted for if your product is to be successful - or, in some cases, even allowed to be sold. There may even be more than one culture with needs to be addressed even within a single country.

Some cultures may find the design (e.g., color) or behavior (e.g., triggering an audible cue) of a feature included in your product to be rude even if acceptable in the culture it came from. Similarly, without an understanding of the target culture, features may be included that are never used or do not adequately support the preferred method or mode of use.

- Be diligent in your research when creating a trendy design because cultural icons (people) and heroes, idioms, colloquialisms, puns, and “cute” objects and text do not translate well between cultures and may not even be understood by all within any one culture
- Account for cultural aspects such as levels of formality between different parts of society, masculinity vs. femininity, comfort level with uncertainty, individual vs. group achievement, and the need to achieve immediately vs. in the long-term
- Icons and the metaphors they represent are not always universal. For example, representing the state of having unread mail with a mailbox with a flag up does not translate well outside of the United States. Rather, a variation of an envelope ought to be used
- Use cultural-neutral colors as much as possible. When not possible, ensure that the meaning of the colors used is appropriate for each culture

This section includes recommendations from the expansive and detailed guidance on these topics and more provided in “Usability and Internationalization of Information Technology” by Naykin.

1.6 Design for localization

The phrase “world-ready” has been used by several companies to describe products that are designed and implemented in a manner making it faster and less resource-intensive to create and deploy on a global scale. This is also known as globalization, of which localization is a part.

- Avoid detailed maps and specific place names as different cultures may have different, or even conflicting, views
- Ensure that UI text can be easily extracted, translated and corrected
- Use brief text phrases and labels - translating short phrases from English to other languages can more than double the length of the text

- Locate field labels above or below the field rather than next to it
- Account for different formatting of items such as time, date, phone numbers, measurements, and currency

Note: while other aspects of world-readiness pertaining to the technical implementation and testing of the product should also be adopted, they are beyond the scope of the user experience design principles.

2 Performs a task...

2.1 Perform a task analysis

Task analysis means learning about the goals of your users. That is, what they want to do with your product and their ways of working. It can also mean determining the specific tasks required to meet those goals and what steps to accomplish those tasks.

Task analysis is especially important for mobile design because of the need to focus on delivering the key features and functionality in order to provide a usable, useful, enjoyable experience.

- Determine the level of desired granularity for the analysis before performing it. Too much granularity may slow down the design process and become more of a burden than a tool. Too little, and the analysis may not provide enough useful information
- Start by identifying the key goals people will have when using your product and then list out one or more tasks that have to be accomplished to achieve those goals
- Once the tasks have been identified, break each of them down into discrete steps, such as “push the down arrow hardware key 3 times” and “push the select hardware key”
- Creating a task flow diagram can be helpful in gaining a deeper understanding of the tasks and can serve as a communication aid with other team members

“User and Task Analysis for Interface Design” by Hackos and Redish provides a thorough treatment of this topic. Usage-centered design by Constantine and Lockwood also integrates a focus on identifying and analyzing tasks .

2.2 Reduce the impact of the technology

Most people do not understand the complexity of creating successful mobile products. Not only do they not understand, but they do not particularly care to, nor should they even be expected to. The user experience is typically best served by reducing or hiding the impact of the complex technology that powers it.

For example, on some handsets sending a text message displays a message-sent confirmation that must be manually dismissed. However, in the case of instant messaging, where the goal

is a rapid exchange of messages, a dismissing a confirmation for each message would render the experience unusable.

- Suppress or eliminate user interface elements or behaviors of the platform or the technologies in use that can interfere with task completion
- Keep successful automated and automatic interactions with other products on the device or a server in the background
- Work to ensure that task flow is continuous by processing data, server requests, polling, and lengthy download times in the background; provide a “multi-threaded” experience when the device and platform can support it

2.3 Account for divided attention

The form factor and personal nature of a mobile device almost ensures multi-tasking. While some mobile activities are typically performed during leisure time when attention may be more focused, it remains prudent to account for divided attention.

It is easy to imagine different scenarios that may cause divided attention and user research should reveal or affirm them. Mobile devices are often used while commuting via mass-transit in much of the world. Consider the potential distractions to the user. Additionally, the impact of laws enforcing hands-free usage of mobile devices while operating a motor vehicle must be taken into account when designing a mobile product.

Also note that the level of attention given to a task may vary even as the task is in progress.

- Provide key information first
- Layout and visual design of individual user interface elements should inform the user about the current state, not just be aesthetically pleasing
- Use techniques to “chunk” the information on the screen, such as white space, dividing lines or other visual elements to separate key components (e.g., navigation vs. content), and paragraphs for blocks of text
- Consider using high-contrast visual design elements
- Reduce and simplify user interface text so that it may be recognized and read more quickly
- Enable hands-free operation when possible through voice and be sensitive to when the device is in hands-free mode
- Use accelerator functions for advanced users to help enable a “burst” pattern of usage

2.4 Plan for interruptions

The nature of an interruption that halts task completion for a time varies, from receiving a phone call while composing a message, to thinking about the groceries needed from the store, to a stranger asking for directions and more.

Considering that mobile devices are often used in public places, interruptions are almost guaranteed. While most originate external to the product, the design ought to help the user recover from interruptions and gracefully handle being abandoned all together.

- The current state should be recognizable at a glance; that is if a person looks away for a period of time and then refocuses their attention, can the person understand where they are in the product, what if anything has happened since they looked away and what is currently happening?
- Allow for the ability to suspend and resume the product - specific “pause” and “play” functionality is not necessary to accommodate this scenario. Rather, if the user jumps into another product part way through a task in the product, ensure that the user will be returned to a sensible place (such as the same screen) when they return
- In some cases a user may abandon the product part way through a task
 - If the user never returns, then likely the platform’s memory management functionality will handle things sufficiently
 - Until the memory management functionality is engaged, the user ought to be able to return to the product and resume the task, though it may no longer be appropriate to return them to exactly where they were in exactly the same state. For example, if the user was filling in a form, encountered an interruption causing the user to abandon that task, it must be determined during design whether it is more appropriate to
 - Display the same form retaining any text that had been entered
 - Save any information entered and display a list of forms that have not been completed
 - Discard the incomplete form for security reasons or simply that it had been a lengthy period of time so the user was unlikely to remember the context or reason they were working on the task
- Avoid causing unimportant interruptions when the user is actively engaged in completing a task. Do not display any of the following that are not completely relevant to the task being performed
 - Pop-ups and confirmation dialogs
 - Application status, connectivity or application-server interactions
 - Progress in other processes or products on the device
- Allow the user to continue working even when the product or other device components are “busy”

2.5 Let user choose the content that is delivered

One of the basic tenets of usability is to give control to the user (or at least the perception thereof). Receiving undesired content is not only potentially costly and frustrating, but may also touch on feelings of privacy and trust.

It may not always be practical to let the user choose the content that is delivered to the mobile product, as doing so may require a more complicated interaction design that detracts from the overall usability to adhere to the principle, but the issue of degree of user control ought to be considered during design.

Note that “content” is a broad concept and includes text information, forms, messages, audio, images, videos, and advertisements.

- Provide options for delivery on the mobile for content considered critical to the use of the product (e.g., mail products typically offer the option to download just the header of each message automatically rather than the entire contents)
- For content that is not critical to the use of the product, use an opt-in approach
- Allow users to opt-out of receiving content that is not critical that they are already receiving or will otherwise receive by default

3 Using a device...

3.1 A mobile device is a personal device

Mobile devices are typically small and optimized for one-handed use (at least in terms of the key communication features). They have a screen that can easily be shielded or angled to prevent others from seeing it and securable by PIN or other security means. Mobile devices typically have only a single user.

When not in hand, a mobile device is commonly powered on, residing within immediate reach, traveling with its user. While merely a communication tool for some, others use it as a means of personal expression. Form factor and characteristics, ring tones, skins or themes that change the default colors, fonts, and the like displayed on the screen are features that support personal expression.

In addition to hardware and platform-level expression, software products are also increasingly supporting personal expression by including features such as presence, location, signatures, themes, the ability to tap into and distribute personal content, and so on.

- Utilize usage patterns, features and settings to deliver a more intelligent, optimized, personalized experience

- When appropriate, provide a means to personalize the experience, be it through the use of color, display of content or inclusion of user-supplied graphics or audio, or the display of location to one's closest friends and family
- Authenticate sparingly and, when necessary to authenticate, focus on making it easy, especially when it comes to password entry - whenever possible, display the password in clear text as it is entered, masking it only once the user has navigated away from the screen or page where the input field is located
- Save credentials to reduce need for re-entry

3.2 Device Input

Many people find it challenging to enter data on their mobile device. Some mobile features allow for voice input, but most data entry tasks require manual input.

Data input varies between devices. For those with touch screens, input can be accomplished by using a stylus to either tap the keys of a virtual keyboard or through handwriting recognition. Devices without a touch screen require physically pressing hardware keys - most of which use a 9-key layout where multiple characters are accessible on each key, though the inclusion of a full QWERTY (or similar) keypad has become more popular. Devices with a 9-key layout typically include T9[®] Text Input or other predictive text input software.

In addition to character input, a device has one or more keys, virtual or physical, that help the user control the input, such as inserting a new line or deleting characters. Designers should understand the input methods available to the user and optimize the experience to make full use of those methods.

- The most usable method of input on a mobile device is none at all; design the interface to minimize input and to provide selectable items (e.g., a list of cities) rather than requiring input
- Pre-fill fields with default values or previously entered data
- Change input modes (e.g., from text to numbers, from sentence case to all lower case) automatically based on the data required for the field in focus
- Touch-screen input
 - Target-size matters - research by Microsoft (similar results found by others) indicates that the minimum target size is 5.04 mm (21x21 pixels) at 24dpi
 - Stylus-on-display friction can affect the user's accuracy when tapping targets, as can left or right-handedness
 - Consider whether the platform automatically moves content currently displayed on the screen up to make space for a virtual keyboard is or if the keyboard is overlaid on top of the existing content or whether this behavior can be specified by the product
- 9-key input

- Default to predictive text rather than multi-tap, especially when long text strings are likely
- Each device and device manufacturer can implement a different version or flavor of T9® Text Input - some allow the user to enter their own words, though differing on the method this is accomplished, and some allow the creators of a product to include or access different databases that may allow context-relevant words, names or other character strings to be more readily available to the user
- QWERTY or other full keyboard input
 - Do not assume that a full keyboard makes input easier for everyone - for example, consider that these devices are typically wider, making it more difficult for people with smaller hands to use it one-handed and thereby reducing the potential that they have a hand free to perform another activity that your product may require
 - Many devices with keyboards also include a predictive text input method, though they differ on whether it is enabled by default or not

3.3 Device Output

Most mobile devices have a portrait (vertical) display rather than landscape, though landscape (horizontal) displays are becoming more popular due to media devices and devices with QWERTYY keypads. Both the orientation and the size and resolution of the display dictate the amount of content that can be shown. In practical terms, this affects the number of vertical lines available for menus and content (especially since the top and bottom lines are typically reserved for status and soft keys, respectively) and the space available for text labels and icons.

Audio on most mobile devices is sufficient only for voice conversations or short listening periods. For mobile communication devices, do not assume that the user has a headphone, let alone stereo headphones. Specialized mobile media devices can provide high-quality audio playback through headphones and may even have a higher quality on-board speaker. Playback-quality of various sound file formats can differ dramatically even on the same device.

- Design for the orientation of the display (Note that a few devices have functionality that can dynamically re-orient the display - be sure to acquire a full understanding on the impact this has on designing a product for the platform)
- Highly detailed visuals making use of subtle gradients and other visual effects are not recommended
- When possible, reduce the complexity of the visuals - it is difficult to design a detailed 16x16 pixel or 24x24 pixel icon and to recognize what the icon represents; focus on providing basic shapes and colors as building blocks for the visual experience first, then the detail design second

- High contrast visuals are always recommended for maximal usability
- Always preview output on the actual target device(s), visual or auditory
- Make audio cues brief and contrasting (similar to visual cues)

3.4 Other device specifications

The technical specifications of mobile device storage and processing speed have improved dramatically over time. High-end devices may have substantial storage and processing power available. How the internal components are integrated and then leveraged by the platform still place constraints on the design of the mobile experience.

Outside of specialized mobile devices, there is a trend toward using one of three primary OS platforms: Microsoft® Windows Mobile™, Symbian™ (especially Nokia's® Series 60™ OS), and Blackberry™ OS. Each OS has different standards as to what user interface elements and behaviors are expected - let alone supported, and the technologies that may be used, such as Sun's® Java™ or Adobe's® Flash™.

Finally, understand the expected battery life for the target device(s) and how much any similar products - or at least products utilizing similar technology in a different way - impacts battery life.

- Investigate the hardware and platform and their potential effects on the design in advance
- If the target device has a platform that has a style guide available, make it an available reference and integrate it into the design process
- Work to minimize
 - The number of simultaneous actions the system must make, such as displaying an animation while playing a sound
 - The amount of storage needed for the product
 - The amount of memory required to run the product
 - Automated activity that consumes battery power

3.5 Consistency and efficiency are a means, not an end

Maintaining consistency - whether with desktop or other mobile products or even within the same product - is less important to creating a usable experience than simplicity and predictability.

Similarly, efficiency, while a good rule of thumb, can be an obstacle to design, especially when reducing the number of button presses is pursued overzealously. Button presses are not automatically "bad"; it is the button presses that the users must consciously attend to

(thereby stealing their attention from their current task) that most negatively impact the user experience.

- Focus on providing a robust set of core features and functionality necessary to support the user's key goals and work style
- Design the elements and their behaviors of the product to be predictable in any given context (e.g., the left soft key always being labeled "Back" and navigating back hierarchically, or having a "Submit" button on the screen for every form, etc.)
- Pressing the same button 3 times can be more usable than pressing two buttons one time each

3.6 Deviate from platform consistency only by necessity

Each OS platform has standardized interaction conventions that create an identifiable experience and help people learn to use the products on the platform. Once learned, there is an expectation that other products available on the platform provide a similar experience.

Awareness of platform conventions varies from user to user. Even if the user remains unaware, breaking convention may still cause frustration, errors, or even task failure. For these reasons, it is important to deviate from platform consistency only by necessity.

- Always make it a conscious decision to deviate from platform consistency rather than standard practice when designing a product
- User research may correctly lead you to conclude that being inconsistent with the platform provides the best experience
- Consider being inconsistent with the platform if it is the only way core functionality can be included (e.g., a specialized multimedia product needs to use the soft keys in another way)

4 With an interface...

4.1 Include a "hub"

Usable navigation is critical to the success of a mobile software product.

A hub is typically a "main menu" or other content containing selectable elements, such as a contact list for an instant messaging product, an inbox for an email product, or a row of service icons plus news and weather for a portal product, for example, from which the user dives deeper into the user interface hierarchy to perform desired tasks along a node, returning to the hub after completing those tasks. A hub provides a familiar locale from which to operate and helps establish an understanding of the product's navigational structure which makes for more efficient usage and reduces errors.

- Design the user experience around a primary "hub"

- A hub does not need to be the first screen user's see of the product - in the case of some connected services, this may be the authentication screen
- Ensure that the hub is visually distinct in content, structure, format, color or some combination thereof from all other nodes to increase recognizability
- Make it easy to return to the hub, preferably by providing a means to jump to the hub directly from every major node (i.e., provide a "Main Menu" or "Home" feature, menu item or selectable element)

4.2 Minimize navigation paths

Providing multiple methods of navigation may initially appear to be a boon to users by accommodating a larger variety of learning and interaction styles. However, it also makes it more difficult to learn how the user interface is organized, thereby increasing the likelihood of errors and decreasing efficiency, utility and enjoyment. Additionally, providing too many methods of navigation can increase cognitive load as the user needs to focus on remembering which of several methods will get them where they want to go as well as the history of how they go to that point if they want to return to an earlier step.

- Ensure that key functions and features are visible and easily accessible
- Use caution when creating user interface hierarchies that are deeper than three levels (e.g., main menu → inbox → message content)
- When possible, minimize navigation to one visible primary means of navigating and one advanced method that allows for faster - though less discoverable - means of navigating (in some cases, dedicated hardware keys may provide a third means of navigating)
- Navigation elements should be clearly distinguishable from all other user interface elements

4.3 Employ progressive disclosure

Progressive disclosure means that complexity and secondary functionality are moved to one or more easily accessible secondary screens or menus. Additionally, it provides a means to progressively build a more detailed, more contextually-appropriate explanation of key content, features and functions. Progressive disclosure helps prevent the complexity of the product structure or concepts from overwhelming the user.

Note that it is possible to go too far, such that using your product becomes a chore for experienced users. Of course, if the expected typical user of your product is a novice or infrequent user, then this is a moot point. Performing a task analysis and user research helps mitigate the risk of going too far with progressive disclosure.

- User teasers to lure interested users away from the main screen or menu, which can include anything from an intriguing text label for an unfamiliar concept or feature to

a selectable “learn more” element to provide additional, contextual description, and more

- Determine if there are standards or pre-existing expectations for the complexity you are progressively disclosing – for example, if providing an “Edit” menu item, be sure to include “Cut”, “Copy” and “Paste” on the submenu
- When appropriate, provide a summary view of the content first – for example, a banking product might display a balance of accounts on the main screen or hub and allow the user to select each account to list out the details

4.4 Design for error prevention

A good design strives to prevent errors from happening in the first place. Of course, user errors are not the only type of errors that can occur in complex mobile systems.

- Be as consistent as possible with labels, icons, concepts etc., especially within the product itself
- Ensure that navigation behavior is consistent and predictable, especially back navigation
- Work to ensure that if the design is leveraging existing expectations and knowledge to not introduce features, functions or concepts that will alienate and frustrate the user
- Account for divided attention during use and allow for easy recovery from errors
- If an action the user is about to take cannot be recovered from in the case of an error, warn the user
- Follow all of the other user experience guidelines within this document as well as those provided by other sources

4.5 Allow easy error recovery

Once an error has occurred, it is critical that the user be able to quickly and easily recover from it, able to return to their task. If that is not possible, the user must at least understand why the error happened and what to do next.

- Notify the user when an error has occurred
- Use a common, understandable language with as little technical prose as possible when describing the error
- Ideally, the solution to the error and how to avoid the error can also be presented, though space constraints may prevent the inclusion of such information
- If a user has to acknowledge an error (as is typical with severe errors), ensure the user is aware of what will happen next
- Whenever possible, allow the user to undo the action that caused the error

4.6 Provide additional help

Providing on-board or otherwise easily accessible help for users reassured by having a reference available, or to help those that have become stuck through a lack of knowledge, is highly recommended. While generally accepted that the vast majority of people will never look at a product manual, there remains a portion that will, however, look at documentation either when they have tried everything else and are about to quit or prior to trying anything outside of the ordinary lest they risk causing inadvertent problems.

- Include a “Help” object or menu item within your product
- Focus the contents of help on tasks and solutions rather than comprehensive knowledge
- Whenever possible, provide contextual help in addition to a static help object or menu item
- Ideally, help is further personalized based on the current and historical actions taken by the user

4.7 Use an appropriate level of frequency for notifications

The frequency with which to notify the user must be appropriate to the significance of the notification, the content contained within the notification, and the current usage context. Error dialogs, new message alerts, sports scores, stock price changes and calendar reminders are just some examples of notifications.

- Factor the user’s current activity into the decision of whether to trigger a notification or wait
- If possible, also factor in the user’s historical activity and allow the user to shape the notification experience in real-time through simple actions (e.g., if a type of notification is always quickly acknowledged, consider notifying more frequently)
- Always notify for critical errors and those in which there may be loss of user data - less important errors that do not prevent the user from working can be delayed until a time when they are not as intrusive
- Always notify for scheduling and task reminders set by the user
- Unless there is significant doubt as to an action’s effectiveness for very specific reasons, avoid notifications for positive results of an action (e.g. after a message is sent successfully)
- Allow a basic level of manual configuration of notification frequency, minimally always/never
- Notifications should be transient (except critical errors) such that the user can resume their previous activity prior to the notification triggering

4.8 Include critical, useful content in each notification

A good notification, like a good error message, includes an appropriate level of content to provide context, relevancy and utility. For example, knowing that new mail has been received is useful, but knowing who sent it, when it was received and what it concerns is ever more useful.

- Ensure that the manifestation of the notification (e.g., inserted inline into an instant messaging conversation, an error dialog, an icon plus tone, etc.) is context, content and product appropriate
- When appropriate, include the time the event that triggered the notification occurred, the reason or cause of the notification, and as much of any content the notification pertains to as possible within the manifestation of the notification itself
- Triggering an audio cue in conjunction with the visual can often be more effective, though more disruptive

5 In a mobile context.

5.1 The physical environment impacts usage

The mobile physical environment is highly varied, extremely dynamic and often unforgiving. While impossible to predict and plan for every condition, it is important to keep the environment in mind as a factor that can drastically affect usage - especially if the device the product runs on is designed for rugged professional use.

- Plan for combinations of the following environmental characteristics to occur and impact usage
 - Fluctuating network coverage
 - Ambient surrounding noise level
 - Changing or unstable positioning of the device or user
 - Use in an environment that is in itself moving (e.g., bus or train)
 - Variable lighting conditions (possibly zero ambient lighting)
 - Variable climate
 - Limited visibility (device could be in a pocket)
- Use a high-contrast visual design with colors that resist fading in bright sunlight
- Use larger, more easily readable fonts
- Provide useful cues regarding connection status and task progress and avoid hiding cues typically provided by the platform such as signal strength and battery level
- Ensure audio cues and notifications are appropriate for the environment

- Not every audio cue or notification is important enough to trigger a vibration in “silent” mode (annoyance, battery life)
- Work to avoid requiring precise input, either through the use of selection lists or, in the case of touch screen devices, by using larger targets for the stylus
- Allow the user to continue working in absence of network coverage

5.2 Respect cultural rules of etiquette

Ownership and use of mobile devices carry different implications in different cultures, from personal value to social status. Some behaviors of the mobile user that may be acceptable in one culture are considered rude in another. Likewise, behaviors of the mobile product may be considered rude or even alienate the user that is attempting to be mindful of their own etiquette. It is important that the product mind its manners and also provide some flexibility to the user in doing so (and to account for use during travel) - for everybody's' sake!

- Respect and integrate global settings, especially in regards to sounds (or lack thereof)
- Use a combination of visual and audio cues rather than relying solely on either
- If there are audible cues in the product
 - Default cues should be brief, differentiated and of moderate volume
 - If personalization is possible, allow the user to choose more complex, loud or potentially annoying cues (consider not supplying any such cues as part of the product)
 - Ensure that appropriate cues will trigger a vibration when the device is in “silent” mode
- Allow for a delayed response to notifications
- When possible, do not pause system activity while awaiting user acknowledgement, as it may be a long time coming
- If the product relies on voice input, ensure that key tasks can be accomplished manually by hand for the times when speaking is impossible or rude
- The phone may be turned off while in the middle of performing a task - make it easy to recover and resume the task at a later time
- Keep required character input to a minimum
- When possible, integrate features that help facilitate and moderate communications with others, such as presence (a feature that can be applied more broadly than in just instant messaging), communication blocking, and call or message identification as it arrives

5.3 Manage perceptions of the mobile experience

The mobile user experience is a compromised one, wherein hardware and software designers as well as service providers have made a number of trade-offs - sometimes contrary in nature to one another - in order to deliver the final product(s) into the hands of the end user.

Given the ubiquity of mobile devices, most people have a reasonable threshold of tolerance for the quirks and occasional frustrations of using the devices. However, familiarity with a PC experience can lower that threshold and make the expectations of the mobile experience more difficult to meet, especially for PC-to-mobile cross-over products, services and features.

There are some techniques that may help to manage perceptions of the mobile experience in order to improve usability and satisfaction, especially when it is not technically possible or otherwise feasible to provide a direct solution to meet expectations.

- If the user feels in control, frustration is less likely to occur
 - Provide control over content
 - Allow users to cancel out of lengthy processes
 - When appropriate provide the means to customize or personalize the experience, especially when it comes to automated activity (e.g., checking for account balance)
- Make the experience appear to at least *appear* to be quick
 - Reduce or eliminate the need to explicitly save data - do it automatically
 - Display user data immediately even if it has not yet been saved, processed or successfully sent from the device
 - Pre-fill forms and cache user data when security is not a major concern to the user
 - Use animation (also consider motion blur), especially for progress indicators as a brief distraction while the system is working
- Allow users to continue working continuously
 - Reduce or eliminate interruptions
 - Process data and communicate wirelessly in the background as the user works on a task
 - If it is not possible for the user to continue working, display an accurate progress meter - an indication of "the system is busy" is of limited utility as many people do not believe they are true
- If there is a desktop counterpart, be as consistent as possible because there will be an expectation that the experience is the same
 - Handle concepts the same way

- Use the same terminology to describe the same things
- Use similar icons and audio cues suited for mobile
- Attempt to replicate, at least in spirit, desktop user interface constructs (e.g., for instant messaging, a split-window conversation screen)