

Measuring, Understanding, and Cultivating Wellbeing in the Age of Technology

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Abstract

The development of information and communication technology (ICT) has brought efficiency and convenience to our daily lives. However, it has also been observed to have a negative impact on the emotional state of users. The concept of *design for wellbeing* is currently drawing a lot of attention. This approach seeks to explore how ICT can support human psychological wellbeing. In this article, we address several questions related to the issue of how to exploit technology and design to improve the wellbeing of humans.

Keywords: wellbeing, human science, self-tracking

1. Introduction

People can now access information anywhere and anytime as a result of the development of information and communication technology (ICT). While the efficiency of intellectual tasks has improved dramatically as a result, there is now concern about the negative impact of ICT on people's mental state. For example, when users constantly pay attention to smartphone screens and alerts, they cannot relax their mind and body because they are forced to be in a psychological state of agitation. Also, because search engines present content that they surmise users want to see, there is the possibility that users will not come into contact with serendipitous information. In addition, social issues such as the high costs arising from addiction to social online games and bullying in private communication groups have also emerged.

Due to these trends, a paradigm shift in design that calls for technology to be not just efficient but also to contribute to wellbeing (WB) is taking place. Research on WB and experimental evidence that

serve as the foundation of this design are being demanded [1]. In fact, WB is one of the critical Sustainable Development Goals (SDGs) for 2030 adopted by the United Nations in 2015. In the field of architecture, the WELL Certification for buildings has already been adopted. This is an environmental certification system that evaluates architectural spaces for how well they incorporate WB. Information technology (IT) companies such as Google practice mindfulness, and business magazines such as Time publish articles on mindfulness and WB. These trends suggest that the issue of WB has reached a level of general awareness.

2. What is WB?

WB means good physical, psychological, and social conditions. However, its exact definition differs depending on the field and purpose. WB is broadly divided into three types. The first is medical WB, in which medically sound functioning of the mind and body is seen as the foundation of our life.

Medical WB can be measured in health checkups that we receive regularly and in questionnaires on mental health. The second is hedonic WB. This concept considers WB as the subjective emotion of happiness at the moment. In general, when people are asked “Are you happy?”, the answer tends to indicate a temporary feeling, which is hedonic WB. The third type is eudaimonic WB. Eudaimonic WB is defined as a state of being that can demonstrate the potential capabilities of mind and body, feeling significant, and leading an active life amid relationships with people around oneself. It is also expressed as *flourishing* [2].

From the perspective of eudaimonic WB, because achieving a *vibrant* state over a certain period of time is more important than momentary pleasure, WB in this definition is not necessarily limited to the idea that positive feelings are good and negative feelings are bad. For example, the process of accomplishing something may involve temporary hardship. However, if it brings about the feeling of accomplishment in oneself, it can be included in the process of eudaimonic WB. Thus, as seen above, there are several definitions of WB. Research on WB in recent years has not been limited to hedonic WB; rather, understanding eudaimonic WB through multidimensional factors such as subjective reports and physiological responses over a certain period of time is increasingly the objective.

Like *weather* and *the economy*, eudaimonic WB is a construct that can be understood by identifying specific factors. In the case of weather, quantitative evaluation of factors such as the temperature, level of humidity, barometric pressure, and wind speed can determine whether the weather is *good* or *bad*. Evaluation of WB also requires identification of factors and multidimensional evaluation. In general, factors that increase eudaimonic WB can be divided into several types (**Fig. 1**). Factors focusing on one’s present state include engagement, mindfulness, and motivation. Furthermore, factors indicating acknowledgement of self-affirmation are also included. These include self-esteem, self-competence, and self-compassion. There are also factors not contained within the individual, but which involve other people for smooth interpersonal relationships. These include empathy and compassion. In addition, there are also factors that transcend the boundaries of the individual person, such as contributing to society.

Although the achievement of all or some of these factors can contribute to WB, which factors bring about an increase in WB depends on each person. WB also differs depending on one’s life stage, such as

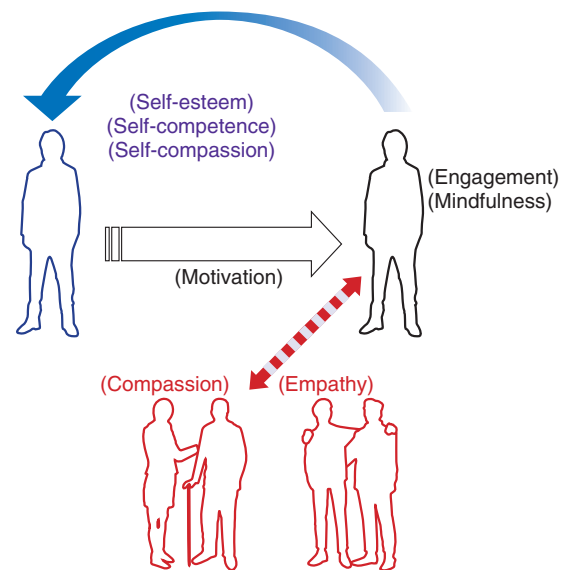


Fig. 1. Examples of factors of WB.

before and after marriage. Factors of WB in the workplace and in the home are also different. It is therefore important to clarify the time period of the person and the situation when thinking about how to increase WB. It is not possible to create a panacea that benefits all. Rather, it is important to be aware of one’s own WB and autonomously choose options to improve WB based on scientific evidence.

3. Measuring WB

In this section, we describe methodologies on how to measure factors related to eudaimonic WB. However, because there is not yet a unified methodology on what should be measured to evaluate eudaimonic WB and how, we give examples of current measurable phenomena and describe their possibilities. Phenomena that have been determined to be measurable factors of WB can be broadly divided into three categories. The first category consists of physiological responses such as changes in heart rate, respiratory rate, body temperature, and hormonal levels. Measuring these factors enables one to read the basic state of a person such as whether his or her body is in a state of nervousness or relaxation. Changes in the cardiac cycle in particular can be used as indicators to evaluate the activities of the autonomic nervous system’s sympathetic nervous system (nervousness) and parasympathetic nervous system (relaxation). Also, a hormone called cortisol, which can be extracted from

saliva and other bodily secretions, is used to measure stress.

The second category consists of behavioral information such as facial expressions, vocal intonation, and limb movements. When people are feeling positive, this is clear from their features such as the movements of particular facial expression muscles and the intonation of their voice.

The third category involves listening directly to descriptions. We can have a person express his or her conditions (subjective report), or ask others of their impressions of the person when viewed externally (third-person evaluation). Because the subjective report of the same event can differ if the person is asked to report how he or she feels at that point in time or if he or she is asked to reflect back on it after a certain period of time, care must be taken on how emotions are measured temporally. The content of the report may describe not only a person's bodily health and mental state, but also the subject's own feelings about the group or organization he or she belongs to.

WB in an organization is defined by replacing *the individual* with *the organization* in the definition of eudaimonic WB described above. It then refers to the state of an organization where resources can demonstrate their potential capabilities, carry out socially significant activities, and work actively in relationships with other organizations. It may be considered to be independent from WB for individuals. If that is the case, when we separate personal WB and organizational WB, it is possible to consider a balance of the two WBs and the factors contributing to this balance.

For eudaimonic WB, the factors need to be continually measured and comprehensively evaluated. What is critical is IT. At present, in addition to recording one's own subjective state, various technologies for self-tracking such as recording body temperature, heart rate, blood pressure, and sleep, are being commercialized. Using IT for self-tracking makes it possible to gain an accurate understanding of one's conditions based on data. Another advantage is the ability to compare one's own state at a certain time to the environmental conditions at that time. A simple example is the effect that a change in climate can have on one's state of health.

4. Research on WB at NTT Communication Science Laboratories

Because WB is determined by interpersonal relationships at a variety of levels such as family, friends, and organizations, it is necessary to analyze the mechanisms at each level when researching WB. At NTT Communication Science Laboratories, we have initiated research on WB and are measuring human physiological responses and elucidating empathy mechanisms in communication. We are establishing a foundation to explore evidence-based WB mechanisms in human beings and study design guidelines by integrating these research areas.

Specifically, in the area of human science, we are conducting research to scientifically understand the effects of experiences such as listening to music and practicing meditation, research on third-party evaluation of emotions to understand how a person's emotions are recognized by others, research on understanding the principles of psychological and physical bonds between mothers and their children, research on the effects that being together with others have on emotional response, and research on quantifying crowd sensations such as at an event or stadium by measuring group physiological responses simultaneously. Furthermore, we are conducting research on physiological response-linked tactile presentation technologies and research on intervention.

In this way, by engaging in WB research from a comprehensive and interdisciplinary perspective, we are pursuing the essence of WB. At the same time, we are engaged in design methodologies to realize conditions in which people and organizations can sustain vibrant activities (that is, WB). Specifically, we are creating indicators and developing measurement technologies for quantifying WB, suggesting product designs, service designs, and organizational designs, and studying how to contribute to sustaining interpersonal relationships (child-rearing and relationships in local communities) in a new technological environment.

References

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