1. A persons interaction with the outside world occurs through information being received and sent input and output. In an interaction with a computer the user receives information that is output by the computer, and responds by providing input to the computer the users output becomes the computers input and vice versa. Input in the human occurs mainly through the senses and output through the motor control of the effectors.

2. Sensory buffers

Short-term memory or working memory

Long-term memory

3. Design is defined as achieving Goals within constraints and encompasses work tasks data design, architectural design, interface design and component-level design and create a design model or design specification.

4. Requirements , Analysis and Design , Iteration and prototyping , Implementation and Deployment

5. A Cognitive model is the designers intended mental model for the user of the system a set of ideas about how it is organized and operates.

6. Analyze and design user interfaces and new user-interface technologies, created software tools and development environment to facilitate the construction of graphical user interfaces, pioneered the user of voice and video in user interfaces, hypertext links, interactive tutorials and context sensitive help systems.

7. Services , Applications , Application Frameworks , Operating Systems , Platforms , Devices , Aggregators , Networks , Operators

8. Services include tasks such as accessing the Internet, sending a text message, or being able to get a location basically, anything the user is trying to do.

9. The grid is a handy tool for planning out interesting moments during a drag and drop interaction. It serves as a checklist to make sure there are no holes in the interaction.

10. Placeholder targeting - Most explicit way to preview the effect. Midpoint boundary - Requires the least drag effort to move modules around.

11. a. Evaluation should not be thought of as a single phase in the design process (still less as an activity tacked on the end of the process if time permits). Ideally, evaluation should occur throughout the design life cycle, with the results of the evaluation feeding back into modifications to the design. Clearly, it is not usually possible to

perform extensive experimental testing continuously throughout the design, but analytic and informal techniques can and should be used. Three main goals of Evaluation To assess the extent and accessibility of the systems functionality , To assess users experience of the interaction. To identify any specific problems with the system. Classification of Evaluation Techniques Cognitive walkthrough , Heuristic evaluation , Review based and Model based Cognitive walkthrough The origin of the cognitive walkthrough approach to evaluation is the code walkthrough familiar in software engineering. Walkthroughs require a detailed review of a sequence of actions. In the code walkthrough, the sequence represents a segment of the program code that is stepped through by the reviewers to check certain characteristics (for example, that coding style is adhered to, conventions for spelling variables versus procedure calls, and to check that system-wide invariants are not violated). In the cognitive walkthrough, the sequence of actions refers to the steps that an interface will require a user to perform in order to accomplish some known task. The evaluators then step through that action sequence to check it for potential usability problems. Usually, the main focus of the cognitive walkthrough is to establish how easy a system is to learn. More specifically, the focus is on learning through exploration. Experience shows that many users prefer to learn how to

use a system by exploring its functionality hands on, and not after sufficient training or examination of a users manual. So the checks that are made during the walkthrough ask questions that address this exploratory learning. To do a walkthrough (the term walkthrough from now on refers to the cognitive walkthrough, and not to any other kind of walkthrough), you need four things A specification or prototype of the system. It doesnt have to be complete, but it should be fairly detailed. Details such as the location and wording for a menu can make a big difference. A description of the task the user is to perform on the system. This should be a representative task that most users will want to do. A complete, written list of the actions needed to complete the task with the proposed system. An indication of who the users are and what kind of experience and knowledge the evaluators can assume about them. Given this information, the evaluators step through the action sequence (identified in item 3 above) to critique the system and tell a believable story about its usability. To do this, for each action, the evaluators try to answer the following four questions for each step in the action sequence. Is the effect of the action the same as the users goal at that point Each user action will have a specific effect within the system. Is this effect the same as what the user is trying to achieve at this point For example, if the effect of the action is to

save a document, is saving a document what the user wants to do Will users see that the action is available Will users see the button or menu item, for example, that is used to produce the action This is not asking whether they will recognize that the button is the one they want. Once users have found the correct action, will they know it is the one they need This complements the previous question. It is one thing for a button or menu item to be visible, but will the user recognize that it is the one he is looking for to complete his task Where the previous question was about the visibility of the action, this one is about whether its meaning and effect is clear. After the action is taken, will users understand the feedback they get If you now assume that the user did manage to achieve the correct action, will he know that he has done so Will the feedback given be sufficient confirmation of what has actually happened This is the completion of the execution-evaluation interaction cycle . In order to determine if they have accomplished their goal, users need appropriate feedback. Heuristic evaluation A heuristic is a guideline or general principle or rule of thumb that can guide a design decision or be used to critique a decision that has already been made. Heuristic evaluation, developed by Jakob Nielsen and Rolf Molich, is a method for structuring the critique of a system using a set of relatively simple and general heuristics. Heuristic evaluation can be performed on a

design specification so it is useful for evaluating early design. But it can also be used on prototypes, storyboards and fully functioning systems. It is therefore a flexible, relatively cheap approach. Hence it is often considered a discount usability technique. The general idea behind heuristic evaluation is that several evaluators independently critique a system to come up with potential usability problems. It is important that there be several of these evaluators and that the evaluations be done independently. Nielsens ten heuristics are Visibility of system status Always keep users informed about what is going on, through appropriate feedback within reasonable time. For example, if a system operation will take some time, give an indication of how long and how much is complete. Match between system and the real world The system should speak the users language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. Follow real world conventions, making information appear in natural and logical order. User control and freedom Users often choose system functions by mistake and need a clearly marked emergency exit to leave the unwanted state without having to go through an extended dialog. Support undo and redo. Consistency and standards Users should not have to wonder whether words, situations or actions mean the same thing in different contexts. Follow platform conventions and accepted standards.

Error prevention Make it difficult to make errors. Even better than good error messages is a careful design that prevents a problem from occurring in the first place. Recognition rather than recall Make objects, actions and options visible. The user should not have to remember information from one part of the dialog to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate. Flexibility and efficiency of use Allow users to tailor frequent actions. Accelerators unseen by the novice user may often speed up the interaction for the expert user to such an extent that the system can cater to both inexperienced and experienced users. Aesthetic and minimalist design Dialogs should not contain information that is irrelevant or rarely needed. Every extra unit of information in a dialog competes with the relevant units of information and diminishes their relative visibility. Help users recognize, diagnose and recover from errors Error messages should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution. Help and documentation Few systems can be used with no instructions so it may be necessary to provide help and documentation. Any such information should be easy to search, focussed on the users task, list concrete steps to be carried out, and not be too large. Once each evaluator has completed their separate assessment, all of the problems are collected and the mean

severity ratings calculated. The design team will then determine the ones that are the most important and will receive attention first. Review based  Experimental psychology and human computer interaction between them possess a wealth of experimental results and empirical evidence. Some of this is specific to a particular domain, but much deals with more generic issues and applies in a variety of situations. Examples of such issues are the usability of different menu types, the recall of command names, and the choice of icons. A final approach to expert evaluation exploits this inheritance, using previous results as evidence to support (or refute) aspects of the design. It is expensive to repeat experiments continually and an expert review of relevant literature can avoid Evaluation through user participation 327 the need to do so. It should be noted that experimental results cannot be expected to hold arbitrarily across contexts. The reviewer must therefore select evidence carefully, noting the experimental design chosen, the population of participants used, the analyses performed and the assumptions made. For example, an experiment testing the usability of a particular style of help system using novice participants may not provide accurate evaluation of a help system designed for expert users. The review should therefore take account of both the similarities and the differences between the experimental context and the design under

consideration. Model-based evaluation A third expert-based approach is the use of models. Certain cognitive and design models provide a means of combining design specification and evaluation into the same framework. For example, the GOMS (goals, operators, methods and selection) model predicts user performance with a particular interface and can be used to filter particular design options. Similarly, lower-level modeling techniques such as the keystroke-level model provide predictions of the time users will take to perform low-level physical tasks. Design methodologies, such as design rationale also have a role to play in evaluation at the design stage. Design rationale provides a framework in which design options can be evaluated. By examining the criteria that are associated with each option in the design, and the evidence that is provided to support these criteria, informed judgments can be made in the design. Dialog models can also be used to evaluate dialog sequences for problems, such as unreachable states, circular dialogs and complexity. Models such as state transition networks are useful for evaluating dialog designs prior to implementation.

12. a. Overlays Instead of going to a new page, a mini-page can be displayed in a lightweight layer over the page. Overlays are really just lightweight pop ups. We use the term lightweight to make a clear distinction between it and the normal idea of a browser pop up.

Browser pop ups are created as a new browser window. Lightweight overlays are shown within the browser page as an overlay. Older style browser pop ups are undesirable because Browser pop ups display a new browser window. As a result these windows often take time and a sizeable chunk of system resources to create. Browser pop ups often display browser interface controls (e.g a URL bar). Due to security concerns, in Internet Explorer 7 the URL bar is a permanent fixture on any browser pop-up window. Three specific types of overlays Dialog Overlays Detail Overlays Input Overlays. Dialog Overlay Dialog Overlays replace the old style browser pop ups. Example Netflix In the previously viewed movies for salesection, a user can click on a Buybutton to purchase a DVD. Since the customer purchasing the DVD is a member of Netflix, all the pertinent shipping and purchasing information is already on record. Considerations Because the overlay is a lightweight pop up, the confirmation can be displayed more rapidly and the application has complete control over its look and placement. Lightbox Effect One technique employed here is the use of a Lightbox Effect. In photography a lightbox provides a backlit area to view slides. On the Web, this technique has come to mean bringing something into view by making it brighter than the background. In practice, this is done by dimming down the background. Modality Overlays can be modal or

non-modal. A modal overlay requires the user to interact with it before she can return to the application. Sometimes overlays are non-modal. Example Netflix site. When a DVD is added to the users shipping list (queue), a confirmation overlay is shown. While it may appear that the only way to dismiss the overlay is by clicking the Close box in the upper-right corner, in reality the user can click anywhere outside the overlay (in the dimmed area) and the overlay will dismiss. Staying in the flow Overlays are a good way to avoid sending a user to a new page. This allows the user to stay within the context of the original page. However, since overlays are quick to display and inexpensive to produce, sometimes they can be tempting to use too freely, and in the process, may actually break the users flow. Anti-pattern Idiot Boxes This is a clear anti-pattern that should be avoided. We call these types of overlays Idiot Boxes. One of the clearest examples of Idiot Boxes is the way certain confirmation overlays were used in Yahoo! Photos. Inlay A common idiom is to provide additional detail about items shown on a page. Hovering over a movie revealed a Detail Overlay calling out the back-of-the-box information. Details can be shown inline as well. Roost allows house photos to be viewed in-context for a real estate listing with a Detail Inlay Considerations One of the more difficult things to do on most real estate sites is get a view of the house in context without having

to navigate from page to page. The curb appeal, inside view, and backyard are all key factors in driving interest for a house. Knowing this, the team at Roost wanted to make it really easy to get to the photos quickly. Combining inlays and overlays Roosts solution was to combine several patterns. It uses the Hover Reveal, a Contextual Tools pattern, to reveal a set of tools when the user hovers over a listing. It uses the Detail Inlay pattern to show a carousel of photos when the user clicks on the View photoslink. It uses a Detail Overlay to blow up a thumbnail when clicked on. Compare this to the traditional approach, one that requires the user to navigate from the listing page to a photo page and back again. The Roost team actually expended a Herculean effort in setting up this convenience, as it is dealing with hundreds of MLS listings with different contractual requirements for displaying real estate photos. The Roost team worked out the difficulties behind the scenes to create a nice user experience. Use Detail Inlay to provide additional information in context without hiding other information. Use Detail Inlay to avoid the anti-pattern Hover and Cover. Make it easy to dismiss the Detail Inlay.

13. a. The organizational issues that affect the acceptance and relevance of information and communication systems. These factors often sit outside the system as such, and may involve individuals who

never use it. Cooperation or conflict The term computer-supported cooperative work (CSCW) seems to assume that groups will be acting in a cooperative manner. This is obviously true to some extent; even opposing football teams cooperate to the extent that they keep (largely) within the rules of the game, but their cooperation only goes so far. People in organizations and groups have conflicting goals, and systems that ignore this are likely to fail spectacularly. Changing power structures The identification of stakeholders will uncover information transfer and power relationships that cut across the organizational structure. Indeed, all organizations have these informal networks that support both social and functional contacts. However, the official lines of authority and information tend to flow up and down through line management. New communications media may challenge and disrupt these formal managerial structures. The physical layout of an organization often reflects the formal hierarchy An email system has no such barriers; it is as easy to chat to someone in another department as in your own. Face-to-face conversation, the manager can easily exert influence over a subordinate Technology can be an important vector of social change, but if violent reaction is to be avoided, the impact of the technology must be assessed before it is introduced. In the short term, solutions must be carefully matched to the existing social and organizational structures. The

invisible worker The ability to work and collaborate at a distance can allow functional groups to be distributed over different sites. This can take the form of cross-functional neighbourhood centers, where workers from different departments do their jobs in electronic contact with their functional colleagues. Alternatively, distributed groupware can allow the true home-based teleworker to operate on similar terms to an office-based equivalent. The ecological and economic advantages of such working practices are now becoming well established, and it seems that communications and CSCW technology can overcome many of the traditional barriers. Free rider problem. In economics, the free rider problem occurs when those who benefit from resources, goods, or ervices do not pay for them, which results in an under-provision of those goods or services. The free rider problem is the question of how to limit free riding and its negative effects in these situations. The free rider problem may occur when property rights are not clearly defined and imposed. The free rider problem is common among public goods. These are goods that have two characteristics non-excludability non-paying consumers cannot be prevented from using it and non-rivalry when you consume the good, it does not reduce the amount available to others. The potential for free riding exists when people are asked to voluntarily pay for a public good. Critical mass A critical mass is the smallest amount of

fissile material needed for a sustained nuclear chain reaction. The critical mass of a fissionable material depends upon its nuclear properties (specifically, the nuclear fission cross-section), its density, its shape, its enrichment, its purity, its temperature, and its surroundings. The concept is important in nuclear weapon design. Automating processes  workflow and BPR Organizations have many such processes, and workflow systems aim to automate much of the process using electronic forms, which are forwarded to the relevant person based on pre-coded rules. Some workflow systems are built using special purpose groupware, often based on a notation for describing the desired workflow. A more radical approach to organizational processes is found in business process re-engineering (BPR). Traditionally, organizations have been structured around functions sales, accounts, stores, manufacturing. However, the purpose of an organization can be seen in terms of key business processes. Evaluating the benefits We have seen several problems that can arise from the mismatch between information systems and organizational and social factors. The benefits from cooperative systems, especially organization-wide systems such as email or electronic conferencing, are in terms of job satisfaction or more fluid information flow. The benefits are difficult to quantify, but, over

time, it has become clear that the competitive edge of information technology is necessary for survival in the modern world.

14. a. The first layer that you have any control over is the choice of application framework. Application frameworks often run on top of operating systems, sharing core services such as communications, messaging, graphics, location, security, authentication, and many others. Java Applications written in the Java ME framework can often be deployed across the majority of Javabased devices, but given the diversity of device screen size and processor power, cross-device deployment can be a challenge.Most Java applications are purchased and distributed through the operator, but they can also be downloaded and installed via cable or over the air. S60 The S60 platform, formerly known as Series 60, is the application platform for devices that run the Symbian OS. S60 is often associated with Nokia devices Nokia owns the platform but it also runs on several non-Nokia devices. S60 is an open source framework.S60 applications can be created in Java, the Symbian C++ framework, or even Flash Lite. BREW Applications written in the BREW application framework can be deployed across the majority of BREW-based devices, with slightly less cross-device adaption than other frameworks.However BREW applications must go through a costly and timely certification process and can be distributed only through

an operator. Flash Lite Adobe Flash Lite is an application framework that uses the Flash Lite and ActionScript frameworks to create vector-based applications. Flash Lite applications can be run within the Flash Lite Player, which is available in a handful of devices around the world.Flash Lite is a promising and powerful platform, but there has been some difficulty getting it on devices. A distribution service for applications written in Flash Lite is long overdue. Windows Mobile Applications written using the Win32 API can be deployed across the majority of Windows Mobilebased devices. Like Java, Windows Mobile applications can be downloaded and installed over the air or loaded via a cable-connected computer. Cocoa Touch Cocoa Touch is the API used to create native applications for the iPhone and iPod touch. Cocoa Touch applications must be submitted and certified by Apple before being included in the App Store. Once in the App Store, applications can be purchased, downloaded, and installed over the air or via a cableconnected computer. Android SDK The Android SDK allows developers to create native applications for any device that runs the Android platform. By using the Android SDK, developers can write applications in C C++ or use a Java virtual machine included in the OS that allows the creation of applications with Java, which is more common in the mobile ecosystem. Web Runtimes (WRTs) Nokia,

Opera, and Yahoo! provide various Web Runtimes, or WRTs. These are meant to be miniframeworks, based on web standards, to create mobile widgets. Both Operas and Nokias WRTs meet the W3C-recommended specifications for mobile widgets.Although WRTs are very interesting and provide access to some device functions using mobile web principles, Ive found them to be more complex than just creating a simple mobile web app, as they force the developer to code within an SDK rather than just code a simple web app. And based on the number of mobile web apps written for the iPhone versus the number written for other, more full-featured WRTs, I dont think Im alone in thinking this. WebKit With Palms introduction of webOS, a mobile platform based on WebKit, and given its predominance as a mobile browser included in mobile platforms like the iPhone,Android, and S60, and that the vast majority of mobile web apps are written specifically for WebKit, I believe we can now refer to WebKit as a mobile framework in its own right.WebKit is a browser technology, so applications can be created simply by using web technologies such as HTML, CSS, and javaScript. WebKit also supports a number of recommended standards not yet implemented in many desktop browsers.Applications can be run and tested in any WebKit browser, desktop, or mobile device. The Web The Web is the only application framework that works across virtually all devices

and all platforms. Although innovation and usage of the Web as an application framework in mobile has been lacking for many years, increased demand to offer products and services outside of operator control, together with a desire to support more devices in shorter development cycles, has made the Web one of the most rapidly growing mobile application platforms to date.

15. a. Interactive Single-Page Process The Gap accomplishes in product selection in shopping in a single page using Interactive Single-Page Process. Example On one page, the user selects a shirt and its color and size. After submitting the choice, a new page is displayed. Only when the user arrives at this second page does he find out that the true navy shirt is not available in the medium size. The purple shirt is available in all sizes from XS to XXXL. Hovering over the dark blue shirt immediately discloses that this color is only available in XS and S sizes. Considerations There are some issues to consider when using an Interactive Single-Page Process. Responsiveness The users taste preference comes first. Either the color or the size can be chosen. If the item is out of stock for any color size combination, it is displayed as unavailable. By placing this process in a few simple interactions, the user can quickly find something available to buy. With any online shopping experience, the potential for the user to bail out is a real concern. In-place

interactions like this reduce these bailout moments. Amazons interface for selecting a shirt also uses Interactive Single-Page Process with a slightly different interface Interactive, single-page process flows improve user engagement and increase conversion rates. Keeping users engaged Broadmoor Hotel uses Interactive Single-Page Process for room reservations. Each column represents what would normally be presented on a separate page. In the first column, a calendar discloses availability up front. This prevents scheduling errors. Selecting the room from the second column updates both the room picture and the pricing. The pricing is reflected back on the calendar days as well as in the third column where credit card and contact information is entered. Benefits Adobe calls out the Broadmoor one-page reservation interface in its Adobe Showcase. It states the benefits of this method Reduces entire reservation process to a single screen. Reduces the number of screens in the online reservation process from five to one. Other online reservation applications average 5 to 10 screens. Seventy-five percent of users choose One Screen in favor of the HTML version. Allows users to vary purchase parameters at will and immediately view results. Reduces the time it takes to make a reservation from at least three minutes to less than one. Inline Assistant Process Common place where multiple pages are used to complete a process is when adding

items to a shopping cart. Instead of thinking about the cart as a process, we can think about it as a real-world object. Given this mindset, the cart can be realized in the interface as an object and be made available on the page. The Gap employed an Inline Assistant Process pattern for its shopping cart when it relaunched its site a few years back_Considerations There are some things to consider when using the Inline Assistant Process. Quick and easy The Gap integrates the shopping cart into its entire site as a drop-down shade. In fact, the Gap, Old Navy, Banana Republic, and PiperLime all share the same Inline Assistant Process-style shopping cart. The Gap is betting that making it quick and easy to add items to the cart across four stores will equal more sales. Additional step Amazon is betting on its recommendation engine. By going to a second page, Amazon can display other shirts like the one added as well as advertise the Amazon.com Visa card. Blending quick and easy with the additional step Netflix does when a user adds movies to his shipping queue. Each movie on the site has an Add button. Clicking Add immediately adds the movie to the users queue. As a confirmation and an opportunity for recommendations, a Dialog Overlay is displayed on top of the movie page. Just like Amazon, Netflix has a sophisticated recommendation engine. The bet is that since the user has expressed interest in an item (shirt or movie), the

site can find other items similar to it to suggest. Amazon does this in a separate page. Netflix does it in an overlay that is easily dismissed by clicking anywhere outside the overlay (or by clicking the close button at the top or bottom). In a previous version of Netflix (or if JavaScript is disabled), this becomes a multiple page experience Each movie add leads to a separate recommendation page. Clicking on Add for a movie on a recommendation page takes the user to a secondary recommendation page. This process can continue, on and on. Eventually, the user has to hit the back button a number of times to get back to the original context.

16. a. Color The fifth design element, color, is hard to talk about in a black-and-white book. Maybe it is fitting, because it wasnt that long ago that mobile screens were available only in black and white (well, technically, it was black on a green screen). These days, we have nearly the entire spectrum of colors to choose from for mobile designs. The most common obstacle you encounter when dealing with color is mobile screens, which come in a number of different color or bit depths, meaning the number of bits (binary digits) used to represent the color of a single pixel in a bitmapped image. When complex designs are displayed on different mobile devices, the limited color depth on one device can cause banding, or unwanted posterization in the image. Different devices have different color

depths. The psychology of color People respond to different colors differently. It is fairly well known that different colors produce different emotions in people, but surprisingly few talk about it outside of art school. Thinking about the emotions that colors evoke in people is an important aspect of mobile design, which is such a personal medium that tends to be used in personal ways. Using the right colors can be useful for delivering the right message and setting expectations.

Color palettes Defining color palettes can be useful for maintaining a consistent use of color in your mobile design. Color palettes typically consist of a predefined number of colors to use throughout the design. Selecting what colors to use varies from designer to designer, each having different techniques and strategies for deciding on the colors. Ive found that I use three basic ways to define a color palette Sequential In this case, there are primary, secondary, and tertiary colors. Often the primary color is reserved as the brand color or the color that most closely resembles the brands meaning. The secondary and tertiary colors are often complementary colors that I select using a color wheel. Adaptive An adaptive palette is one in which you leverage the most common colors present in a supporting graphic or image. When creating a design that is meant to look native on the device, I use an adaptive palette to make sure that my colors are

consistent with the target mobile platform. Inspired This is a design that is created from the great pieces of design you might see online, as shown in offline, in which a picture of the design might inspire you. This could be anything from an old poster in an alley, a business card, or some packaging. When I sit down with a new design, I thumb through some of materials to create an inspired palette. Like with the adaptive palette, you actually extract the colors from the source image, though you should never ever use the source material in a design. Typography The sixth element of mobile design is typography, which in the past would bring to mind the famous statement by Henry Ford Any customer can have a car painted any color that he wants so long as it is black. As devices improved, so did their fonts. Higher-resolution screens allowed for a more robust catalog of fonts than just the device font. First, lets understand how mobile screens work. Subpixels and pixel density There seem to be two basic approaches to how type is rendered on mobile screens using subpixelbased screens or having a greater pixel density or pixels per inch (PPI).A subpixel is the division of each pixel into a red, green, and blue (or RGB) unit at a microscopic level, enabling a greater level of antialiasing for each font character or glyph. The addition of these RGB subpixels enables the eye to see greater variations of gray, creating sharper antialiasing and crisp text. Type options

Fortunately, todays mobile devices have a few more options than a single typeface, but the options are still fairly limited. Coming from web design, where we have a dozen or so type options, the limited choices available in mobile design wont come as a big surprise. when creating mobile designs for either web or native experiences, my advice is to stick with either the default device font, or web-safe fonts your basic serif variants like Times New Roman and Georgia or sans-serif typefaces like Helvetica, Arial, or Verdana. Font replacement The ability to use typefaces that are not already loaded on the device varies from model to model and your chosen platform. Some device APIs will allow you to load a typeface into your native application. Some mobile web browsers support various forms of font replacement; the two most common are sIFR and Cufon. sIFR uses Flash to replace HTML text with a Flash representation of the text, but the device of course has to support Flash. Cufon uses JavaScript and the canvas element draws the glyphs in the browser, but the device of course needs to support both JavaScript and the canvas element. In addition, the font-face CSS rule allows for a typeface file to be referenced and loaded into the browser, but a license for web use is usually not granted by type foundries. Readability The most important role of typography in mobile design is to provide the user with excellent readability, or the ability to clearly

follow lines of text with the eye and not lose ones place or become disoriented.. This can be done by following these six simple rules Use a high-contrast typeface Remember that mobile devices are usually used outside. Having a high contrast typeface with regard to the background will increase visibility and readability. Use the right typeface The type of typeface you use tells the user what to expect. For example, a sans-serif font is common in navigation or compact areas, whereas serif typefaces come in handy for lengthy or dense content areas. Provide decent leading (rhymes with heading) or line spacing Mobile screens are often held 10 12 away from the eye, which can make tracking each line difficult. Increase the leading to avoid having the users lose their place. Leave space on the right and left of each line; dont crowd the screen Most mobile frameworks give you full access to the screen, meaning that you normally need to provide some spacing between the right and left side of the screens edge and your text not much, typically about three to four character widths. Generously utilize headings Break the content up in the screen, using text-based headings to indicate to the user what is to come. Using different typefaces, color, and emphasis in headings can also help create a readable page. Use short paragraphs Like on the Web, keep paragraphs short, using no more than two to three sentences per paragraph. Graphics The final design element is graphics, or the

images that are used to establish or aid a visual experience. Graphics can be used to supplement the look and feel, or as content displayed inline with the text.For example, in figure, you can see Ribots Little Spender application for the iPhone and the S60 platform. The use of graphical icons in the iPhone experience helps to establish a visual language for the user to interact with to quickly categorize entries.On the S60 application, the wallet photo in the upper-right corner helps communicate the message of the application to the user. Iconography The most common form of graphics used in mobile design is icons. Iconography is useful to communicate ideas and actions to users in a constrained visual space. The challenge is making sure that the meaning of the icon is clear to the user. For example,looking at figure, you can see some helpful icons that clearly communicate an idea and some perplexing icons that leave you scratching your head.

Photos and images Photos and images are used to add meaning to content, often by showing a visual display of a concept, or to add meaning to a design. Using photos and images isnt as common in mobile design as you might think. Because images have a defined height and width, they need to be scaled to the appropriate device size, either by the server,using a content adaptation model, or using the resizing properties of the device. In the latter approach, this can have a cost in performance. Loading larger images takes longer and

therefore costs the user more. Using graphics to add meaning to a design can be a useful visual, but you can encounter issues regarding how that image will display in a flexible UI for example, when the device orientation is changed.