Suggestion: Human Factor Based User Interface Design Tool

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***Abstract*-In this paper, we introduce HFBUIT, Human Factor based user interface tool that enables designers and engineers to create human factor based user interface. This tool will help the designer to utilize the knowledge about the user to configure the interface for different users, i.e. each user may have different skills, level of experience, or cognitive and physical disabilities. The tool makes it easy to know human factors & to reduce the number of usability problems. HFBUIT can be used in real world interface design projects and it will definitely improve the efficiency of the user interface. It focuses that future systems will be usable, efficient and useful.**

Keywords –HFBUIT, Suggestion, User Interface

I. Introduction

The science of understanding the properties of human capabilities include cognitive ergonomics ,usability and Human computer interaction etc. Specific applications can sometimes be used with little difficulty by cognitively impaired users. Part of the reason is the designers have very less knowledge about human factors. Source of knowledge for designers are manuals, technical reports or guidelines etc. But mostly designers want computer based design aids which should be integrated in their design tools. Several user interface tools are available for obvious physical disabilities. To reach the goal designing human factor based user interfaces, the software designer needs excellent **tools.** Especially for graphical and hypermedia user interfaces. These tools should allow the designer to concentrate on the design process and on the quality of the design results. There is a definite need of such tools which help them to design human factor based user interface. Earlier we had introduced framework of HFBUIT . Our HFBUIT framework suggests a wider scope for the designers by concentrating on human factors during the development of user interface[1].

II. Designing of User Interface with the help of Design Aid Tools

The affordances and philosophies of many user interface tools contrast with the nature of the process of designing a user interface. As it can be expected, there are many methodologies, lifecycles, and processes that can be followed in order to design a user interface[2]. It's clear that the user interface design has to be embedded in the software development life-cycle. Today a lot of methods and tools for the application development (e.g. Structured Analysis, Entity-Relationship Model, Structured Analysis and Design Technique, Object-Oriented Method) are available.

Over the years , the human computer interaction community has produced a large number of s/w tools and environment for the design and development of user interfaces[3]. It is therefore somewhat of a paradox that in practice user interface designers have very few options in terms of s/w tools when working on their design projects[2]. Software designers want help / tools which should be integrated in their design tool. To design human factor based user interface , the s/w designers needs excellent tools .These tools should allow the designer to concentrate on the design process and on the quality of the design result. There is a definite need of such tools which help them to design human factor based user interface. The implications from these facts are significant to the nature of the user interface tools we need to build.

A BASIC DESIGN PROCESS

1. **Analysis.**

During the design requirement phase,.We have conducted interview and discussion with s/w developers of a company which are developing software application for various private and govt. organizations. The main topic of discussion was problems of end users and main agenda of interview was :

- To determine what type of tools and help designers want

- What they presently do
- What should they do

At the end of the discussion and interview results have shown that most of the designers have very less knowledge about users. For example : Who will be the system user, experience, what are their physical and cognitive disabilities etc. As Paul Ryan Bohman and Shane Anderson[4] describes that people with cognitive disabilities need highly usable, concise, well-designed sites, perhaps even more than the average user. When we asked designers what they want to overcome from these problems most of them said that there should be some mechanism or tools which help them to design human factor based user interface so that end user can easily perform their task.

2.Framework(HFBUIT)

After getting analysis results, We produced a framework of the tool.The concept typically undergoes a number of revisions and refinements until it is approved. **HFBUIT Framework** is based on GENEX framework The original GENEX framework had four phases-Collect, Relate , Create , Donate :

- **Collect :** Learn from previous works stored in library,the web etc.
- **Relate :** Consult with peers and mentors at early,middle and late stages
- **Create :** Explore, compose and evaluate possible solutions.
- **Donate :** Disseminate the results and contribute to the libraries[Boham, P. & Anderson, S. (2005)].

The HFBUITT framework has much in common with genex but there are important modifications.

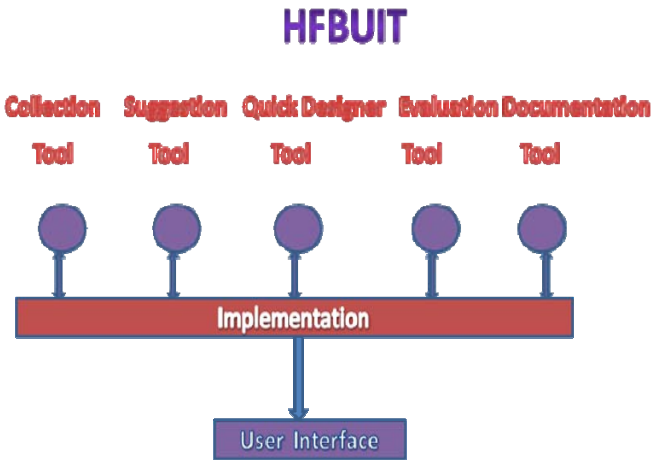

Figure 1

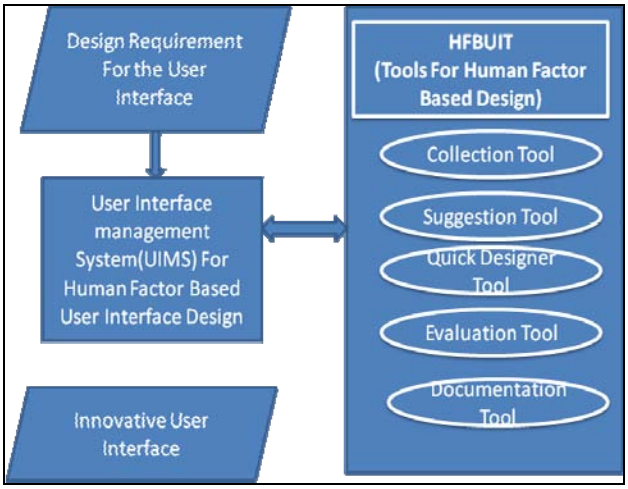

Figure 2:

HFBUIT framework consists of five tools / phases :

Collection Tool

Suggestion Tool

Quick Designer Tool

Evaluation Tool

Documentation Tool

The science of understanding the properties of human capabilities include cognitive ergonomics ,usability and Human computer interaction etc. HFBUIT in short ,is a fundamental approach to impart human factor knowledge for innovative user interfaces to the designers. The most important reason for concentrating on this issue is the lack of knowledge of the designers in the area of human factors.

Our HFBUIT framework suggests a wider scope for the designers by concentrating on human factors during the development of user interface. This will be done with the help of tools. These tools offers a way to capture knowledge from previous work stored in library.

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3.Applying The Framework To Tool Development

In this paper , we introduce HFBUIT, a Human Factor Based User Interface Design Tool that addresses the shortcomings mentioned above. There are some fundamental reasons why many proposed tools do not prosper in practice. In particular, we see the following problem :

- Lack of knowledge of the designers in the area of human factor.

The accessibility laws in the United States require that federal information is accessible by persons with disabilities. Usability is becoming a requirement for companies in purchasing software as they recognize that unusable software will increase the total cost of ownership[3].

Figure 2 is depicting a completed layout of HFBUIT. In this section, we describe the various components of the tool and illustrate its use.

Front –End Components
The front-end components of HFBUIT can be briefly described as follows :

Collection Tool
The collection tool supports the process of designing the user interface and is based on previous work. With the help of an information retrieval tool the interface designers could search for a information and use it as a part of the user interface. *On* the basis of previous information the designers will **be** able to build the final interface which will be easily accessible by the end user.The main reason **be**hind is, that there is a real need for libraries of previous work that have been developed and tested. This would lead to increased productivity by reusing the software, and by providing necessary information to
the designers to develop a useful user interface.

3.2 Suggestion Tool
This tool presents the designers the human factors knowledge. If the designers need support in the area of human factors design they can get suggestions with the help of documents and an expert system. If the supposition mechanism of the expert system detects some design shortfall a list of comments is generated automatically. It shows the designers the analyzed shortfalls and presents them the relevant human factors knowledge in form of a hypermedia document or shows them a relevant interaction object of the library. With the help of these instructions
the designers could improve the user interface.

3.3 Quick Designer Tool

Prototyping is now recognized as a cornerstone of the successful construction of the user interface . This prototyping tool will help the designer to develop a prototype. Before proceeding to the development phase this prototype can be tested with users and user can check whether the system upto the mark or not.If not then again changes can be made.

Early user involvement can be very beneficial.The end user can describe the problems associated with the system to perform their task. The use of prototyping feature will help to detect problems with the UI itself and architecture before programming starts.

3.4 Evaluation Tool

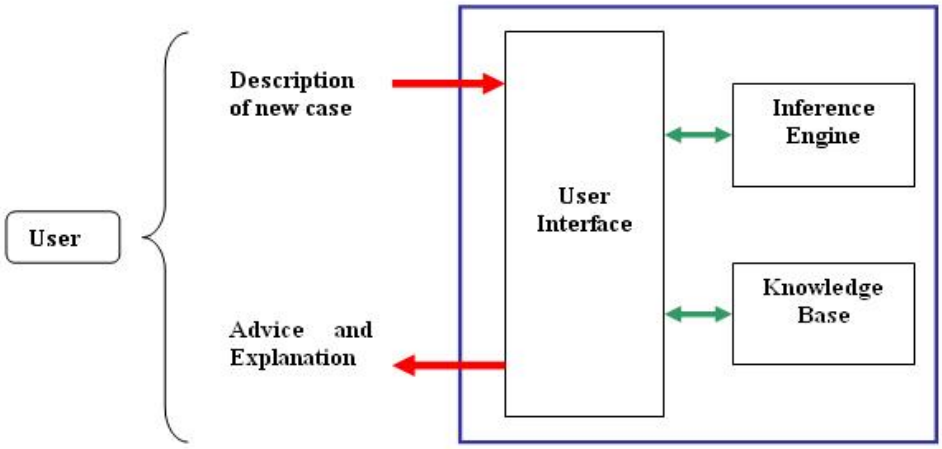
Each prototype will be tested by set of users and evaluated by Evaluation Tool. The result of this evaluation will be some comments that show the defects in the system and give some suggestions to the designers to rectify those defects. This tool will help designers to point out undesirable features among user interface units. This tool will check whether newly designed interface is upto the mark.

3.5 Documentation Tool

Writing the document on application Programming interface (API) is essential. The document on the API, which we call the API documentation, is mainly read by programmers who want to develop their applications on top of that framework . The documentation Tool will generate the API documentation of a framework .

Back-End Components :

A small prototype of Suggestion Tool of this framework (HFBUIT) is built to validate the project and to provide guidance.The following component makeup the back end of the Suggestion



Suggestion tool enables its designers to collect information about the target user. A rule-based approach is used because Suggestion Tool discusses the problem using IF/ THEN type statements. It provides guidance to designers by establishing an idea about user . This guidance will definitely help the designer to design human factor based user interfaces and most importantly it would increase the usability of the system.

Suggestion Tool used screen to ask questions, provide explanation on the system's reasoning and display results.

IV. Screen Design(Screen Shots of Suggestion Tool)

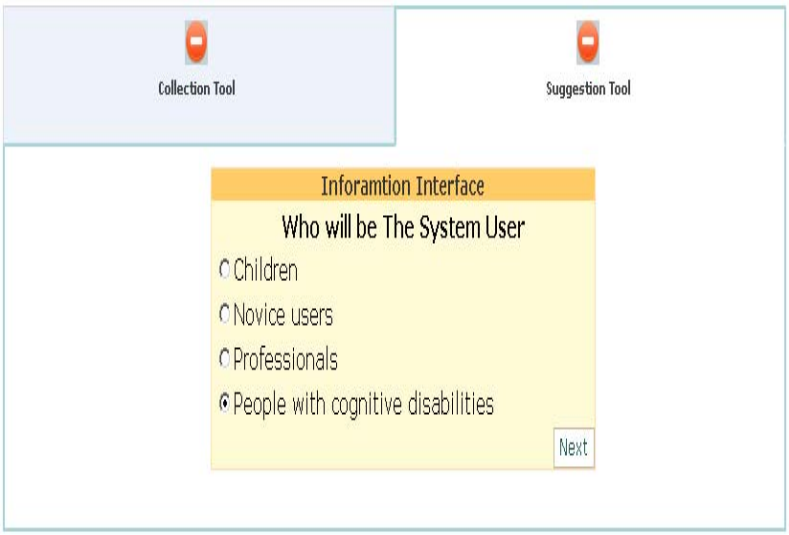


Figure 1: Information about the type of user

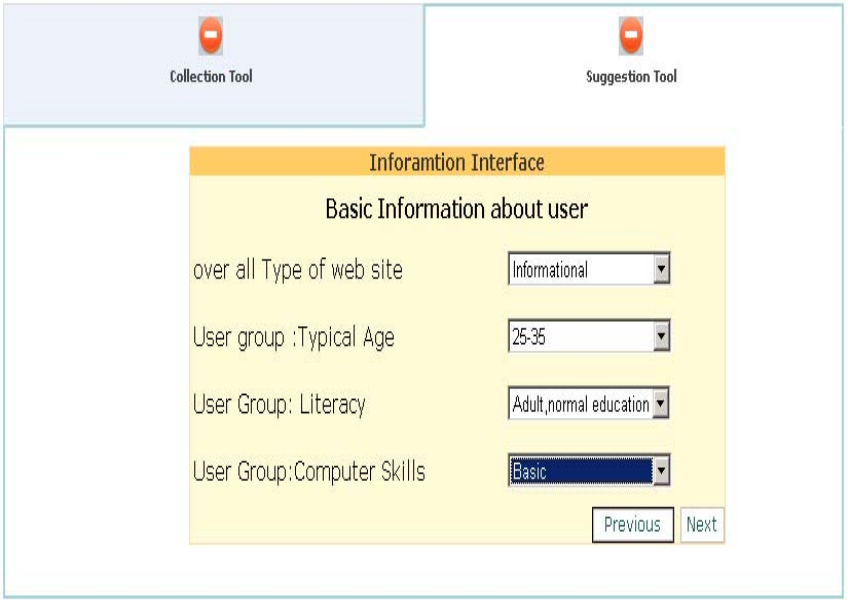


Figure 3:General information about users

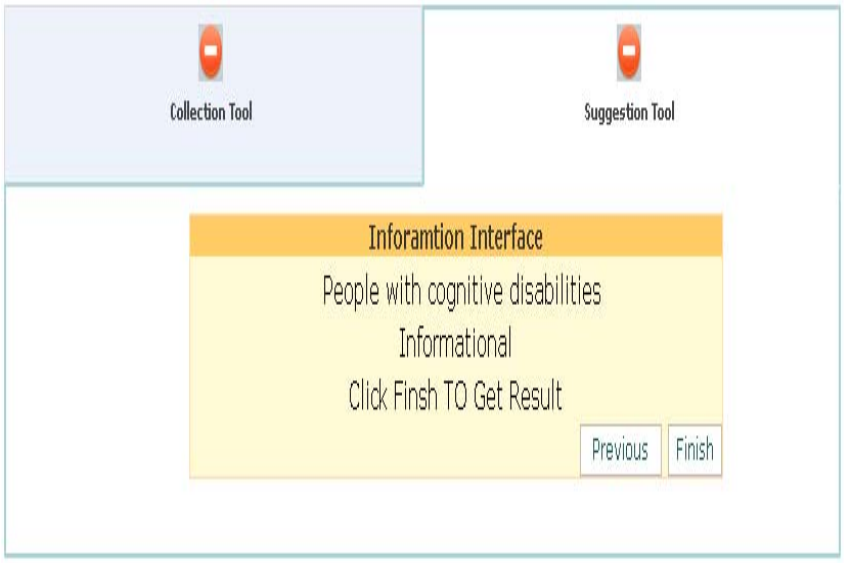


Figure 4:The above mentioned parameters and factors will help in decision making.

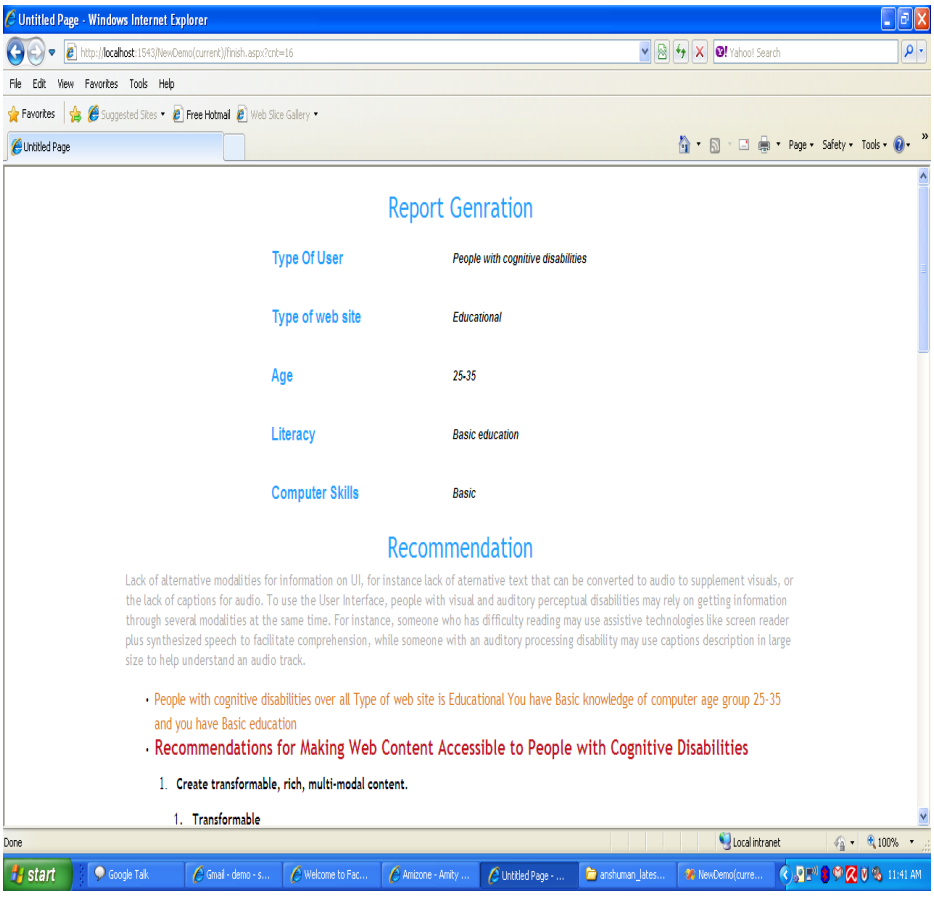


Figure 5 : Recommendation based on user's need[5]. Recommendation can be generated in two ways , one is HTML document and second is in report form

HFBUIT can be implemented in different levels of complexity, using a variety of techniques. The simplest case is where the designer has enough information about the users of the system. Knowledge - base can be incorporated at design time of the application to increase the usability. This will help the designer to create interface according to the

needs of users. The most important aspect of modern interactive computer systems is the level of support they provide for the
underlying human activity. This level of support is encompassed in the user interface (UI) with which the user interacts with the system

VI Conclusion :

Our objective here is to lay out the foundation of Tools for the design of Human Factor Based User Interface, in order to tackle usability issues of modern systems . We have summarized a number of human factors issues that affect the success of a system. Our HFBUIT will definitely help the designers to develop an interface which will be useful for all type of users. Suggestion tool of HFBUIT lets designers ask questions about users and provide guidance / suggestions to develop appropriate user interface.
Interfaces developed with the help of HFBUIT can be used by more users. The range of users can be from teenagers to grandparents.

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