

Research Methods

Unit 5: Management Research Proposal

Research Topic:

Human-computer interactions (HCI) concerns and challenges in the user interface design of health information systems in a context of clinical encounters

Research Problem:

There exist predominant issues and challenges in HCI in information systems than can affect system adoption. Studies have demonstrated that usability issues can result in decreases in productivity, resistance to system adoption high costs associated with unusable systems, and user frustration (Hebda T. & Czar P., 2013). Knowing the differences between usability and acceptance, and how to measure them can lead us to a good interface design and successful adoption of a product. Traditional approaches did not involve many aspects of HCI design such as user satisfaction in productivity, communicative usability, and pragmatic perspective that emphasizes the individual fulfillment, lacking these aspects can affect the usability and functionality of the systems.

Human-computer interaction (HCI) has become increasingly important in the design of information systems as systems are becoming more complex. This complexity has arisen as a result of concerns such as cultural diversity, user diversity, society, context, and privacy affecting the HCI interface design.

Research Purpose

The purpose of this research project is to identify and know the current approaches to Human-computer interaction (HCI). The importance of many factors such as social, cultural diversity, and user diversity on user interface design. This subsequently can affect the usability of a system which impacts the user's ability to perform a task successfully with little or no inconvenience and frustration. The project also aims to suggest how to address these issues by interface designers.

Research Questions and Aims

Based on the purpose of this research project, this project is divided into two parts:

In the first part, I basically try to identify the different approaches to design in HCI and how factors such as culture, user diversity and society affect the design of a user interface. Literature reviewed has demonstrated how these factors can negatively affect the usability of a system. User's perspective, usability is a very important aspect in the development a system which impacts the ability to perform a task successfully with little or no inconvenience and frustration.

The second part consists of identifying the predominant issues and challenges in Human computer interaction for Health information systems related to an encounters with the objective of categorizing these issues.

The following research questions are formulated:

1. *How do society, user diversity, culture, and privacy issues affect the HCI interface design?*
2. *What are the more predominant challenges in HCI for Electronic Health Records?*
3. *What is the importance of HCI and Usability?*
4. *How user interfaces designed for health information systems will meet these challenges?*

Aims

1. *Identify how culture, privacy and society issues affect the HCI interfaces in designing an information system.*
2. *Identify and categorize the most common issues and challenges in HCI in a health information systems.*
3. *Examine the importance of HCI and Usability*
4. *How user interface design will meet the current challenges in a health information system?*

To meet the research objectives a literature study will be conducted concerning the new approaches for HCI that reflect or contemplate many aspects and concerns in the functionality of a system such as pragmatic perspective, culture diversity, user diversity, cultural context as well as individual needs. This literature review will help me to gather information regarding the importance of HCI and

usability in the design of a system and the main factors that are a concern in user design in general. As well as demonstrate the understanding of concepts in HCI, and its importance for health information systems.

I selected the literature reviewed according to the research topic and specified studies on predominant issues in HCI for health information systems by scholars and researchers. The literature and work that I made reference to, in order to investigate and understand the relevant issues and concerns in HCI, is generally from systematic reviews that have helped me to build the knowledge in this research area. Also, a literature search criteria was added such as search terms: Human Computer Interactions, usability, factors in HCI, issues in HCI design. A selection criteria for the literature such as only English written, data between 2002 and 2018. The literature on which I want to develop the research project consists of journals, online articles, book, database and searching through bibliography and relevant and important contributions on my research area for example contributions by Harry Hochheiser & Jonathan Lazar (2007) HCI and Societal Issues - International Journal of Human Computer Interaction among others. Scholar articles, for international conference on Competitive manufacturing New Challenges in Human Computer Interaction.

Description of your research environment.

- The number of interviewers are two, both of them are user experience and adoption specialists with a demonstrated experienced working in the hospital & health care industry.
- The interviews will be conducted in the company of the participants in the Caribbean and the duration of the interview will be approximately one hour.

Define the academic relevance, as well as the practical relevance of your management research

This research project is important because personally I am interested in expanding my knowledge in the area of HCI. The company where I am currently working, is a software development company that is focused on the health care industry. The company wants to improve the usability of the software products in order to make it more efficient and competitive in the health care industry. The products' usability is critical for the successful adoption and acceptance of the system by the users and reduce dissatisfaction.

This research will provide an understanding of the new approaches in HCI and identification of predominant challenges in HCI design, particular for health information systems and the importance of HCI and usability in designing a system. This study will contribute to helping designers improve the usability and functionality when designing a health information systems using human centered design.

Chapter 2: Critical Literature Review

A systematic literature review will be conducted with a meta-synthesis technique, that is base on integrating, evaluating and interprets findings of the qualitative research study.

Many researchers have demonstrated that not only technological innovation plays an important and decisive part in high competitive information systems, but the human technology interface also impacts the advance, progress and productivity of them. Human performance and work productivity in terms of usability, efficiency and user satisfaction are important requirements for HCI approaches. Due the increasingly complexity of interface design, user diversity, context and different technology types, the traditional HCI approaches do not reflect many aspects in the functionality of a system. Therefore researchers have found new approaches that include the importance of some aspects such as (1) the *pragmatic perspective* (emotional and effective designs) (Ziefle, & Jakobs, 2010). Usability should not only involve the effectiveness of the interaction, but “rather user satisfaction in the productivity and individuals' well being, pleasure and fun when interacting with technology” (Ziefle, & Jakobs, 2010). (2) There is an ongoing discussion whether the *design approach* should lead to a design for all or a differential approach. The design for all approach relies on an empirical evidences that claims that “HCI interfaces should be designed to meet requirements and needs for all users and the differential design should focus on the specifics such as diversity of users, technology types, social, cultural context as well as individual needs” (Ziefle, & Jakobs, 2010). Researchers concluded that both approaches are complementary not exclusive and must be considered at the same time.

Culture is a critical and complex issue in HCI, many of its techniques and approaches are not known by the designers. This factor influence the design, development of interfaces. The culture context is an important aspect to considered in the design as the culture affect the way people interact with and react to symbols, design process etc. (Salgado, Pereira & Gasparini, 2015). Also, “system features

appropriated for one culture may not be suitable for others and the quality of user experience is intricately related to the users' cultural" (Salgado, Pereira & Gasparini, 2015) Some study cases comparing Western website and Chinese website design, show that evaluation of interface design may be influenced by mindset and philosophies, suggesting that system design should need to fit certain culture and society.

Some of the reviewed articles identified the common challenges in HCI in the use of Electronic Health Records (EHR) during the clinical encounters are user interface design such as navigation issues, system work-flow, information overload and poor display of clinical data (Ziefle, & Jakobs, 2010). These HCI issues can have a negative impact on clinician – patient interaction, that can result in loss of productivity, decreased work performance, user frustration and decreased patient quality care.

Chapter 3: Research approach and design

3.1 Research Approach

Researches has classified the types of research into basic approaches Qualitative and Quantitative approaches.

The Qualitative research approach is concerned with subjective assessment of attitudes, opinions and refers non-numerical data collection, it uses empirical research based on observations and derived knowledge. It also uses open ended questions, interview data and observation data. It focuses on an "in-depth research process that seeks insights through loosely structured data to provide detailed answers" (McLeon, 2017) .

The qualitative research approach that is conducted in this research project makes knowledge claims based on subjective perspectives based on experience and from secondary data collection results of reviewing literature, online articles, journals, and empirical studies.

Exist different types of research exploratory, confirmatory, descriptive and analytical. "Exploratory research refers to the research process, that seek to learn more about a topic or a issue, which is usually done to collect data for designing a descriptive or explanatory investigation" (Shamekh, 2008). The qualitative approach allow starts with an exploratory research process that investigate and provide a precise description of my research topic and explore specific aspects of the research area of HCI. Such as gather clear understanding of the old and new approaches in HCI and acquire a deep knowledge regarding issues, concerns in the design of user interfaces in the health care information systems in relation to clinical encounters. Also, the qualitative method is often associated with descriptive research.

I selected a qualitative approach for my research because I am interested in knowing the meaning of and understanding the issues, challenges, concerns in the HCI and how to address these issues. The way to gain this knowledge is through the secondary data collection, relevant literature review. However, it will not be easy to reduce these descriptions, knowledge and aspects to numbers or in a quantified manner as a quantitative approach will allow.

The general researches methodologies may lead to obtaining new knowledge according to Kenneth F. Hyde that result in inductive and deductive approaches.

Inductive research approach: No hypothesis is defined at the beginning of the research. This research approach intends to understand a complex problem and produce illustrative information in order understand the dimension of the issue (Almeida, F., & Faria, 2017).

Deductive research approach: A researcher formulates hypotheses, that is defined at the beginning of the research and then research strategies are defined to test the hypotheses (Dudovskiy, 2017).

This research project will follow an inductive research approach that will start with the formulation of research questions and aims that need to be achieved during the research process. Also, interviewing experts in order to answer research questions base on their knowledge and experience. The data collected will be analyzed and compared with other result finds from literature reviewed. This approach will help to defined concepts and take measures when designed a user interfaces.

Exist two main research philosophies according to .. Positivism and Phenomenological positions. In this research a phenomenological approach will be used. Phenomenological approach are subjective and interpretative from the researcher and interviewers perspective.

The knowledge acquired for this research is socially constructed and interpretative were there is a detailed investigation of the issues and challenges in HCI. According to Creswell J. (2003) social constructivism states that "reality is determined by people rather than by objective and external factors and often is combined with interpretivism" (Creswell, 2003). This qualitative research uses open-ended questions so the interviewers can express their view points of the predominant issues in HCI design for health information systems based on their knowledge and experience. Also, logical knowledge, interpretation will be used to analyze the primary data findings from interviewing experts regarding design issues in health information systems and also from the literature reviewed.

Research methodology strengths and limitations

There are four types of research: exploratory, confirmatory, descriptive or explanatory. “Exploratory research refers to the research process, that seek to learn more about a topic or a issue, which is usually done to collect data for designing a descriptive or explanatory investigation” (Shamekh, 2008). One of the reasons that I chose the qualitative approach is because it will allow for starting with an exploratory research process that investigate and provide a precise description of my research topic and explore specific aspects of the research area of HCI. Such as gather clear understanding of the old and new approaches in HCI and acquire a deep knowledge regarding issues, concerns in the design of user interfaces in the health care information systems in relation to clinical encounters.

The qualitative method is often associated with descriptive research. In the process of my research I am interested in knowing the meaning of and understanding the issues, challenges, concerns in the HCI and how to address these issues. The way to gain this knowledge is through the secondary data collection, relevant literature review. However, it will not be easy to reduce these descriptions, knowledge and aspects to numbers or in a quantified manner as a quantitative approach will allow.

Ethical Considerations

- 1) Consideration needs to be given, to the potential ethical issues regarding consent and confidentiality in the case of exposure of sensitive clinical data and processes from a health information system when conducted the interviews.
- 2) In this case permissions must be granted to the researcher from the organization and interviewer. The researcher must agree to maintain confidentiality with all sensitive data. Interviews will be conducted privately with the objective of ensuring privacy.
- 3) The interview results and research findings will be recorded in my Google drive account with the respective credentials.
- 4) Research permission letter will be needed in the case of accessing clinical patient data from any health organization to conduct interviews.

Research Tools, validity and readability

In a qualitative research the method of collecting the data can be through observations, in-Depth interviews and focus groups. The qualitative methods used in this research are In-depth interviews where open-ended questions will be used. **collecting primary data** from interviewing subject matter experts in user experience and adoption specialist for Health Information Systems where questions will be conducted regarding of the predominant issues in human computer interaction during the patient-clinician interaction in the context of encounters. Also, the importance of being aware of factors such as cultural diversity, user diversity and society in the process and design of a system is also investigated. This research **collects secondary data** through the relevant online journals, online articles, books and conferences. The approaches for collection of data rely on grounded analysis (Easterby-Smith et. Al, 2008) and both approaches are interpretative. These two approaches from different perspectives will help me to obtain a good understanding of the research topic.

This study will use the *triangulation method* with the purpose of verifying if the findings of the data collected are true and certain (Golafshani, 2003). According to Patton (2001), triangulation methods are used in qualitative research as strategy test to improve the validity and reliability of the research findings. It ensures the *validity* of this study through analysing each research question from different perspectives with the objective of arriving at consistency across data sources (Golafshani, 2003). i.e in the analysis phase, the results from the interviewees will be compared to determine the validity between them and the previous research findings from the literature reviewed and determine areas of agreement as well as areas of divergence (Golafshani, 2003). According to Golafshani (2003), any inconsistency in the research findings should be treated as an opportunity to uncover deeper meaning in the data.

Denzin (1978) and Patton (1999) identified four types of triangulation, data source triangulation, investigator triangulation, theory and method triangulation (Golafshani, 2003). This research will implement **data triangulation** that uses different sources of information in order to increase the validity and confiability of the study results (Golafshani, 2003). The interviews conducted are private and not influenced by the researcher or by what the researcher wants to hear. The information collected is accurate in context through constant comparison with other sources.

Data Analysis method

This qualitative research will start with exploratory research on the topic and with a collection of quality information. The collected information will be organized, interpreted, and analyzed to draw conclusions on the research theme. To carry out the data analysis process, I will conduct an inductive approach that starts defining the research questions and aims that narrow the study. After collecting the information *first*, I will transcribe all the information using qualitative data analysis software ATLAS.ti or Nvivo. *Second*, I will organize the remaining information based on the research questions and aims. I will use the software to simplify the data organization process. *Third*, I will code the data. This consists in categorizing the information into concepts and summarizing the central topic of my information. This process can be done manually or using the analysis software. *Fourth*, state the findings and research outcomes based on the research aims defined and conclude the data analysis as a final report. The final report will state the processes and methods of the research, the pros and cons of the research and the implications of the findings.

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