

4

Evaluation and User Support

4.1 : Evaluation of User Interfaces

Q.1 What are the increasing importance of user interfaces ?

Ans. : Importance are as follows:

- Users' demands on software have changed; they expect to be able to sit down and use software without spending their time reading manuals.
- Empirical results show that attention to usability dramatically decreases costs and increases productivity.
- Poor user interfaces have contributed to disasters, including loss of life.

Q.2 Explain subjective evaluation method.

Ans. : • Subjective evaluation methods are directly based on the user's judgment. The user is the source of the evaluation, possibly even its initiator.

- The user of a system is asked questions about certain system properties. The answers are based on the user's accumulated experience.
- A distinction must be made between oral and written questions. In addition, the "thinking aloud" method should be mentioned.
- In this method, the users perform a task while giving verbal expression to their thoughts, problems, opinions, and so forth, all of which provide the evaluator with indicators for interpreting the test.

- This approach may seem artificial to the user, and one alternative is the "constructive interaction" method, in which two users work together on a task and "tell" each other what they are feeling, doing, or intending to do, and so on.
- This generates data in a more "natural" manner. Subjective evaluation methods tend to yield subjective data rather than objective data.
- The advantages of subjective methods are those of low cost, ease of implementation, an ability to pinpoint unstructured problems, and so forth.
- The drawbacks are a tendency to produce exaggerations, the difficulty in avoiding leading questions, a plethora of data, which makes evaluation a costly matter, and the low regard in which such methods are held by those questioned.
- Examples of subjective evaluation methods based on written questions and answers that can be practically applied are the "questionnaire for user interaction satisfaction or the "evaluation checklist".

Q.3 Write short note on Expert Review.

Ans. : • Expert reviews are a method of evaluating user interface design. They provide an efficient way of developing insight into usability problems, but should not by themselves supplement other methods of evaluation.

- Expert reviewers should consist of two types of experts: Domain/Application experts and User-Interface Design experts.
- Expert-Review Methods are as follows:
 1. Heuristic Evaluation - The expert(s) check the interface to determine if it violates any of the rules specified in the design heuristics, such as the eight golden rules. This method has become quite popular because it doesn't take very much time to

- complete and requires only a small number of experts.
2. Guidelines Review - The expert reviewer(s) check the interface for conformance with the organizations design guidelines. Because organizational guidelines can consist of hundreds or even thousands of items, this process can take from days to weeks to completely review.
 3. Cognitive Walkthrough - A group of experts navigate through a series of typical tasks that the user may perform to determine if any areas of the interface are unclear or confusing. During this type of review, it is important that the experts have a clear understanding of who the targeted users are so they can determine areas that may be problematic to the users.
 4. Consistency Inspection - The experts check for interface-wide consistency in language, fonts, colors, layout, logos, etc. There are tools available to automate this process.
 5. Formal Usability Inspection - The expert reviewers, designers, and managers involved hold a meeting to discuss the interface, screen by screen. The experts give their input while the designers are allowed justify/defend their design choices based on previous usability tests.

Q.4 List the advantages and disadvantages of Expert Review and usability testing.

Ans. : Advantages of Expert Review :

1. Only requires one or two experts
2. Quickest and shortest method
3. Least expensive
4. No users are involved, so you avoid the cost, effort, and time involved in recruiting, scheduling, and running sessions

Disadvantages of Expert Review :

1. The quality and reliability of the findings and recommendations depends on the quality, knowledge, and experience of the expert

2. Doesn't involve users, so it can't find problems that are only found by the end users of the system

Advantages of Usability Testing :

1. The interface is evaluated by actual users, which makes the findings more relevant to improving the experience of end users
2. Finds problems that only the end users of the application can find

Disadvantages of Usability Testing :

1. Requires the time, cost, and effort to recruit, schedule, and run sessions with participants
2. Only finds problems based on the tasks you test, which might not cover the full spectrum of how people would actually use the application
3. It doesn't provide in-depth information about the users and the context in which they perform their tasks

Q.5 When to use usability testing and expert review ?

Ans. : • Usability testing can be used to evaluate an early design concept, a prototype, or a completed interface.

- Ideally, usability testing should be used throughout a design process to evaluate a design and make changes based on the problems found.
- Expert reviews are a good first step to clean up an interface.
- They're not a substitute for testing an application with users, but they are good at finding and eliminating the basic problems.

Q.6 Explain types of Evaluation

Ans. : • Evaluations is classified into three broad categories, depending on the setting, user involvement, and level of control.

These are :

1. Controlled settings involving users : users' activities are controlled in order to test hypotheses and measure or observe certain behaviors. The main methods are usability testing and experiments. Examples are laboratories and living labs

2. Natural settings involving users : there is little or no control of users' activities in order to determine how the product would be used in the real world. The main method used is field studies. Examples are online communities and products that are used in public places
3. Any settings not involving users: consultants and researchers critique, predict, and model aspects of the interface in order to identify the most obvious usability problems. The range of methods includes inspections, heuristics, walkthroughs, models, and analytics.

4.2 : Web Browsers

Q.7 Explain static and dynamic web content.

Ans. : Static Web Content

- i. **The message and the medium :** On the web documents, users want to see the information and to retrieve it, which have an influence on design. The paper copy of information does not have the same inbuilt hypertext and active capabilities as the web page.
- ii. **Text :** The text information on web can be presented with different fonts, styles, colors, sizes in order to make the text more attractive and readable as per importance of text in the context.
- iii. **Graphics :** There are a number of sites on the web that contain archives of graphical images, icons, backgrounds and so on. There are also paint and image manipulation packages available on almost all computer systems, and scanners and digital cameras, where available, enable the input of photographs and diagrams.
- iv. **Movies and sound :** Movies and sound are both available to users of the web, and hence to the page designers. It is made available with the help of different file formats.

Dynamic Web Content

- i. *The active web* : This type involves complex forms of interactions on web. The actual content may be fixed, but the user can change the form of presentation. The web pages can be generated from database contents, and the database information can be updated through the web.
- ii. *Fixed content - local interaction and changing view* : Probably the most overestimated aspect of the web in recent years has been Java. In fact, Java can be used to write server-end software and platform independent standalone programs.
- iii. *Search* : The user's keywords are submitted to the server using an HTML form; they are compared against pre-prepared indexes at the server.
- iv. *Dynamic content* : The content of the web pages reacts to and is updateable by the web user in dynamic web context. The user interacts through a web browser with a web server. The Java Servlet Pages (JSP) and Java Enterprise Beans (JEB) is used for this purpose. There is use of 'business logic' in the data processing for e.g. online banking. These Java Enterprise Beans takes data from corporate database using JDBC connections.

Q.8 What is Browser safe palette and Browser-safe colors ?

Ans. : **Browser safe palette :**

- A website color palette is the combination of colors you choose for your site's design. You'll stick to using these colors throughout your whole site
- Color is displayed on your monitor with a combination of Red, Green and Blue values. The RGB values for each color within this palette are all formed from variations of the RGB number values 00, 51, 102, 153, 204 and 255.
- The hexadecimal code values for each color are all formed with variations of the hex code values 00, 33, 66, 99, CC and FF.



DECODE® @ Less than PHOTOCOPY Price

- These colors were chosen from a mathematical color cube based on multiplying six values of six colors (red, green, blue, cyan, magenta, and yellow).
- This is why the browser-safe palette is sometimes called the $6 \times 6 \times 6$ palette.
- It's also frequently called Netscape palette, Explorer palette, Color cube, Web color, and Web safe.
- Whenever you see these terms, it usually refers to the colors browsers impose on end-users viewing the Web on an 8-bit system.
- If you design your Web graphics and color schemes with the Browser-safe color palette, your site will not be prone to unexpected color shifting or dithering on 8-bit systems.

Browser-safe colors :

- The color management system currently used by Web browser software is based on an 8-bit, 216-color palette.
- The browser-safe color palette is a solution devised by Netscape to solve the problem of displaying color graphics in a similar way on many kinds of display screens, with browsers running under different operating systems.
- Because a majority of the Web audience years ago had 8-bit display screens, 256 colors was the upper limit for the color palette. But the various versions of the Windows operating system reserve 40 colors for displaying such graphic interface elements as windows, menus, screen wallpaper, icons, and buttons, which leaves just 216 colors to display everything else.
- The 216 colors chosen by Netscape are identical in both the Macintosh and Windows system palettes. Although the browser-safe color scheme originated at Netscape, at present both of the dominant Web browsers use the same color management system.



@ Less than PHOTOCOPY Price

- Most Web users have computers and monitors set to "thousands" or "millions" of colors, so the importance of the so-called Web-safe palette has sharply diminished in the past few years.
- When the user has a monitor set to thousands or millions of colors all colors display properly, so there is no longer any need to restrict your color choices to the 216 Web-safe colors.

Q.9 How do you go about identifying requirements ?

Ans. : • Requirements discovery is highly proactive, interactive, and, well, sometimes hyperactive. You are engaged in eliciting, analyzing, specifying, prototyping, and testing.

- Elicitation includes interviews, existing documentation study, exploratory prototypes, facilitated workshops, focus groups, observation, surveys and user task analysis.
- There are a number of specific techniques within each of these general categories, and some techniques overlap. Analyzing involves using lightweight models, often combined with specifications, which are often in the form of acceptance tests or prototypes or both.
- It's not enough to get the right people together and ask the right questions. To communicate efficiently and effectively about how to deliver, product partners need a focused way to communicate and make decisions together.
- Then evaluate many options in terms of value. This means having shared understanding of what value really means at that point in time. Once they have narrowed the list of options through the evaluation process, they confirm how they will verify and validate these candidate solutions with unambiguous acceptance criteria.
- The validation includes how to test that they delivered the right requirements, and that they achieved the anticipated value from each delivery

Q.10 Explain adaptive and responsive web design.

Ans. : • Adaptive design will ensure the best user experience according to whichever device the user is using to interface.

- A screen "flows" from desktop design into a smaller device's, adaptive design offers tailor-made solutions.
- As the name suggests, they adapt to the user's situational needs and capabilities.
- A strength of adaptive design is that it feels more relevant to the modern user experience, whereas responsive design shows a more desktop-centric approach.
- You can also design to optimize advertisements for your relevant user interfaces with adaptive design. Because you're designing for different resolutions , you can access your user's specific needs.
- Responsive design is easier and takes less work to implement. It affords less control over your design on each screen size, but it's by far the preferred method for creating new sites at this moment
- Responsive designers create a single design to be used on all screens and will generally start in the middle of the resolution and use media queries to determine what adjustments will be made for the lower and higher end of the resolution scale.
- This tends to make users happy, because that familiar web design seems guaranteed to translate across to any device's screen. Uniformity and seamlessness are crucial considerations in providing a good user experience.
- Download times vary between desktop and mobile devices. The flexibility of images is a big consideration here. A large design that comes through quickly on the big screen at home or in the office takes more time (and data) to appear on your mobile

4.3 : Mobile Device Issues

Q.11 What is mobile ergonomics ? List the ergonomics guidance for Mobile Devices

Ans. : • Designing for mobile ergonomics requires that we pay attention to device dimensions as well as the pragmatic concerns of touch screens.

- The way a user holds a device and touches the screen, for example, influences how easy it is for that user to reach parts of the screen.
- Hit areas, or “areas of the screen the user touches to activate something” require adequate space for the user to accurately press.
- The average fingertip is between one to two centimeters wide, which roughly correlates to somewhere between 44px and 57px on a standard screen and 88px to 114px on a high-density (“retina”) screen.
- Nokia, Apple and Microsoft each recommend slightly different sizes to account for the nature of touch screens.

Guidance for Mobile Devices :

- Emerging mobile phone and tablet technology has created convenient access to email, Internet, and text messaging.
- Phone Setup : Use hands free devices to eliminate awkward, static postures during long phone calls.
- Tablet Setup : For extensive text entry (e.g. emails, meeting notes), use a separate keyboard and prop the tablet on a stand to improve the viewing angle.
- Sync the tablet with a compatible computer monitor or television to improve neck posture and increase screen size. Place the tablet keyboard in a position that allows the shoulders to relax and the elbows to rest at the sides.

Work Practices

- Limit duration and frequency of calls, texts, and emails. Take frequent micro-breaks from phones/tablets.
- Alternate fingers when using buttons/touch screens.
- Reduce keystrokes with text shortcuts or where feasible, use speech-recognition applications.
- Maintain neutral wrist posture and alternate hands when holding devices. For tablets, consider cases with hand straps to reduce gripping.
- Focus on neck posture - avoid excessive looking down when reading emails or texts

Q.12 List and explain challenges in HCI design for mobile devices.

Ans. : • Challenges in HCI design for mobile devices are of hardware and software.

Hardware Challenges

- Due to the limitations of size and weight for portability purpose, the interface design for mobile devices comes with more hardware challenges.
- These challenges include limited input facilities, limited output facilities, and designing for mobility.
- There are 3 main inputs in current mobile device : Keyboard, Stylus on the touch screens and Scroll wheel
- The keyboard allows a user to hit a key to perform a task or navigate through the mobile menu functionalities; the stylus with the touch screen allows a user to hit the screen to do the task; the scroll wheel can be scrolled and pushed by a user to do a task and also navigate through the menus and submenus.
- The design of keyboards for mobile devices has been a challenge because the space for key installation on a mobile device is limited.

- Touch input would be problematic if the screen of a mobile device is small and that would lead a user's fingers to occlude the graphical elements he wishes to work with.
- Scroll wheel can be used to navigate a mobile device menu in one direction, either horizontally or vertically. It can also be used as a push button to do a specific task to support the use of one hand to interact with the mobile device.
- Limited output facilities: The small-sized screen is one of the mainly and most commonly used output facilities for mobile devices. Designing the screen for outputting is a trade-off challenge that needs to be experimentally studied to find out which is the efficient and most effective size of the screen that can be used for the different types of mobile devices

Software Challenges

- System Of menus: taking a successful design from a desktop and apply it to a mobile device without a clear understanding of the translation inputs and outputs can lead to an ineffective interaction design.
- The mainly and widely used alternative is the use of hierarchical menus. With a hierachal menu, a user can select a menu item that can then open another submenu; and so on until the user reaches the desired function he or she is aiming to reach.
- Navigating and browsing: to display information that is well suited for larger screens, the information has to be segmented into many small presentation units that can fit into the small screen of mobile devices. And this makes it difficult to effectively organize information and help users navigate to and from the information they want.
- Images and Icon: display of graphical content described by raster and vector graphics on mobile devices to allow appropriate and resource-saving implementations

Q.13 How to choose breakpoints ?

Ans. : • Do not define breakpoints based on device classes.

- Defining breakpoints based on specific devices, products, brand names, or operating systems that are in use today can result in a maintenance nightmare. Instead, the content itself should determine how the layout adjusts to its container.
- Create breakpoints based on content, never on specific devices, products, or brands.
- Design for the smallest mobile device first; then progressively enhance the experience as more screen real estate becomes available.
- Keep lines of text to a maximum of around 70 or 80 characters.
- Pick major breakpoints by starting small
- Design the content to fit on a small screen size first, then expand the screen until a breakpoint becomes necessary. This allows you to optimize breakpoints based on content and maintain the least number of breakpoints possible.
- Pick minor breakpoints when necessary

Q.14 Explain the following related to mobile device :

Ans. : a) Small screen b) Single windows c) Touch screen

a) Small screen :

- Screen size is a serious limitation for mobile devices. The content displayed above the fold on a 30 inch monitor requires 5 screenfuls on a small 4-inch screen.
- Thus, mobile users must incur a higher interaction cost in order to access the same amount of information;
- They must rely on short-term memory to refer to information that is not visible on the screen.

- Users come to a site to find information that they need or to accomplish a task, not to contemplate the beauty of buttons, navigation, menus, and other design elements.
- Content is always of interest, but whereas on desktop there is enough screen space for both content and chrome to coexist, often, on mobile, designers must downplay the chrome to make space for essential content.

b) Single windows :

- Although some phone manufacturers are trying to accommodate multiple windows on the screen at the same time, the limited size of the mobile screen makes that goal quite unpractical, even with today's larger-screen phones.
- The vast majority of users only see a single window at a time; they cannot split the screen and work with two different apps simultaneously.
- The single-window constraint means that design should be self-sufficient: Any mobile tasks should be easy to complete in a single app or on a single website.
- Users should not have to leave an app or website to find information that the app requires, but that it does not provide.
- If users must move information from one app to another, it's likely that they will need to copy-and-paste it ; the interaction will become more complex and error prone.
- Apps and websites should be self-sufficient and should not necessitate any external props, be them physical or virtual.

c) Touch screen :

- Touch screens come with many blessings. Gestures represent a hidden, alternate User Interface (UI), that, when built with the right affordances, can make the interaction fluid and efficient and can save screen real estate.



@ Less than PHOTOCOPY Price

- But they also suffer from low memorability and discoverability. On the other hand, it's hard to type proficiently on a tiny virtual keyboard and it's easy to accidentally touch the wrong target.
- Perhaps the biggest problem is related to typing: on a soft keyboard, users need to continuously divide attention between the content that they are typing and the keypad area.
- Touch typing is impossible in the absence of haptic feedback; plus, keypads themselves are small and keys are crowded.
- Because on a touch screen there can be many target areas, it is easy to make accidental touches. Some can leave the user disoriented and unsure of what happened. Undo is one of the original 10 usability heuristics, and it is even more important on touch devices.

Q.15 Explain Mobile Information Architecture.

Ans. : • Mobile devices have their own set of Information Architecture patterns.

- While the structure of a responsive site may follow more "standard" patterns, native apps, for example, often employ navigational structures that are tab-based.
- Again, there's no "right" way to architect a mobile site or application. Instead, let's take a look at some of the most popular patterns: Hierarchy, Hub & spoke, Nested doll, Tabbed view, Bento box and Filtered view.
- Fig. Q.15.1 shows mobile information architecture hierarchy.

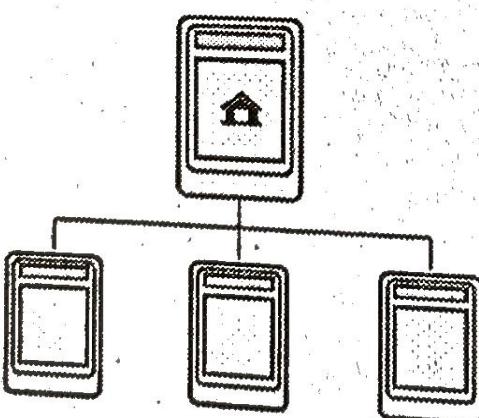


Fig. Q.15.1 Hierarchy

- **Hierarchy** : The hierarchy pattern is a standard site structure with an index page and a series of sub pages. If you are designing a responsive site you may be restricted to this, however introducing additional patterns could allow you to tailor the experience for mobile.
- **Hub & spoke** : A hub and spoke pattern gives you a central index from which users will navigate out. It's the default pattern on Apple's iPhone. Users can't navigate between spokes but must return to the hub, instead. Fig. Q.15.2 shows hub and spokes.

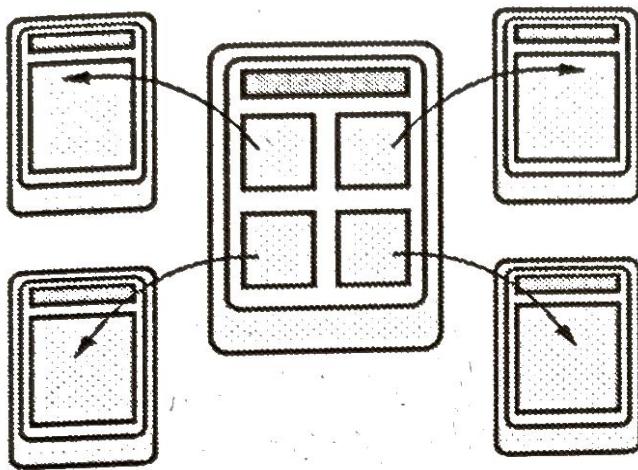


Fig. Q.15.2 Hub and Spokes

- **Nested doll** : The nested doll pattern leads users in a linear fashion to more detailed content. When users are in difficult conditions this is a quick and easy method of navigation. It also gives the user a strong sense of where they are in the structure of the content due to the perception of moving forward and then back
- **Tabbed view** : This is a pattern that regular app users will be familiar with. It's a collection of sections tied together by a toolbar menu. This allows the user to quickly scan and understand the complete functionality of the app when it's first opened.
- **Bento Box/Dashboard** : The bento box or dashboard pattern brings more detailed content directly to the index screen by using components to display portions of related tools or content. This pattern is more suited to tablet than mobile due to its complexity.

Q.16 What are the challenges of designing web pages for mobile device ?

Ans. : Challenges are as follows :

- Screen shape - most smart phone users hold their phones vertically, in portrait mode. This means the screen is taller than it is wide, the opposite of a desktop computer or laptop.
- Screen size – smart phones have very small screens compared to desktop computers, so designers need to make the pages simpler. Different models have different screen sizes, but as a rule of thumb aim for 340px as a maximum width for your mobile portrait design.
- User interactions - mobile phones do not have a mouse, so effects that appear "on hover" or "on blur" don't work.
- Navigation - the majority of websites tend to have a full-width top navigation bar which doesn't work at all on a smart phone in portrait mode.
- Lower bandwidth - it depends whether you're in the middle of a city or the countryside, but mobile users on a cellular connection can have slower internet speeds. You may want to replace the full-screen background video on the mobile version of your site.

END ... 