User Empowering Design: Expanding the Users' Hierarchy of Needs

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Abstract: We offer a comprehensive framework for HCI designers to empower users. Our purpose is to lay the foundations for a complete design method: User Empowering Design (UED). Empowerment is not a new human need, and the ability of technologies to empower users has already been discussed and deemed important by many experts. UED concentrates on the human need to fulfil the potential for growth, increase strengths, and reduce weaknesses. It does not replace user-centred design (UCD) but expands it to a higher-level need. Thus, we suggest that UED is the third revolution in developing interactive technology. Just as user experience (UX) has expanded usability, UED expands the user experience. The UX design method focuses on the user experiences while interacting with a digital product (e.g., emotions, feelings, aesthetics, hedonic needs). The UED approach takes a step further, as it focuses on the impact that goes beyond the scope of the digital product with an emphasis on aspects that are in the user's main life path. Within this framework, we offer a methodology that includes eight distinct models, each referring to a variety of technologies that have an impact on personal, community and organisational empowerment. We explain the current need for a design that is intended to empower users, present the different models by describing their mechanisms, and offer practical examples to implement the empowering design.

1 INTRODUCTION

Technological advancement in recent decades has led to fundamental changes in the way users think about and use their digital products. Today, users are no longer settling for a merely functional product, or for having a pleasant experience when using the product. It seems that as technology progresses, users also expect more from their digital products. In this paper, we argue that product designers should address an additional need, which is at a higher level than user experience. Therefore, we call for **User Empowering Design** (hereafter UED). In his seminal paper, Shneiderman (1990) declared that users need to be empowered by technology and stated that they should "be able to apply their knowledge and experience to make judgments that lead to improved job performance and greater personal satisfaction." The

term "Empowerment" denotes reinforcing and enabling people so that they realize their abilities, increase their strengths, have a high level of belief in themselves, and perceive themselves as more self-efficient (Brendtro et al., 2002). Our research follows the idea that there should be design methods that intentionally achieve user empowerment (Gallula and Frank, 2014) and aims to encourage innovative ideas and tools for empowering users with technologies.

In recent years, we have witnessed a rise of the concept of empowerment in various fields, such as employment and learning. In the field of employment, one of the most prominent factors that impact employees' engagement, their commitment to the organisation, and their level of performance at work, is employee empowerment (Osborne and Hammoud, 2017; Hanaysha, 2016). In the past, work was regarded as a source of livelihood and financial security. Later generations sought interest and self-

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satisfaction in the workplace (including a good atmosphere, and fascinating tasks). Nowadays, people are looking for a workplace that allows them to develop abilities and skills, grow and feel empowered. In a similar vein, in the field of learning, the rhetoric of empowerment has been linked to formal education (Selwyn, 2011). This is evident in the literature related to learning technologies and pedagogic approaches, where the Internet is considered an appropriate space for autonomous learning and where students can exercise their power and experience with a high degree of freedom and control (see, e.g., Prinsloo and Slade, 2017; Bennett and Folley, 2019).

In this paper, we will address the manner in which digital products can provide empowerment to their users. We begin by describing the user empowerment framework, followed by a discussion of the applied implications of the model, and conclude with recommendations for future research. Before we broaden the scope of user empowerment and discuss how it can be applied in practice in designing digital products, we must first understand the building blocks on which user empowerment is laid, i.e., the current designers' focus on user's interaction with digital products and determine whether existing trends fulfil the aim of user empowerment.

1.1 Time to Address a Higher Order of User Needs

According to the User-Centred Design (hereafter UCD) approach, the purpose of a system is to serve its users, and the needs of the users should lead the design of the system's interface (Norman, 1986). Currently, the UCD approach concentrates on two main design methods that meet the users' needs: Usability and User Experience (UX). Usability emphasizes the effectiveness, efficiency, and satisfaction of execution (Nielsen, 1993) and UX emphasizes the feelings, sensations, and experiences of a user (Norman, 2004).

The UED framework is inspired by the ERG (existence, relatedness, growth) theory (Alderfer, 1969). This refers to an order of needs, in which certain needs serve as building blocks for higher needs. If we relate to Alderfer's theory, existence is the basic material required for living and is the cornerstone of the hierarchy pyramid; relatedness emphasizes the importance of social interactions and positive emotions, and growth describes the urge to continue personal development and therefore is at the top of the pyramid. We propose an extension to the UCD model by adding a third and higher level to the

users' needs hierarchy. We claim that it is time to consciously add user empowerment when designing digital products.

1.1.1 Usability: The First Need

Usability addresses the users' need to perform well in tasks and successfully complete the tasks conducted via the interfaces of digital systems (Nielsen, 1993). It refers to the extent to which a system, product, or service "can be used by specified users to achieve specific goals with effectiveness, efficiency (in minimum time, with minimum errors), and satisfaction in a specified context of use" (Bevan et al., 2015; ISO FDIS 9241-210). Nielsen referred to usability as a method for improving ease of use during the design process. The usability emphasizes the user's need to achieve pragmatic goals such as successful and efficient performance in tasks supported by the computerized system, with a focus on cognitive and task-oriented aspects, emphasizing the instrumental value of technological products (Hassenzahl and Tractinsky, 2006).

1.1.2 User Experience: The Second Need

A User Experience (UX) goes beyond meeting the instrumental (pragmatic) user's needs for usefulness, efficiency, and satisfaction. It strives to optimize the user's holistic experience, which includes the need to achieve hedonistic goals (Hassenzahl and Tractinsky, 2006). Among these goals, users require aesthetic pleasure, fun, being surprised, and entertainment (Gaver and Martin, 2000). The holistic UX includes emotions, beliefs, preferences, psychological responses, and physical behaviours (Bevan, 2009).

1.1.3 Empowerment: The Third Need

Shneiderman (1990) declared that users need to be empowered by technology. Kim and Gupta (2014) demonstrated the critical role of user empowerment in regulating IS infusion in organizations. Schneider et al. (2018) claim that empowering people through technology is of increasing concern in the HCI community and reviewed 54 CHI full papers using the terms empower and empowerment. Inspired by these previous works, we too concentrate on the human need to be empowered.

1.1.4 User Empowering Design (UED)

User empowering design (UED) goes a long way beyond the concept of UX. While UX strives to increase feelings and emotions of pleasure and

enjoyment, these remain within the limited context of interacting with the product or system. In contrast, UED focuses on the effects of the interaction beyond its occurrence, not in limited terms of reflection on the user experience, but in a way that benefits aspects of the user's life that are outside and beyond the product's use experience. UED is a powerful idea, because it is based on the understanding that technological product designers can positively impact the users' well-being. UED strives to strengthen the users and minimize their weaknesses, which are reflected in the central path of their life. Therefore, it significantly expands the ramifications that a product, system, or service has for its user by fulfilling the user's need to be empowered in their personal life.

We define UED as a method built from a collection of design rules and principles aiming to design HCI systems that meet the need for user empowerment. These systems will have positive effects on the perceptions or abilities that are in the main path of the user's life, in a way that minimizes the user's weaknesses and/or emphasizes the user's strengths. While it is possible that the existing models for designing user-technology interaction might provide user empowerment unintentionally as a most welcome side effect, there is more to aspire to. We argue that the existing situation in HCI should not be left intact, and the growing need for empowerment must be addressed; The fact that there is currently no orderly design method that consciously provides an answer for this need motivated us to explore and offer a preliminary basis for such a method. As the previous two methods have evolved over decades of research and practice, we do not claim to offer in this paper a complete and encompassing method, but only raise awareness of this need and suggest implementation options.

Just as the need for good UX has not replaced the need for usability, so the need for empowerment will not replace the two previous needs. An empowering product should also be usable and provide a good UX. Different user need should not come at the expense of each other. However, different products may emphasize a particular need, according to their purpose and the context of their use.

1.1.5 Why Now?

To this date, there is no orderly method designed to empower users. We believe that the conditions for empowering users have matured, and this is the time for a qualitative leap towards a design that is consciously dedicated to user empowerment. This argument is based on four components:

First, it is the Zeitgeist of the current generation who grew up with technology, which leads its users to take functionality for granted, cease to be satisfied with positive experiences, and expect technology to improve their lives. As in the other areas of life we mentioned earlier - work and education - expectations from technology are undergoing a revolution. Usability and UX are already considered foundational and the need for a transition to the next level has arisen.

The second factor is technological maturity. Nowadays, the hybridity and friction between humans and technology (e.g., mobile and wearable devices, augmented reality, virtual reality, IoT) create a symbiosis between users and the technological products that surround them. Advanced digital developments such as Metaverse will increase this friction. New digital products will continue to adjust and adapt themselves to the user (e.g., by using AI and machine learning). While these technological developments integrate and keep the users more and more inside the digital matrix, the concept of user empowerment emphasizes positive changes in the users' well-being outside the virtual space.

The third factor is based on the fact that, at present, steadiness, in terms of not regenerating products, is detrimental to digital companies, and therefore there is a constant demand for continuous innovation. Big tech companies that have reached maturity and technological extraction are seeking their next breakthrough. Having a competitive innovation edge is a key aspect of survival and growth. This makes 'innovate or perish' the new motto of the global knowledge economy era (Shakina and Barajas, 2020). Thus, one way to overcome technological barriers and continue to innovate is by addressing the human high-quality need to be empowered.

Lastly, Netflix' "Social Dilemma" documentary, which came out in 2020, raised public awareness of the negative sides of social networks, including their ability to act as an "addictive drug" (see also Eyal, 2014 on the addictive patterns underlying technologies). We use the term "Junk Tech" (Bally and Desmaison, 2021) to describe technology as tasty but not healthy for us users. That is, we consume digital products in a way that is equivalent to eating unhealthy fast food. Technological products capture our attention and without being aware, we fall into the rabbit hole. This, for example, causes us to stay awake late at night, and thus affects us negatively the next day. Usability, user experience, and empowerment can be analogous to food consumption influences. Just as consumers have realized that they

can and should demand food that is not only fast and tasty, but also healthy, so will users of digital products undergo a transformation and stop settling for just the experience. They will demand products that will also improve their well-being, lead them to personal growth and help them fulfil the important goals in their lives. In other words, people will look for products that empower them to manage their well-being and health (Blandford, 2019; Seshadri et al., 2019). Illustrative examples are apps for body self-acceptance to elevate the self-esteem of young people (Paay et al., 2018), for raising the sense of self-efficacy among job seekers such as "review me" and "Interview4" (Dillahunt and Hasiao, 2020), and for dealing with social anxiety, such as the app "CogniShift" (Elefsen and Khaliq, 2021).

2 HOW TO IMPLEMENT UED

We propose to expand the UCD theory and add practical tools that enable user empowerment.

To develop a digital product, one must start from the premise of the steps within the UCD. Within them, we will focus on the first two processes of the UCD - research and concept, as a thorough examination of the design and test stages are beyond the scope of the current paper. When developing a new digital product or updating an existing one, the designers of the product must keep in mind that the product can improve the user's strengths, and we encourage them to think of ways to help the users reach their potential in the central path of their life.

2.1 Research

We consider the common tool of personas as an effective UCD method (Cooper, 1999; Jansen et al, 2022; Goodwin, 2011). In UED, the persona's description (user card) includes additional layers that describe the importance of the product for the user in terms of the technological product's potential impact on the user's life beyond the course of interaction with the product itself.

The UED approach introduces additional important aspects to the process of building personas, including the user's personal potential mapping tool. Using this tool, we ask about the life of the user and define their "main path," i.e. their important goals and ambitions, strengths and weaknesses in the context of that main path. Applying our mapping tool, for each persona we add several Likert-type scales, each representing an attribute that is relevant to the main path. The attributes are important characteristics or

abilities that the persona wants to have or fulfil. On each attribute scale, we mark the persona's current state and their potential future state. In addition, we describe the factors that currently inhibit or prevent the persona from realizing their potential.

2.2 Concept

We suggest that the product designer employ a systematic usage of our methodology. After the designer defines the trait/ability that the user wishes to emphasize and identifies the factor that inhibits the user's potential to advance that trait (the "preventive factor") – the methodology systematically leads the designers through certain paths to the most suitable design solutions.

The methodology we offer includes eight distinct models, demonstrated in Table 1. Each model appears in a separate column and represents a different "preventive factor." We suggest a suitable design solution for each of these factors, which may empower the user beyond the course of interaction with the technological product. We divided the models into two groups: four models see technology as the solution for dealing with the preventing factor, and the other four models identify the source of the preventing factor in the technology itself.

Due to space constraints, we will demonstrate only two models out of the eight described in Table 1, the Walls and the Ripples. For each, we suggest design features specifically intended to empower users using a popular instant messaging application, WhatsApp.

2.2.1 The Wall Model: Intergenerational Dictionary

Many adults experience technology as an obstacle in their lives. Age-related barriers are derived from normal changes that a person undergoes in cognition and physical conditions, along with affective barriers (age-related perceptions and attitudes towards technology). In addition, technologies are usually not designed to be age-friendly. The combination of these factors leads to intergenerational gaps and negative consequences, including digital exclusion that may, in turn, lead to social exclusion and deterioration of the sense of belonging (Katz and Sophia, 2021). The acquisition of online literacy for digital communication creates a linguistic gap that distinguishes generation Y from the baby boomer generation (Subramaniam and Razak, 2014). The use of nonstandard language, emojis and new forms of slang in social networks may lead to misunderstandings and communication barriers.

Table 1: The eight model that guides designers to empower users.

		Technology offers the solution			Technology causes the problem			
		mental aspects		lack of abilities		unintentional		intentional	
		motivation	barriers	transient	permanent	exclusion	side effects	to addict	to harm
		Engines	**Breaks**	**Trainers**	**Bridges**	**Walls**	**Ripples**	**Hooks**	**Bad Wolf**
Explanation		Technology deals with lack of motivation that prevents the user from persevering and succeeding	Technology deals with fears and changes thoughts that hinder the user from realising his or her potential	Technology offers proper guidance and coaching, so users will be able overcome transient difficulties and inabilities	Technology can help users overcome a permanent or inherent disability	Technology was not designed to fit the user's needs, and therefore becomes an obstacle, excluding users.	While technology solves a problem, it may create others, by causing unexpected by-products such as loss or degrade of capabilities	Technology was designed to addict the user or negatively affects the user	Technology was designed to allow for evil or is exploited by users in immoral ways
Design		Create a habit by encouraging existing motivations and by sparking hidden motivations	Encourage small successes and dissolve fears in a safe environment	Build a training process that will encourage the user to succeed without the product	Build a tool that will provide a permanent solution	Consciously include the user in the design process.	Refine and weaken the by-product outcomes without impeding the main product	Neutralize an addiction or create an alternative positive conduct	Block the possibility to harm and protect the users

One of the weaknesses of the WhatsApp application is faulty communication caused by the user being unfamiliar with unique slang and terms that are typical to the medium of instant messaging correspondence. Through the lens of the Walls Model, Katz and Sophia (2021) identified this problem and suggested a solution by designing "WhatsThat," which provides a synchronous automatic translation for dialogue participants.

WhatsThat offers a solution that reduces the gap between participants and minimizes possible negative consequences for the well-being of all family members, especially older adults. Figure 1 shows a screen that demonstrates message exchanges between Grandpa David and his grandson, Tamir. The figure presents Grandpa David's view. Grandpa David clicked on an embedded link for the word "sup" that the system generated automatically and received contextual knowledge (an explanation) retrieved from the system's dictionary (Figure 1).

The design contributes to fulfilling the user's communication potential with loved family members, especially grandchildren, by building common ground, increasing mutual understanding and overcoming potential miscommunications. This design focuses on empowering older adults' self-efficacy, a meaningful goal that is on the main path of their lives.
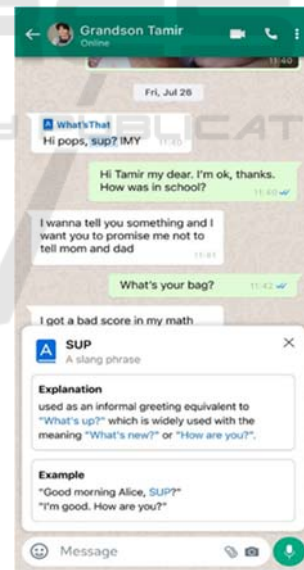

Figure 1: A synchronous automatic" translation" for dialogue participants.

2.2.2 The Ripples Model: Displaying the "Important" along with the "Recent"

Nowadays, people make extensive use of instant messaging applications throughout almost every waking moment. They constantly check, read, and

send messages in the context of various relationships and activities: family, friends, work, leisure, colleagues and more.

The Ripples Model portrays situations in which technology that was invented to solve a certain problem inadvertently creates other problems. For example, nowadays people hardly remember telephone numbers due to the high availability of digital personal contact apps. Another example is navigation apps, which help people efficiently move from one geographic point to another, freeing them from the need to remember the directions required to reach their destination. However, this technological assistance may come at the cost of the loss of intrinsic navigational skills and lack of attention to landmarks situated in a route. Thus, researchers list many negative side effects and ramifications of technological designs, including loss of navigational skills, memory loss, lack of attention, inability to form interpersonal relationships, loneliness and more (Amichai-Hamburger and Etgar, 2018; Turkel, 2017; Goodman, 2021).

For the sake of continuity, we will once again use WhatsApp to demonstrate another ripple effect. In order to meet user needs, WhatsApp designers surely applied the rules of usability and UX. To fulfil users' needs for efficiently detecting and reading messages, chats with the most recent incoming messages are presented at the top of the screen. This design strategy also reinforces the emotional UX level, since people become more engaged when seeing a new message. This emotional response is related to the widespread *Fear Of Missing Out* (FOMO), which triggers the need to be constantly updated. Presenting the most recent chats at the top supports the immediate need to know what is happening here and now at any given time.

Although the designers' good intentions to provide a user-friendly app that meets the users' need for usability and a good experience, WhatsApp's current design may impede the need of many users to preserve and promote certain relations that are important in their lives. As in various social media platforms, many users feel that their time and attention have been hijacked by the abundant social groups to which they belong and that intensive involvement in social media negatively affects their well-being (Sagioglou & Greitemeyer, 2014; Vorderer et al., 2017; Appel et al., 2020). A mundane message recently received in the kindergarten parents' group finds its way to the top of the chat list. An inflated volume of chats that find their way to the top of the screen may push important contacts (such as family members and dear friends) down the chat history and thereby lead to the "out of sight – out of mind" phenomenon. This may blur the distinction between recent and important, leading users to focus on recent chats while forgetting about the important contacts that are out of sight. WhatsApp developers identified this problem and attempted to offer various solutions, such as muting groups and allowing users to pin up to three chats at the top of the chat list. However, enabling users to pin more than three chats is not possible. In addition, WhatsApp's current design does not create a continuous awareness of the people that are important to the user. The user's ability to see their important contacts at any moment is crucial for the user's sense of control (Ng, 2004).

We propose a solution that does not require the user to give up the convenience of having recent messages appear at the top of the screen. Rather, we focus on adding a permanent horizontal bar of important contacts to the top of the screen (see Figure 2). We enable and encourage users to select and add their important contacts to the bar that we label "Important to me". This microcopy will appeal to the user's emotions and act as a subtle reminder of who is truly important to them. The ordinary vertical order of chats preserves the recent, while our new horizontal bar simultaneously pins the important to the top. Together, the vertical order of chats and the horizontal bar that we offer allow the user to find the balance between what happened recently (changes dynamically) and what is important (relatively constant), thus restoring their sense of control over the important things in life. This design will contribute to the user's main life path outside the product - maintaining and strengthening the relationships with the people who are truly important to them.
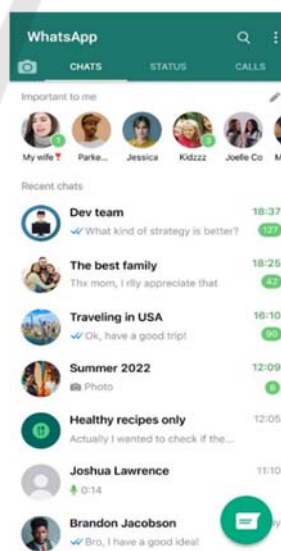

Figure 2: Fixed bar of important contacts in the upper part of the screen.

3 CONCLUSIONS

In this paper, we lay the foundations for a design method – UED, motivated by the fact that there is currently no orderly design method that consciously provides an answer for empowering users. We described the user empowerment framework and explained how it expands UCD to a higher-level user need. We also described practical solutions that implement the empowering design. Our framework offers a methodology that identifies eight models, each representing a variety of situations that may have an impact on personal, community and organisational empowerment.

Empowerment is certainly not a new concept. The innovation we offer is UED, designing digital products intentionally to empower users. UED is a powerful idea, as it emphasises the understanding that HCI designers can positively affect the users' well-being and aspects that are in the central path of the users' lives (behaviours, worldviews, feelings of self-worth, self-efficacy and even perceptions of the meaning of life). While most designers focus on providing influences that occur during the interaction (usability and emotions at the time of interacting), UED is meant to achieve positive effects way beyond the interaction. We wish not only to highlight this ability of designers to enhance the impact of their designs, but also call on designers to take responsibility for the characteristics of the product they produce and design products that will better the lives of their users.

There are already some very interesting and inspiring projects by Maes in MIT Media Lab that show how new body-integrated technologies may assist people by strengthening cognitive skills and "soft" skills such as attention, learning, decision-making, creativity, communication, and emotion regulation. Maes' works with her students and colleagues (e.g., Rosello et al., 2016; Leong et al., 2021) demonstrate how technologies can assist users in overcoming their limitations and realizing their goals. Some applications include intelligence augmentation, memory augmentation, motor augmentation, augmented decision-making and more. These works adopt a design approach to create and study new wearable and immersive systems that can help people reach a life with well-being, and while doing so, they are mindful of ethical and social issues.

In future works, we will further expand the description of the design stages (research, concept, design and test) under the UED lens. For example, we will elaborate on practical instructions for building a persona card that focuses on the user's weaknesses and strengths. We will also offer design principles for each of the eight models and include a solution plan for various problematic situations. In addition, we will expand the discussion beyond personal empowerment, to social and organizational empowerment. To these ends, we will refine the measures of user empowerment and test the usefulness of UED by means of empirical experiments.

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