A Framework for the Design of Personal Health Information Systems User Interfaces.

Laura Cheptegei[1]. Moses Thiga[1]. Elizabeth Okumu[1].

1. Kabarak University, School of Science Engineering and Technology, Department of Computer Science.

INTRODUCTION

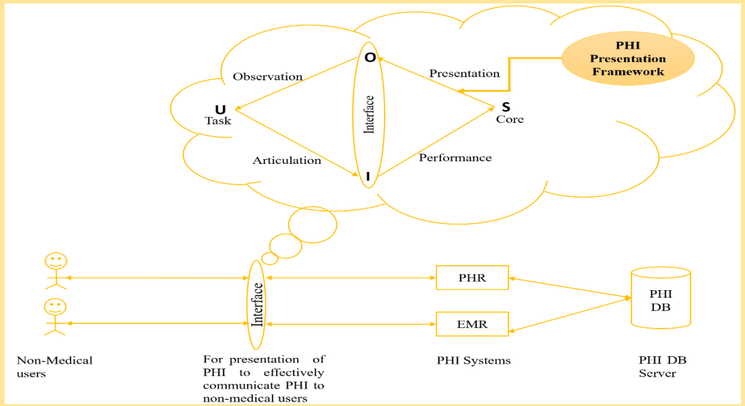
There is an increasing drive for people whether health care professionals, patient or non-patient to participate in the management of their own health and well-being. The third sustainable development goal concerns good health and well-being, and governments across the world are making efforts to achieve this goal [1]. For instance, the Trump administration started a MyHealthEData initiative that aims to empower patients to take control of their personal health information (PHI) [2]. The Kenyan government is also making strides towards the same direction e.g the implementation of the open source electronic medical records system (OpenMRS) in public hospitals [3]. These are efforts aimed to improve the quality of health care systems in the country by empowering members to access and participate in the management of their health e.g in shared health decision making. However, this participation might be hindered, especially for the non-medical users, due to lack of medical knowledge or medical training background and therefore they might not easily make sense of their data; or even due to inappropriate presentation of their data on the user interface of the PHI systems (PHIS) which may lead to wrong interpretations and as a result unintended consequences. Human computer interaction (HCI) is a multi-disciplinary field concerned with developing interactive technologies that are accessible, useful, usable and safe for the users [4]. Therefore, this research seeks to add knowledge and skills from the domain of HCI in understanding the specific challenges in the area of PHI presentation design on the user interface as well as in the development of a suitable approach to designing presentation of PHI on the user interface in a manner that meets usability goals, information and interface design guidelines and careful observation of gestalt laws in order to communicate PHI effectively to the non-medical users for correct interpretation and action.

OBJECTIVES

The main objective of the study is to develop a framework for the design of user interfaces of PHIS in order to communicate PHI effectively to non-medical users. The specific objectives include:

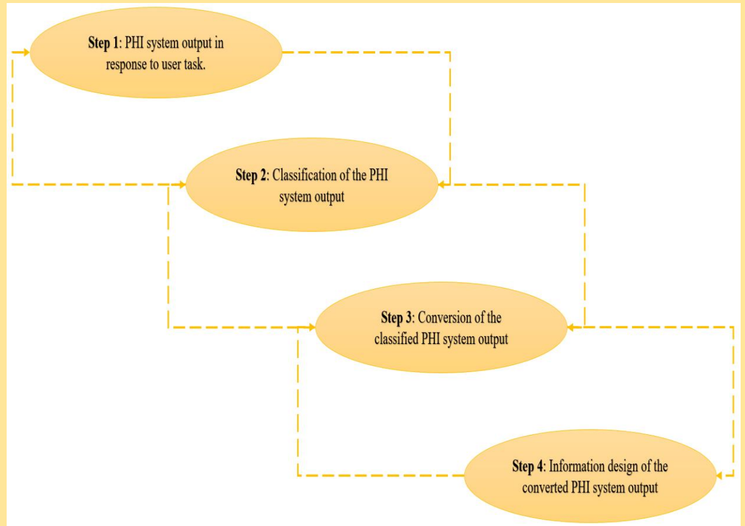
- To examine the context of use of user interface design of PHIS that prevents effective communication of PHI to non-medical users.
- To develop a framework for user interface design of PHIS for effective communication of PHI to non-medical users.
- To apply the framework on user interface design of PHIS to effectively communicate PHI to non-medical users.
- To evaluate the effectiveness of the framework for user interface design of PHIS in communicating PHI to non-medical users

CONCEPTUAL FRAMEWORK: UTILIZATION OF THE PHI PRESENTATION FRAMEWORK



CONCEPTUAL FRAMEWORK: PHI PRESENTATION FRAMEWORK COMPONENTS

The PHI presentation framework contains four sequential components as shown in the figure below.



CONCEPTUAL FRAMEWORK: PHI PRESENTATION FRAMEWORK IMPLEMENTATION

The implementation of the PHI presentation framework under each component is described in the figure below

Step 1: User performs a task on the user interface of PHIS

i. Non-medical user establishes a task to be performed on the interface and the goal for the task.
ii. Non-medical user performs a task on the interface.
iii. System translates the user tasks into its language and executes the task.
iv. System selects the output in response to the user task.

Step 2: Classify the output of the user task

i. Determine the relevant information and not so relevant information for the non-medical user to be displayed on the interface.
ii. Determine the level of details of the relevant information to be displayed on the interface for the non-medical user.
iii. Determine the mode of presentation to be used for presenting the relevant information to the non-medical user on the interface i.e. consider color, graphics, icons etc. In other words, establish the best way to communicate the relevant information.

Step 3: Convert the language of the classified output to its equivalent plain English language

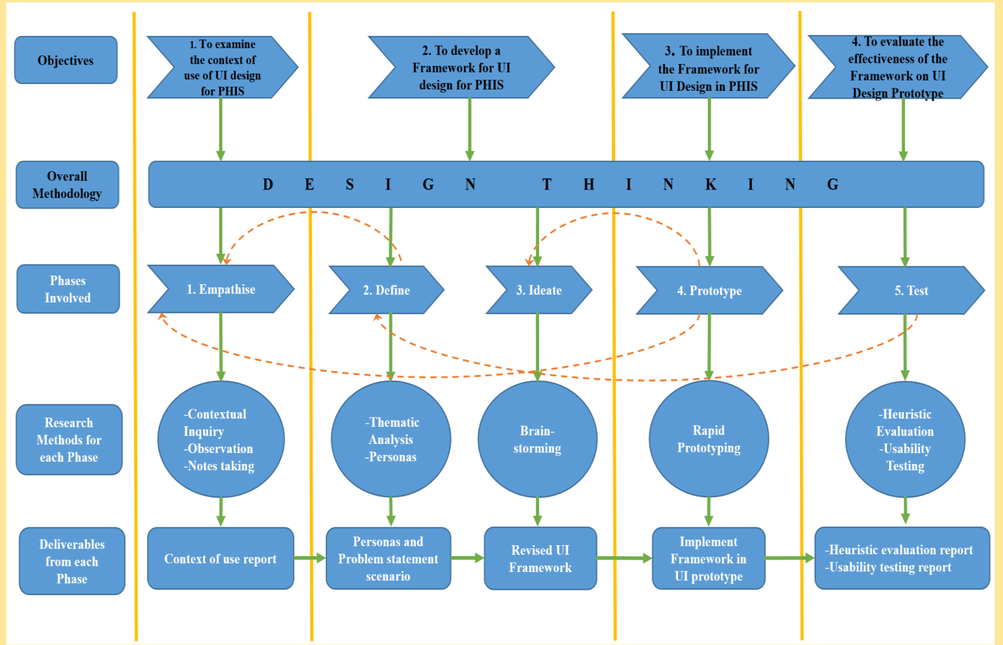
i. Consider language and vocabulary used in the classified output, especially for text presentation.
ii. Consider a relevant simplified English language conversion tool to use.
iii. Convert the language in the classified output to its equivalent plain English language.

Step 4: Determine the information design on the user interface for the converted output.

i. Examine the user interface with the converted output
ii. Examine a relevant user interface design principles e.g Jakob Nielsen's ten heuristics for user interface design
iii. Apply where possible and as much as possible the principles on the user interface design for the converted output.
iv. Examine the Gestalt laws of perceptual organization and apply relevant laws to the converted output.

RESEARCH METHODOLOGY

This study is qualitative in nature and it will employ design thinking methodology as illustrated in the figure below. There are five phases of the design thinking methodology, and under each, relevant research methods will be carried out to achieve the specific objective of the study as shown at the top of the figure.



CONCLUSION

This study will be helpful to system designers in developing PHIS and designing of interfaces that takes users' needs and requirements into consideration. This especially for non-medical users who are interested in accessing and making correct interpretations concerning their health status from their PHI. At the end of the study, the PHI presentation framework will lead to the design of a good user interface of PHIS that will present PHI output to non-medical users in an easy-to-learn and easy-to-understand manner. Thereby, communicating PHI effectively to non-medical users.

REFERENCES

1. SDG. (n.d.). Goal 3: Ensure Healthy Lives and Promote Well-being for all at all stages. Retrieved February 22, 2019, from Sustainable Development Goals website: https://www.un.org/sustainabledevelopment/health/
2. CMS, C. for M. & M. S. (2018). Trump Administration Annouces MyHealthEData Initiative at HIMSS18. Retrieved March 14, 2019, from Centers for Medicare & Medicaid Services (CMS) website: https://www.cms.gov/newsroom/fact-sheets/trump-administration-announces-myhealthedata-initiative-himss18
3. Muinga, N., Magare, S., Monda, J., Kamau, O., Houston, S., Fraser, H., … Paton, C. (2018). Implementing an Open Source Electronic Health Record System in Kenyan Health Care Facilities: Case Study. *JMIR Medical Informatics*, *6*(2), e22.
4. Shneiderman, B., & Plaisant, C. (2010). *Designing the user interface: strategies for effective human-computer interaction*. Pearson Education India.