User Empowering Design - Influences of Human-Computer Interaction Design on Users' Empowerment \ David Gallula

Abstract

The domain of Computerized Systems (or Information Technologies) is the basis of the Information Revolution that we are in its midst. It is changing the lives of entire generations and is shaping the faces of the human culture in various aspects: social, economical, educational. political, and others. Human-Computer Interaction (HCI) Systems - to whom belong social media, organizational information systems, medical systems, military systems, computerized learning systems, smartphones and their apps, personal/mobile computers and many other well-known technological applications - engulf and surround our lives and have powerful influence on our way of life, our feelings, and even on our aspirations and hopes. This research is part of a many-years effort that aims to change the perception in the development world of computerized systems: from focusing on the system itself to favor focusing on the humans that use it.

The foundational premise of the research is that computation should be directed to humanity. The foundations of this approach come from the humanistic psychology which places the human and his/her persona in the center. When we turn to develop computerized systems, the needs of the human user should be utmost in our order of preferences and high in our desires. We catalog the needs of the user by a needs hierarchy, and try to direct the characterization of the human-computer system to answer those needs.

We proceed from the User-Centered Design (UCD) that is the prevalent approach nowadays in designing HCI. This approach directs the system developers to adapt the systems to their users and their needs. Up to now, the researchers have identified two categories of major needs for humans using human-computer systems: functionality and experience. In response to these needs, two design methods have been shaped, where each one gives a design answer to the user needs:

the usability design method answers the need of functionality and the user experience design method answers the experience one.

However, the need for empowerment, that it turns out is the third need of the user of human-computer systems, has not been taken care of and is still not in the thought focus of research and industry. An interaction designer that works with the UCD method does not put the user empowerment in the system as his goal. Although, it could be possible that the current model for interaction design produces randomly and with no initial intent a welcome side effect of user empowerment. Following the approach of researchers in humanistic psychology and HCI thinkers we argue that the current state cannot be left intact and that we have to progress to satisfying the higher level needs - the empowerment ones; the fact that there is no ordered design method that gives a design answer to this need is our motive to research and propose such a method.

The main aim of the research therefore is to lay the foundations to a full design method that will be developed as time goes by. We propose a User-Empowerment Design (UED) method that aims to provide a design answer for the empowerment needs of the users. The research takes a snapshot of the field as it currently is and refines from it design principles of HCI systems that look like they could encourage empowerment in all dimensions. The research aims to discover how and in what ways it is possible to characterize and design HCI systems so that they would be directed to empower their users, while relating to the personality and demographic characteristics of the user.

This research topic is multidisciplinary and spans varied knowledge domains. The research literature that was chosen as a basis and background for this research is that that reviews and describes the different theories in HCI design, in user classification by relevant characteristics and in the area of personal empowerment. During the review of the theoretical background we understood that empowerment is both a process and outcomes, and realized that empowerment is divided into different types: professional empowerment, socio-community empowerment and personal empowerment. From the literature we saw that personal empowerment is composed of four psychological dimensions: Mastery, Independence, Competence

and Meaning. We found that the personal empowerment outcomes can be measured using a sayings questionnaire and the process itself using a self-reporting questionnaire. Considering the complexity of the program domains and the difficulty of defining specific outcomes, we chose to measure the process so we made use of the self-reporting questionnaire.

From the UCD method we learned that it is a must to classify the users to groups that for them a system is developed and we have shown that a popular method used nowadays in the classification arena, called Persona, makes use of the external characteristics, especially the demographic ones. We have estimated that user empowerment will be influenced from internal characteristics of users, the personality characteristics ("the big 5"), and presented research works that discuss the influence of personality characteristics on personal empowerment in the non-digital world.

In the research worlds of HCI there have been recently more and more calls for investigating the need for empowerment. A body of knowledge has slowly been formed that describes principles for designing technology that encourages and produces empowerment in its users. However, there are still no research works that discuss in a significant way personal empowerment through use of UCD design methods, of specific identification of the high need for empowerment and on constructing a design method that will provide a response to this need. We have reviewed the work of different researchers that describe the empowerment concept from different angles: some talked about empowerment in the sense of enhanced capabilities, some on professional empowerment, and some on social empowerment; there were those that saw the participation and involvement that are empowerment outcomes as the major aspects and there were those that renounced that approach. We took from those research works several important principles that are related to design of HCI systems and the design process itself.

As a result of the theoretical background, the following research questions were articulated:

Is it possible to influence the personal empowerment of a user by specific design of an HCI system? If yes, what will be the design principles and the major categories of topics that will be generated for that?

What will be the confounding variables - i.e., what will be the influence of HCI design on personal empowerment of different users (in relation to personality and demographic characteristics).

Do certain computerized systems have attributes that differentiate them from other systems and enable them to empower in better way. Does the domain in which the programs operate have an influence? Does the duration of work with the system influence empowerment? And do specific perceptions at the time of learning or work with the system have an influence on empowerment?

This research was based on field-anchored theory that promotes the bottom-up mapping of the researched area and the need to approach the field itself. Use has been made of a qualitative-quantitative combined platform both in the gathering of data and in the data analysis and following discussion.

In this research, use has been made of both online questionnaires and open questions, combined with varied materials written in different places, unofficial discussions that have been textualized, and observations. The questionnaire was composed of a chapter in which the testee described a technological application and provided details like duration of work, application type, feelings during work and nowadays, and additional questions on the application; from a chapter in which the testee reported on change in the empowerment state with an open question to explain what in the design of the technological application caused that; from a chapter of a personal questionnaire and a chapter of a demographic questionnaire. Following a continued effort, questionnaires were delivered by 172 participants of different computerized systems with the following distribution: a few more females than males (53.5%; 43.6% correspondingly); more younger people less than 40 (64.5%); a majority of academics (72.8%); and slightly more than half claimed knowledge in computers (52.9%).

The analysis of the qualitative component of the research was the most demanding and challenging. The analysis method was based on systematic qualitative content analysis from the open questions, that raised and gathered from it the design principles indicated by the testees (120 principles) and following were converged into 10 master categories. In this framework use was made of correlations,

difference analysis, variance analysis, and regression tests, between the quantitative data and the qualitative data that was converted to quantitative ones.

The outcomes show that users of computerized systems report on increase in personal empowerment, at all dimensions: Mastery, Independence and Competence in a strong and positive way; Meaning in a medium and positive way. The empowering design principles rising from the users sayings were analyzed and the analysis showed that the users tend to the safe and basic, i.e., on design principles that provide then with assurance and trust through use of technology or help them improve their performance in areas they feel lacking or weak. It turns out that usability is an important component in empowerment using technology - as an enabler but also as generative of empowerment by its own self; users that manage to operate the computerized systems feel empowerment; the Independence is positively influenced from design principles in the category of non-dependence; Independence and Competence are negatively influenced from design principles in the category of communication. Only part of the users tend to relate to technology an influence on the Meaning dimension of their life, and when they do that it turns out the design principles of social interaction, performance, humanity and usability are those that have positive influence. The design principle of privacy loss turned out as having a strong negative influence in restraining empowerment.

In addition, it was discovered that the demographic characteristics have a small and non-dramatic influence on empowerment. No differences were discovered between males and females in all empowerment dimensions and it can be said they are empowered in the same degree. Indeed, the research shows that whoever starts at a relatively lower starting point in the digital world, someone who is a digital immigrant - old age, low education or little computer knowledge - finds out that the technology is of higher capability to cause empowerment. The influence of the personality characteristics turned out to be even lower than the demographic ones; nearly no relations were found between different personality characteristics and the empowerment dimensions.

The users reported on empowering applications from different domains (work, personal management, entertainment, communication), and it was discovered that applications from the communication and entertainment domains are not of positive influence on empowerment. Considering the outcomes it can also be stated that

duration of work with the technological application us an important factor for empowerment: the more time of work the user has with the computerized system the more s/he tends to be empowered, especially in the Meaning dimension.

This research is only the infrastructural stage as part of the full design method to be developed in time. Initially it would be expanded into additional empowerment domains such as social, professional and community empowerment. Second, it will pass validation with confounding expectations over what has already been found in the current research of field mapping and also from empowerment theories from outside the real world. In addition, there is need to expand the research population and reach users that currently less identify this need or alternatively have difficulty in filling forms. Moreover, the method will include also empirical tests of the empowerment outcomes to ascertain that there is correspondence between the self-reporting and the outcomes. As claimed, the method developed will be utilized by HCI designers to enable empowerment in the systems they develop. The goal is to provide a full design method for the forthcoming important need of the users. We saw that the users are already situated in the empowerment world but in a carful and hesitant manner. Once the need for empowerment clarifies, the UED design method will be already established and available to the users.

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