Literature Review

This literature review will look into the current research into general HCI considerations and methodologies as well as more specialised HCI aspects in relation to target demographics of my application. Each of the HCI concepts will be explored and the value for use in the app considered.

**HCI Methodologies**

Many HCI researchers have proposed rules to follow when building a system with human interaction. Among these rules; prevention of errors, Universal usability and simplistic design of interaction. The rules often differ between schemes and change as technology progresses and interfaces change. Norman D proposed 7 principles that are generally still universally accepted within HCI. Normans approach is good for simple systems and is still relevant today due to the way it mirrors human psychology and intuition (Dix, 2003).

Heuristics evaluation (HE) is often used to prevent user interface errors and usability problems. Many heuristic tables exist with varying rules/attributes; *Nielsen’s ten usability heuristics* (Nielsen, 1994) is a common methodology and *Schneiderman’s golden rules* (Shneiderman, 1998) are often cited. However each of the previously mentioned tables have advantages associated, discussed below.

Nielsen’s ten usability heuristics is particularly useful due to its high-level approach. It particularly stands out as it reinforces the significance of using documentation and help for the user as they navigate the system. Help guides and documentation can be particularly useful for elderly users, elderly users as visual training results in better or even comparable results to young users (Mykityshyn, Fisk and Rogers, 2002) This should not be neglected when considering this approach.

Schneiderman’s golden rules present a shorter list of underlying design principles than other heuristic evaluation methods, making it more concise. This approach is considered to have an advantage over many methods as it considers the use of ‘dialogs’ to guide the user through the system. Schneiderman provides guidance in utilizing dialogs in the system design providing designers with the tools to make more useable systems. (Shneiderman, 1998)

(Tognazzini, 2003)

To benefit from the differing heuristic evaluation schemes a multiple heuristics evaluation table (MHET) has been created (Wheeler Atkinson, Bennett, Bahr and Walwanis Nelson, 2007). This combined approach takes the most common elements and creates a more inclusive list (see *figure 1.1*).

*Figure 1* – MHET Heuristic Scheme

|  |  |
| --- | --- |
| **MHET Heuristic** | **Description of Heuristic** |
| Software User Interaction | Providing the user with necessary information for interaction. Combining overlapping concepts: “Visibility of system status” (Nielsen, 1994), “Offer informative  feedback and Design dialogs to yield closure” (Shneiderman, 1998). |
| Learnability | Training tools and learning aids within the system. Making the system easy and intuitive to learn. |
| Cognition Facilitation | Reducing the cognitive load on the user, combining multiple heuristics such as: “Recognition rather than recall” (Nielsen, 1994) and “reduce short term memory load“ (Shneiderman, 1998). |
| User Control & Flexibility | Creating software that responds flexibly to user actions. “flexibility and efficiency of use” (Nielsen, 1994). Shortcut keys, toolbar icons and other interaction controls. |
| System Real-World Match | Matching the system with the real world, elements such as shopping carts/baskets in a store for example. “match between system and the real world” (Nielsen, 1994). |
| Graphic Design | Defining the quality of design in a system through “Graphical integrity, Multifunctioning graphical elements, Colours and Increasing data comprehension” (Tognazzini, 2003). |
| Navigation & Exiting | Concept of easy navigation within a system and intuitive reversal of accidental actions. “User control and freedom” (Nielsen, 1994) “Permit easy reversal of actions” (Shneiderman, 1998) “Explorable interfaces and visible navigation” (Tognazzini, 2003). |
| Consistency | Consistent terminology, GUI elements throughout the system. “Should not use multiple words to describe the same function” (Nielsen, 1994). |
| Defaults | Referring to placeholder or default content in input fields to prompt the user to set their own information. “Defaults should be easy to change or delete” (Tognazzini, 2003). |
| System-Software Interaction | How effectively the system can use and present the status of the use of resources on the computer. For example: “reasonable  speed of processing” or “Latency reduction” (Tognazzini, 2003) and “Visibility of system status” (Nielsen, 1994) such as loading screens and status of the process. |
| Help & Documentation | The importance of help files and documentation as well as on screen assistance or prompts without straining the user. (Nielsen, 1994) (Tognazzini, 2003). |
| Error Management | The ability to aid users in noticing, understanding and recovering from errors in the system (Nielsen, 1994) (Tognazzini, 2003) (Shneiderman, 1998). |

**Universal Usability in HCI**

Universal usability is a core aspect medical assistive systems as the demographics that it caters for are often more challenging for some Heuristic evaluation schemes. The 12 MHET design heuristics (*figure 1.0)* provides an encompassing methodology for system HCI design however fails to cover universal usability and accessibility exclusively.

Universal usability

Simplistic interaction design

HCI The elderly, disabled and non-native speakers

HCI and e‐mental health

**Potential Solutions**

Medical assistive technology

**Research to read**

Development of Open Platform Based Adaptive HCI Concepts for Elderly Users

<https://link.springer.com/chapter/10.1007/978-3-642-02710-9_76>

Prototyping a Touch-based Communication Application for Social Support of the Elderly focusing on UI Aspects

<https://www.politesi.polimi.it/handle/10589/89925>

Combining e‐mental health intervention development with human computer interaction (HCI) design

<https://onlinelibrary.wiley.com/doi/full/10.1111/inm.12527>

HCI textbook

<https://books.google.co.uk/books?hl=en&lr=&id=IuQxui8GHDcC&oi=fnd&pg=PR14&dq=Human-computer+interaction&ots=I49csOGQZG&sig=l3uZF66dSp8u3QPiA9HbaUPpJ8s#v=onepage&q=Human-computer%20interaction&f=false>

Development of a Multiple Heuristics Evaluation Table (MHET)

<https://www.researchgate.net/profile/Gisela_Bahr/publication/225163960_Development_of_a_Multiple_Heuristics_Evaluation_Table_MHET_to_Support_Software_Development_and_Usability_Analysis/links/552967430cf2779ab790b2ac.pdf>

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Wheeler Atkinson, B., Bennett, T., Bahr, G. and Walwanis Nelson, M., 2007. Development of a Multiple Heuristics Evaluation Table (MHET) to Support Software Development and Usability Analysis. Lecture Notes in Computer Science, [online] pp.563-572. Available at: <https://link.springer.com/chapter/10.1007/978-3-540-73279-2\_63>

Tognazzini, B. (2003). First principles of interaction design. Retrieved November 8, 2006,

from http://www.asktog.com/basics/firstPrinciples.html