

The Crucial Part of a Software Product from the User's Perspective: A Lesson for User Interface Designers

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Abstract: The emergence of touch screen interfaces and devices have changed the orientation of application users. No computer application user looks for the text-based/command driven applications again. This research paper seeks to show that computer application users are much more concerned with the effectiveness of the user interface of the applications they use than any other part of the application. The work has taken a study of the evolution of computer application interfaces, both in convenience and complexities through materials from secondary sources and interaction with experienced practitioners in software industry. The research has shown that application users tend to focus more on how easily and effectively they can navigate through the application than any other functionality of the application. It then recommends that application developers should not pay less attention to user interface part of their software to enable their products appeal to their clients-the application users.

Key word: User Interface • Menu-Driven • GUI • Touch Screen • Animation • Voice Command

INTRODUCTION

Computer applications are widely sought products. They are needed and used on second-by-second basis by both computer and non-computer experts. To this end, Computer programmers and applications developers are usually faced with a lot of challenges while developing/creating computer applications. Every application user wants the best experience while using the software product and as well wants the most efficient and error free output from the product. These expectations of the application users place a daunting challenge on applications developers as they work on the products.

The way we interface with a computer is constantly being revised and reinvented. Human ingenuity has brought computer users from the keyboard to the mouse, from the mouse to the trackball, through touch screens and now to voice commands. All these were in attempt to bring about a user computer interface that is convenient, effective and entertaining.

[1] stated that every interaction between an application and the user take place at the interface of the application. So, for the programmer and applications developers to attempt meeting the demand and desires of applications users, the user interface must be effective as well as efficient. The user interface is one of the most

important parts of any program because it determines how easily you can make the program do what you want. A powerful program with a poorly designed user interface has little value. Communication breakdown usually cause problems both in human relationship and other interactions. In line with this, [2] observed that most computer applications fail as a result of lack of effective communication between the user and the application. If something goes wrong in a system and stakeholders are properly informed, they will prepare for the outcome. In the same manner application users need to know when and what has gone wrong in the applications they are using.

The motivation to carry out this study came as a response to the quest to finding the reasons that made computer applications usage (both mobile and desktop) spread like a wild fire. This could not have been possible if the applications are not giving the users a satisfying experience at both the interface, computation and storage components.

Literature

User Interface Defined: The online Business Dictionary defined User Interface (UI) as the visual part of computer application or operating system through which a user interacts with a computer or a software. The UI determines

how commands are given to the computer or the program and how information is displayed on the screen for the user. [3], refers to User interface as the junction between a user and a computer program. This definition points at the UI as though it is not part of the computer program. Merriam-Webster's Learner's Dictionary defines a user interface as a system that controls the way information is shown to a computer user and the way the user is able to work with the computer. From all these definitions, we can confidently and unmistakably say that the UI is therefore made up of the input and output sections (screens/forms) in a computer program.

The whole essence of producing/developing computer software is to provide tools for a computer user to adapt the computer to their particular area of interest. A User interface is therefore, that part of the computer software product that provides a link or communication between the computer software and the computer user. The user interface of a software application is like a door into an office. If the owner of an office is unable to understand how to open the door to the office, nobody will be able to use the office. The ability to understand and easily navigate through the interface of an application determines how the application user will appreciate the application.

User Interface: Passive or Active Component of the Software: [4], sees the user interface as a passive syntactic mechanism whose purpose is to transfer a user's commands to the processor. This points out that the user interface in itself does not take an active role in the problem solving process like the processor and the user do. But it should be noted that an error at the interface can cause an enormous processing error. Most times, the discussions about the user interface

dwells on those actions which transmit information to the processor which are mainly mouse clicks and keyboard strokes. The discussion should as well move ahead to consider the tremendous potential of the user interface to visually present domain semantics that are too complex to be kept in mental models. That can only be made cognitively accessible in external models that provide a clear visualization of an application's semantics [5].

Types of User Interface: The business dictionary identified three main types of user interfaces namely: Command language, Menus and Graphical user interface (GUI). Other authors have classified UI in their own ways. In this paper, we wish to present UI in three categories namely:

- System driver or application main menu or Home page,
- Input interface and
- Output interface

System Driver Or Application Main Menu Or Home Page: Looking at the system driver, application main menu or home page, a UI can be classified into three thus:

Command Driven Interface: A *command-driven* interface in which the user enter commands at the command prompt. Techopedia explained that Command-driven programs are more efficient but can be difficult to learn. This is true because the user must know the commands and the syntaces for entering them. Many early computing systems and operating systems were command-driven systems and even today, many programmers still use command-driven compilers and interfaces due to their efficiency. Figure 1 presents an MS DOS command prompt for the command driven interface of the Microsoft Disk Operation System.

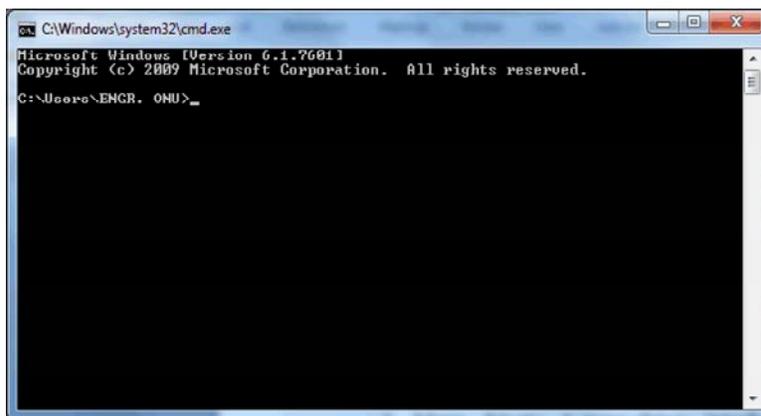


Fig. 1: Command-driven interface of MS-DOS in windows

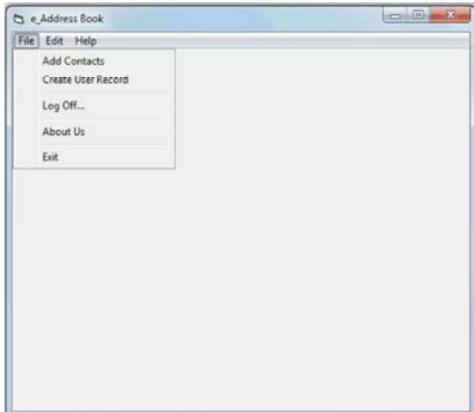


Fig. 2: Sample of a Menu driven interface

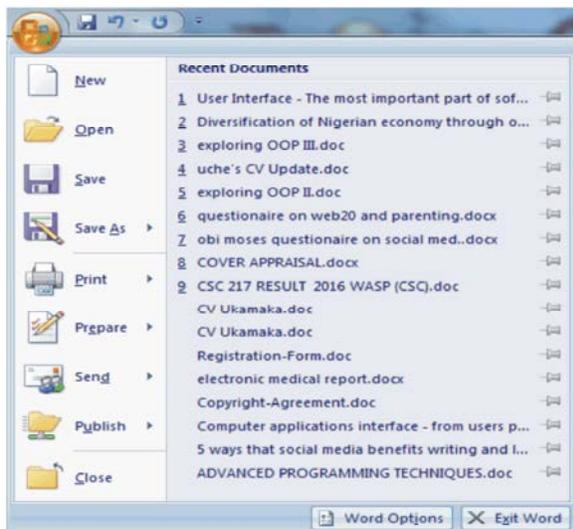


Fig. 3: Graphic user interface (Adapted from Ms Office Word 2007)

Menu Driven Interface: A menu-driven interface is an interface in which the user selects command choices from various menu items displayed on the screen either horizontally or vertically. Figure 2 shows a sample of a menu driven application. The menu items represent the operations available in the software.

Graphical User Interface: Graphical user interface (GUI) use windows, icons, images and pop-up menus to show/present processes and operations in the application. They have become standard on personal computers, hand-held devices and personal digital assistants (PDA). Techopedia explains that GUIs were created in the late 1970s, by Xerox Palo Alto research laboratory and are now common in Windows, Mac OS

and many software applications. The GUI use specially designed and labelled images, pictures, shapes, colour combinations and other objects to represent operations. The objects shown on the computer screen were usually chosen to depict the action that resembled the operation to be performed with them or they were obviously recognized by the user for the action/operations they represent. Today, each operating system (OS) has its own GUI. Software applications use these OS GUIs and additional GUIs of their own to make user interaction a wonderful experience. Figure 3 shows the menu items in home ribbon of Microsoft Office Word 2007

The ease and convenience in the use of GUIs has made them very popular among non-computer experts. And as we all know, there are more non computer expert users of computer applications than career computer users of such applications. Most GUIs have become very stable over the years. The stability of a GUI has important positive benefits to the applications users. For application users, the consistency of interfaces makes it possible for them to build skills which can easily be transferred between applications and platforms. This means that knowing one GUI provides skills that may apply to many other GUIs. That accounted for the popularity of the GUI.

Input Interfaces: Most input interfaces are presented as forms to collect user input data. Modern input forms are usually created with visual elements called controls or objects. The following are the qualities of a good input interface as exemplified in Figure 4.

- Consistency of data entry transactions.
- Minimal input actions by user
- Minimal memory load on user
- Compatibility of data entry with data display
- Flexibility of user control on data entry

Output Interfaces: Output interfaces come inform of dialogue boxes, acknowledgement receipts, reports, etc. Their ordering/rendering depends on the type of output required.

Designing and Creating User Interfaces (Uis): [6] clearly stated that user interfaces for programs have increased in sophistication, with the use of direct manipulation and WYSIWYG (What You See is What You Get) styles, mice, window managers, CLC. This, in turn, has made the programming task more difficult. However, tools to help with user interface software have also become more sophisticated and helpful.

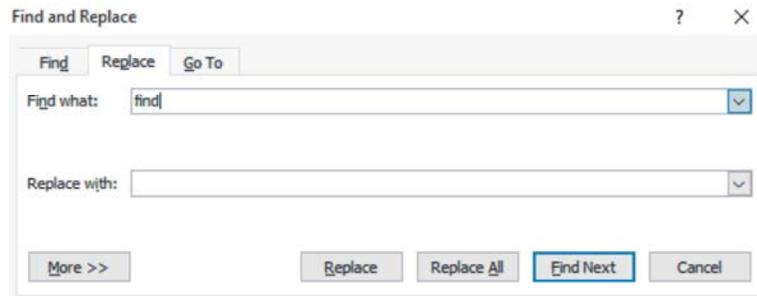


Fig. 4: Sample input interface (Microsoft office, 2007)

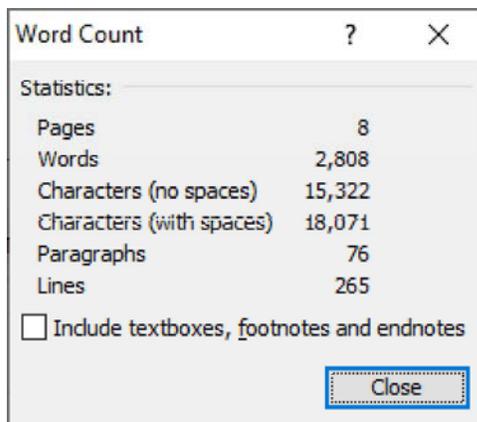


Fig. 5: Sample output interface (adapted from Microsoft Office Word, 2007)

Uis as part of software are designed and created with application implementation tools like programming languages, active-X objects and scripting tools. Visual programming languages have evolved as GUI has become commonplace in both operating systems (OS) and applications software. Users with little or no computer skills can now learn how to use computer applications for word processing, financial computations, inventory, design, artwork or hobbies and games. All thanks to the GUI.

A well-designed user interface insulates the user from the complexities of the underlying technology both software and hardware. It makes it easy for them to perform the intended task. UI designers should note that their personal likes and dislikes may not match those of their users. They will need to validate their ideas with those of their intended users. Most popular applications provide choices to accommodate varying user preferences. For instance, the Microsoft Windows Explorer allows users to copy files with menus, keyboard commands, or by drag-and-drop techniques.

Providing options broadens the acceptability of your application to the users. It is therefore important to keep the application user in mind while designing/creating the user interface of an application.

The UI designer needs to keep the user in mind by answering the following questions.

- How easily can a user discover the various features of the application without instruction?
- How will the application respond when errors occur?
- What will the application provide in terms of help or user assistance?
- Is the design aesthetically pleasing to the user?

As a minimum requirement, a good interface should make all functions accessible to the user by both mouse-clicks, keyboard strokes and/or voice commands.

The Basics of Interface Design: Modern programming languages make it easy to create a user interface by simply dragging controls onto a form and using some code to build intelligence into the controls. To create a desirable UI, a little planning before the actual designing can make a world of difference in the usability of the application. The designer has to consider sketching the interface on paper first. That would enable him to determine which controls/objects are needed, the relative importance of the different elements and the relationships between them. Below are the guiding principles for designing a UI.

Positioning of Controls: In most interface designs, not all elements are of equal importance. Careful design is necessary to ensure that the more important elements are readily apparent to the user. Important or frequently accessed elements should be given a position of

prominence on the interface. While less important elements should be moved to less prominent locations on the interface.

Consistency of Interface Elements: Consistency is a virtue in user interface design. A consistent look and feel creates harmony in an application because everything seems to fit together. A lack of consistency in your interface can be confusing and can make an application seem chaotic, disorganized and cheap. It even causes the user to doubt the reliability of the application. For visual consistency, establish a design strategy and style conventions before you begin your interface design. Design elements such as the types of controls, standards for size and grouping of controls and font choices should be established in advance. You can create prototypes of possible designs to help you make design decisions.

Affordances: *Affordances* are visual clues to the function of an object. Although the term may be unfamiliar, examples of affordances are all around you. A good user interface makes use of affordances. A handgrip on a bicycle has depressions where you place your fingers, an affordance that makes it obvious that it is meant to be gripped. Push buttons, knobs and light switches are all affordances-just by looking at them you can discern their purpose. For instance, the three-dimensional effects used on command buttons make them look like they are meant to be pushed.

Use of White/Blank Space: The use of *white/blank space* in the user interface helps to emphasize elements and improve usability. Consistent spacing between controls and alignment of vertical and horizontal elements can make the design more usable and attractive.

Keep It Simple: Perhaps the most important principle of interface design is simplicity. When it comes to applications, if the interface looks complex, the application is probably difficult to use. Also, from an aesthetic standpoint, a clean, simple design is always preferable.

Using Colours and Images: The use of colours in interface can add visual appeal. With many display units capable of displaying millions of colours, it is tempting to use all these colours. Colour, like the other basic design principles, should be carefully considered in the initial design else it becomes a problem. Individual preferences for colours vary widely. The user's taste may not be the

same as that of the designer. Colour can trigger strong emotions. For international audience, certain colours may have cultural significances. It is usually best to stay conservative, using softer and more neutral colours.

Pictures, Images and Icons: The use of pictures and icons can also add visual interest to your application, but careful use is essential. Images can convey information compactly without the need for text, but images are often perceived differently by different people. Toolbars with icons to represent various functions are a useful interface device, but if the user can not readily identify the function represented by the icon, they can be counterproductive.

Choosing Fonts: Fonts are also an important part of your user interface, because they often communicate important information to the user. You need to select fonts that will be easily readable at different resolutions and on different types of displays. It is best to stick to simple fonts where possible. Complex ones like Scripts and other decorative fonts generally look better in print than on screen and can be difficult to read at smaller point sizes. Too many fonts can leave your application looking like a ransom note.

In summary, a good user interface designer should keep to the following golden rules as outlined by [7].

- Strive for consistency
- Cater for universal usability
- Offer informative feedback
- Design dialogs to yield closure
- Prevent error
- Permit easy reversal of actions
- Support internal locus control
- Reduce short term memory load on user

CONCLUSION

It is an obvious fact that first impression matters. The user interface is the first part of every software and it forms the point of interaction between the software and its user. This paper has provided a lesson for software designers to bear in mind that they should impress their users rather than themselves while designing the interface of their applications. The study has elicited the qualities of good interfaces categorising the interfaces into system driver, input and output interfaces. Also the principles of good interface design have been clearly outlined. Most conspicuously presented is the idea that user interface designers should design with the user in mind.

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