Fetaji, Bekim et al.

Conference Paper

Devising UIF Model in Designing Usable User Interface Impacted from Shorter-Time-To-Market Phenomena

Provided in Cooperation with:
IRENET - Society for Advancing Innovation and Research in Economy, Zagreb

Suggested Citation: Fetaji, Bekim et al. (2019) : Devising UIF Model in Designing Usable User Interface Impacted from Shorter-Time-To-Market Phenomena, In: Milković, Marin Seljan, Sanja Pejić Bach, Mirjana Peković, Sanja Perovic, Djurdjica (Ed.): Proceedings of the ENTRENOVA - ENTerprise REsearch InNOVAtion Conference, Rovinj, Croatia, 12-14 September 2019, IRENET - Society for Advancing Innovation and Research in Economy, Zagreb, pp. 10-16

This Version is available at:
hp://hdl.handle.net/10419/207658

Terms of use:
Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.
Devising UIF Model in Designing Usable User Interface Impacted from Shorter-Time-To-Market Phenomena

Bekim Fetaji  
Faculty of Informatics, University Mother Teresa, Skopje, Macedonia  
Mirlinda Ebibi  
Faculty of Informatics, University Mother Teresa, Skopje, Macedonia  
Majlinda Fetaji  
Computer Sciences, South East European University, Tetovo, Macedonia  
Aferdita Abdullahu  
Computer Sciences, South East European University, Tetovo, Macedonia  
Goce Armenski  
Informatics, S.Cyril &Methodius, Skopje, Macedonia  
Ljupcho Antovski  
Informatics, S.Cyril &Methodius, Skopje, Macedonia

Abstract

The research goal is set in devising a UIT (Usability interface Factors) model in designing user interface when there is a time pressure and investigating the today's software company's tendency to shift towards shorter-time-to-market phenomena, while still carrying about high quality of User Interface- UI and User Experience-UX. Currently there is only few published research analysing this tendency and habit of today’s companies. Also, there is no published research that addresses efforts in handling this habit by analysing and assessing the impact of IU design systems for increasing the level of usability using UI consistent. However, the complexity of the research landscape and the diverse set of approaches and goals impedes the analysis and advancement of research and the identification of promising research areas, challenges, and research directions. As research, method will use analyses of published research and then surveys and questionnaires to collect information from a representative sample of a broad population using specifically devised questionnaire. Insights and recommendations are provided.

Keywords: Instructional methodology, programming robots, educational methodology, Computer-assisted instruction

JEL classification: A31

Introduction

We have found out that most of the companies that are focused on Software Development in North Macedonia and Kosovo are working on developing Web and Mobile applications. Mostly they are doing usability testing and bugs or crash tests of their software. "Each software system has a part where users test and report a problem and which is taken into account by the developers here".

Important in UI design and usability testing process they have mentioned "the time". Usually they are under the pressure to deliver as fast as possible and meet unrealistic deadlines and usually they do not have time to do properly at least usability testing.
This is important since the users are those that will like or dislike the application and therefore usability testing gives the most important to them feedback information. In order to improve the current situation they all mentioned the need to some standardized usability testing methodology since different working groups are doing it differently and what is important according to the focus groups and speaking with experts from Companies is that "No application developer involved in the development of the software should not do the testing, but specially trained professional in usability testing". Currently they do not have any professional usability tester and the same people that developed the software are doing the UI testing and that has a lot of bias in the testing results (Myers et al., 2011; Hanssen et al., 2011).

**Research methodology**

**Qualitative Research**
For the preliminary phase of the thesis, the Grounded Theory method was selected for the analysis of the prior data, a decision that was based on the type of the existing data and considered feasible approach for extended application in the latter qualitative research phases. The process of our literature review (Trivedi, 2012; Marques et al., 2012; Imtiaz et al., 2013) is an example of our qualitative research. To gather data, we have analysed others work (Banerjee et al., 2013; Garousi et al., 2013) on the field of software usability testing process and their methodologies (Myers et al., 2011; Hanssen et al., 2011; Imtiaz et al., 2013). As result we have conducted possible research gaps on the field and also we have identified a research problem which we aim to solve. We have used statistical survey with a view towards making statistical inferences about the research question being analysed.

**Quantitative Research**
The questionnaire and survey method have been used for the quantitative phase of the study. Experiments and the generated empirical results are the base for our quantitative research methodology.

The central hypothesis and research questions that will guide this research study are:

H1: If companies use UI design systems than this will improve the overall user satisfaction and increase usability.

H2: If companies use UI guidelines and libraries in their software systems than this will decrease the overall learning curve for the product/platform and increase usability.

Research questions are as following: (i) RQ1: What components contribute to the UX process and how should they be addressed in the design of software systems?; (ii) RQ2: What is important in UX and how should they be addressed in the design of software systems?; (iii) RQ3: What are the contributing factors in proper UI design?; (iv) RQ4: What are the effect and relevance of the UI in increasing the level of usability?, and (v) RQS: What are the effect and relevance of the UX in increasing the level of usability?.

**Results and findings from case study analyses**
Our study is built on numerous studies from the reviewed published literature (Myers et al., 2011; Trivedi, 2012; Hanssen et al., 2011; Marques et al., 2012; Imtiaz et al., 2013; Banerjee et al., 2013; Garousi et al., 2013) and then used questioner to include the opinion of companies that work in this field. There were in total 30 participants of this research that where divided in two groups consisting of one company in North
Macedonia and one in Kosovo. Both of the groups also provided their opinion about the global worldwide situation with larger companies. A preliminary survey from all groups has been conducted. The survey questions have aimed to capture and answer the research question previously defined. In this study, the same objectives for both groups will be used. The tests, quizzes and observations have been collected and recorded. Furthermore, questionnaires are recorded and transcribed for analysis. We have done feasibility study, which includes the literature review, and after questionnaire, and empirical research where we measure parameters and comparative research.

Jakob Nielsen, a renowned web usability consultant and partner in the Nielsen Norman Group, and Rolf Molich, another prominent usability expert, established a list of ten user interface design guidelines in the 1990s. There is considerable overlap between Nielsen and Molich’s heuristics and Ben Shneiderman’s ‘eight golden rules’. These 10 rules of thumb further iterate upon Shneiderman’s eight golden rules 4 years after Shneiderman’s initial publication. The devised UIT (Usability interface Factors) model we have used and integrated both of the approaches in our study and the results are given below.

**Conclusion**

This research study investigates to find out if there is any benefit in the proper UI design that might increase the usability of the software system. The idea is that when creating UI functionalities, all sites, windows, and parts that have interactivity with the user have a predictable view and location.

The earliest innovations in this field were made from Microsoft, where every part of it is predictable and sometimes the fingers and eyes themselves know where to find any functionality without knowing in advance, based on consistency.

Currently there is only few published researches analysing the phenomena, tendency and habit of today’s companies to shift towards a shorter-time-to-market. But there is no research that follow design of UI and test properly the usability of the UI of software, while still carrying about high quality. Also, there is no published research that addresses efforts in devising new methodology for more efficient usability testing methodology. However, the complexity of the research landscape and the diverse set of approaches and goals impedes the analysis and advancement of research and the identification of promising research areas, challenges, and research directions. One of the goals of this study is to try to answer these mayor deficiencies and lack of research efforts and systematically map (classify) the secondary studies in usability software testing. The merits of the research study are the assessment of the impact of UI / UX design systems for increasing the level of usability using UI / UX consistent and devising a new novel methodology. Also provide insights and recommendations when undertaking manual software testing process for practitioners and industry experts.

Another important role of the research we aim is communicating the devised UIT (Usability interface Factors) model were we have used the approach with the devised main factors to Usable User Interface design that we tested for usability: 1. Visibility of system status; 2. Match between system and the real world; 3. User control and freedom; 4. Consistency and standards; 5. Error prevention; 6. Recognition rather than recall; 7. Flexibility and efficiency of use; 8. Aesthetic and minimalist design; 9. Help users recognize, diagnose and recover from errors; 10. Help and documentation.

Therefore testing the usability of the above-mentioned factors is crucial. User Interface Design is responsible for the transference of a software system strengths and visual assets to a product’s interface as to best enhance the user’s experience. This
study may contribute to improve the usability design by invoking the usability experts to realize the benefits of this approach and encourage companies that are under the pressure of short-time-to-market phenomena to implement this approach and interchangeably incorporate usability testing for UI and UX before final release.

References
1. Banerjee, I., Nguyen, B., Garouisi, V., Memon, A. (2013), "Graphical User Interface (GUI) Testing: Systematic Mapping and Repository," Information and Software Technology, Vol. 55, No. 10, pp. 1679-1694.
2. Garouisi, V., Mesbah, A., Betin-Can, A., Mirshokraie, S. (2013), "A Systematic Mapping Study of Web Application Testing", Information and Software Technology, Vol. 55, No. 8, pp. 1374-1396.
3. Hanssen, G. K., Smite, D., Moe, N. B. (2011), "Signs of Agile Trends in Global Software Engineering Research: A Tertiary Study," in the Proceedings of the Sixth International Conference on Global Software Engineering Workshop, Helsinki, Finland, IEE, pp. 17-23.
4. Imtiaz, S., Bano, M., Ikram, N., Niazi, M. (2013), "A tertiary study: experiences of conducting systematic literature reviews in software engineering", in the Proceedings of the 17th International Conference on Evaluation and Assessment in Software Engineering, Porto de Galinhas, Brazil, ACM, pp. 177-182.
5. Marques, A. B., Rodrigues, R., Conte, T. (2012), "Systematic Literature Reviews in Distributed Software Development: A Tertiary Study," in the Proceedings of the Seventh International Conference on Global Software Engineering, Porto Alegre, Brazil, IEE, pp. 134-143.
6. Myers, G. J., Sandler, C., Badgett, T. (2011), The art of software testing, 3rd edition, John Wiley & Sons.
7. Trivedi, S. H. (2012), "Software testing techniques", International Journal of Advanced Research in computer science and software Engineering, Vol. 2, No. 10, pp. 433-438.

About the authors
Bekim Fetaji is Full Professor of Informatics at University Mother Teresa - Skopje. Vice Rector for Science & Research, former head of Research group in Programming and software Engineering and Formals specifications. Previously Dean of Computer Science Faculty and before that vice-dean for academic issues in computer Sciences at South East European University. Received his PhD in Computer Sciences at the Faculty of Computer Sciences in Graz University of Technology with the dissertation thesis “E-learning indicators- a multidimensional model for planning, designing and developing e-learning software solutions”. Main research interests are in software engineering, programming, technology enhanced education, e-Learning, m-Learning, web design, data processing, and closely related fields. Participated in several project teams within different programs such as Tempus, Erasmus and other national and international research projects. Published more than 100 scientific papers in international conferences and more than 20 international journals. The author can be contacted at bekim.fetaji@unt.edu.mk.

Mirlinda Ebibi is Assistant Professor of Informatics at University Mother Teresa - Skopje. Received her PhD in Computer Sciences at the Faculty of Computer Sciences in Graz University of Technology with the dissertation thesis “Expert based learning methodology for developing mobile expert learning knowledge management software system”. Main research interests are in programming, e-Learning, m-Learning, technology enhanced education, web design, and closely related fields. Participated in several project teams within different national and international research projects.
Majlinda Fetaji is an Associate Professor at the Faculty of Computer Sciences at South East European University -SEEU. She received her PhD in Computer Sciences at the Faculty of Contemporary Sciences and Technologies at South East European University -SEEU with the dissertation thesis “MAI instructional model, MLUAT testing methodology and TBMLM methodology framework for developing mobile learning software solutions”. Her main research interests are algorithms and data structures, programming, e-learning, m-learning, virtual learning environments, and closely related fields. Awarded “Researcher of the year 2008” from the Macedonian Academy of Sciences for her research work in mobile learning and Technology Enhanced Education. Participated in different projects in Tempus, Erasmus and other national and international research projects. Head of the Quality Team of the Faculty of Computer Sciences. Published more than 80 scientific papers in international conferences and more than 20 international journals. The author can be contacted at m.fetaji@seeu.edu.mk.

Aferdita Abdullahu is a Master student at the Faculty of Computer Sciences at South East European University -SEEU. His main research interests are usability testing Flipped learning, e-learning, m-learning, virtual learning environments, and closely related fields. She published 3 scientific papers in international conferences and 1 international journal. The author can be contacted at aferdita_al@hotmail.com.

Goce Armenski is an Associate Professor at the Faculty of Computer Sciences and engineering at Saint Cyril and Methodius University. He received his PhD in Computer Sciences at the same University in PhD in 2010 with the doctoral dissertation titled “Service-oriented architecture in e-testing” and in the same year he was selected as an assistant professor.” His main research interests are: e-learning, e-learning, web applications, service-oriented architecture. Published more than 40 scientific papers in international conferences and more than 10 international journals. The author can be contacted at goce.armenski@finki.ukim.mk.

Ljupcho Antovski is an Associate Professor at the Faculty of Computer Sciences and engineering at Saint Cyril and Methodius University. He received his PhD in Computer Sciences at the same University in January 2008 with a doctoral dissertation titled "A New Model of Mobile and Wireless Electronic Public Service". His main research interests are: electronic voting systems, semantic enabled architectures, mobile and ubiquitous applications, e-business and e-government services. Published more than 60 scientific papers in international conferences and more than 15 international journals. The author can be contacted at ljupcho.antovski@finki.ukim.mk.
Appendix

Table 1
What Components Contribute to the UI Process

| Q1. What components contribute to the UI process and how should they be addressed in the design of software systems? |
|---------------------------------------------------------------------------------------------------------------|
| **UIT (Usability interface Factors)** | North Macedonia | Kosovo | Worldwide |
| 1. Visibility of system status. | 75 | 50 | 80 |
| 2. Match between system & reality | 75 | 80 | 90 |
| 3. User control and freedom | 100 | 100 | 100 |
| 4. Consistency and standards | 50 | 90 | 100 |
| 5. Error prevention. | 100 | 100 | 100 |
| 6. Recognition rather than recall. | 50 | 50 | 90 |
| 7. Flexibility, efficiency of use. | 75 | 85 | 90 |
| 8. Aesthetic minimalist design. | 25 | 25 | 75 |
| 9. Help users recover from errors. | 50 | 50 | 80 |
| 10. Help and documentation | 25 | 25 | 90 |

Source: Authors’ work

Table 2
What Is Important in UI

| Q2. What is important in UI and how should they be addressed in the design of software systems? |
|---------------------------------------------------------------------------------------------------------------|
| **Strongly Agree** | **Agree** | **Neutral** | **Disagree** | **Strongly Disagree** |
| 1. Visibility of system status. | 34 | 43 | 8 | 13 | 2 |
| 2. Match between system and the real world. | 29 | 39 | 14 | 17 | 1 |
| 3. User control and freedom | 39 | 47 | 14 | 0 | 0 |
| 4. Consistency and standards | 11 | 34 | 39 | 15 | 1 |
| 5. Error prevention. | 34 | 43 | 8 | 13 | 2 |
| 6. Recognition rather than recall. | 29 | 39 | 14 | 17 | 1 |
| 7. Flexibility and efficiency of use. | 39 | 47 | 14 | 0 | 0 |
| 8. Aesthetic and minimalist design. | 11 | 34 | 39 | 15 | 1 |
| 9. Help users recognize, diagnose and recover from errors. | 34 | 43 | 8 | 13 | 2 |
| 10. Help and documentation | 29 | 39 | 14 | 17 | 1 |

Source: Authors’ work
Table 3
What Are the Contributing Factors in Proper UI Design?

| Q3. What are the contributing factors in proper UI design? | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|----------------------------------------------------------|----------------|-------|---------|----------|------------------|
| 1. effectiveness                                         | 37             | 49    | 12      | 2        | 0                |
| 2. satisfaction                                          | 11             | 34    | 39      | 15       | 1                |
| 3. learnability (easy to learn)                          | 43             | 28    | 15      | 13       | 1                |
| 4. memorability                                         | 27             | 41    | 17      | 11       | 4                |
| 5. efficiency                                           | 21             | 39    | 20      | 17       | 3                |

Source: Authors’ work

Table 4
Effect and Relevance of the UI

| Q4. What are the effect and relevance of the UI in increasing the level of usability? | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|--------------------------------------------------------------------------------------|----------------|-------|---------|----------|------------------|
| 1. effectiveness                                                                     | 34             | 43    | 8       | 13       | 2                |
| 2. satisfaction                                                                       | 29             | 39    | 14      | 17       | 1                |
| 3. learnability (easy to learn)                                                       | 39             | 47    | 14      | 0        | 0                |
| 4. memorability                                                                       | 33             | 35    | 19      | 12       | 1                |
| 5. efficiency                                                                         | 11             | 34    | 39      | 15       | 1                |

Source: Authors’ work

Table 5
Effect and Relevance of the UX

| Q5. What are the effect and relevance of the UX in increasing the level of usability? | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|--------------------------------------------------------------------------------------|----------------|-------|---------|----------|------------------|
| 1. effectiveness                                                                     | 37             | 41    | 16      | 5        | 1                |
| 2. satisfaction                                                                       | 34             | 39    | 14      | 13       | 0                |
| 3. learnability (easy to learn)                                                       | 46             | 43    | 17      | 0        | 0                |
| 4. memorability                                                                       | 39             | 40    | 19      | 2        | 0                |
| 5. efficiency                                                                         | 42             | 34    | 16      | 7        | 1                |

Source: Authors’ work