Positive Computing

A New Trend in Business and Information Systems Engineering?

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1 The Idea of Positive Computing

Can information systems be developed to support the unfolding of human potentials and create positive impacts for all stakeholders in the future? Can we change the development paradigms from overcoming barriers and improving (weak) acceptance towards a positive perception and impact for all stakeholders? These are the key questions of Positive Computing and related research for the Business and Information Systems Engineering (BISE) community in the next years.

Positive computing denotes the "design and development of technologies to support well-being and human potential" (Calvo and Peters 2014). The concept is currently discussed as the "next big thing" in non-scientific publications (Rodruigez 2015).

Up to now, technologies have mostly been seen as an obstacle or threat to potential users who develop fears, addictions, or similar negative behavior ("the dark side of information technology"; cf. Tarafdar et al. 2015). This is strongly reflected in implementation strategies as well as in theories for information and communications technology (ICT) usage and diffusion which – in many cases – start with the assumption that certain barriers need to be overcome to successfully adopt technologies. The idea of positive computing might change this negative paradigm towards one of positive usage, perception, and adoption of technologies.

This new paradigm is rooted in positive psychology, a research trend aiming at emphasizing potentials instead of deficits of patients and at focusing on exploring conditions that promote people's well-being and flourishing (Seligman and Csikszentmihalyi 2000). Similar approaches are positive technologies (Botella et al. 2012) or positive design (Faust 2009). The concept of positive computing also relates to current societal trends such as the development and use of e-health or well-being apps including public sharing of experiences (e.g., achievement of goals) and emotions.

2 Positive Computing: Understanding the Paradigm

The initial idea of positive computing has been taken up by researchers in the field of (positive) design regarding human-machine interaction and its effects. The potentials of positive computing, however, go beyond human-machine interaction and should rather be understood as a research and action paradigm. Currently, improvements in efficiency and effectiveness are key objectives/outcomes in many design-oriented research areas of Computer Science and (Business and) Information Systems Engineering. The narrow perspective is for example represented in the constructs of the IS success model for user satisfaction. In contrast, positive computing gives priority to a broader interpretation of the outcomes, such as quality of life or well-being of users:

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Positive computing comprises concepts, processes and systems which contribute towards the quality of life and well-being of users.

The origins of positive computing lie in psychology: positive psychology (Seligman and Csikszentmihalyi 2000) represents a departure from the long prevailing deficit-orientation in psychology. The treatment of patients does no longer focus on their deficits and differences from the mainstream. Instead, the aim is to identify human resources and specific conditions that promote a positive physical or psychological development and allow for improvements in the quality of life through personal growth and flourishing of individuals and society as a whole (Biswas-Diener 2011). Information technologies can contribute in multiple ways to achieve this goal (faster); for example by monitoring, individualization, and making them widely available. Technologies fostering such activities as well as the idea of well-being and quality of life are summarized under the term positive computing (Sander 2011).

The specific goal of the positive computing paradigm emphasizes positive outcomes and impacts of ICT. Goals are for example wisdom, well-being, mental balance, empathy, or human potential. Thus, this paradigm aims at positive influences on human development in a general sense.

While the first applications in the ICT domain were directed towards design aspects and human computer interaction, the potentials of positive computing are much broader. They are not simply a different target function of IS adoption but a development paradigm. In Business and Information Systems Engineering as well as management disciplines, improvements are in many cases related to efficiency, effectiveness, of efficacy from the perspective of employers. However, it has been shown that work-life balance or generally the happiness of employees may also improve those economic goal systems (cf. Robertson and Cooper 2011). As a consequence, methods of the evaluation of success are beginning to change, shifting the focus towards social benefits and a socially responsible way of doing business (see e.g., http://www.fourthsector.net). Furthermore, technologies which integrate non-intrusively into our day-to-day activities are also recognized as systems that can potentially be used in a more positive way.

3 Current Developments

A variety of approaches and recent developments show the current status of the field. Similar psychological, economic, and social approaches can be found in the interdisciplinary field of research on happiness (Frey 2008). In computer science, comparable relevant approaches can be found: to

give an example, socially responsible computing includes approaches that consider the impact of computer science on society, organizations, and individuals (cf. Friedman and Kahn 1992). Another related area of research in computer science is affective computing (Calvo and Peters 2014) which deals with emotional aspects and in particular with the emotional perception and impact of user interfaces. Also, persuasive computing ("captology"; cf. Fogg 2002) represents an adjacent field in the context of which applications/interfaces are attributed the potential to form, intensify, and modify human attitudes, behavior, and feelings. A final influencing research trend can be observed regarding the user behavior in social media: social networks do not only (directly and indirectly) influence well-being (e.g., building social capital, sense of connectedness, envy; cf. Krämer et al. 2015), people also increasingly share activities dealing with well-being and health aspects (such as their current body condition or completed sports activities).

Additionally, ubiquitous computing conceptualizes computational devices becoming more and more integrated into our day-to-day activities as well as allowing them to support users in order to fulfill tasks more efficiently (Friedewald and Raabe 2011).

In the business domain, human resource management focuses on well-being and its impact on individual and organizational performance (cf. Cooper et al. 2014). A current research strand discusses how engagement and well-being influences performance (cf. Truss et al. 2013). For example, there is evidence that positive emotions contribute to individual long-term performance.

Since the concept is so comprehensive, possible application domains are multifaceted: Examples are (individual) usage and emotional consequences (Krämer et al. 2015) as well as comprehensive use in health care (Riva et al. 2012) or education (Graesser et al. 2014). Thus, a scientific trend can be observed in the context in which researchers try to clarify how the design and use of information technologies (taking into account diversity issues such as gender and age) relate to well-being and quality of life and how they can be specifically used to promote and unfold human potentials.

One key issue is which scales can be used to measure outcome and impact. Although the definition and operationalization of positive emotions, circumstances, or preconditions of well-being and life satisfaction are very complex, existing scales for assessment and models have been developed and continuously redefined. For example, there are scales for the assessment of life satisfaction. The *satisfaction with life scale* (Pavot and Diener 2008) or the *flourishing scale* (Diener et al. 2009) are widely used. These scales can be taken as a basis for a broader measurement of IS success.

From a practical perspective, various research projects and initiatives have been launched which address issues to pursue the goal of a flourishing society (Sander 2011): ubiquity, data (on our emotions, behavior, relationships) allowing for contextualization and customization, persistence and persuasiveness, creation of augmented and virtual worlds, scalability/mass availability, and openness (allowing for diversity and participation).

To mention some specific examples, the project Silvergame[1] from the healthcare sector creates applications for elderly people including the creation of virtual communities to improve virtual and face-to-face social contacts. It includes the positive use of technologies (e.g., speech/gesture recognition). As a second example, the project Superbetter[2] is developing a customizable mobile app game for a broader audience, aiming at strengthening people's resilience (i.e., the ability to cope with challenging situations in life). Players can select and complete challenges in four categories that were shown by research to support resilience and promote their health and well-being, namely social, emotional, mental, and physical strength. The BinCam project[3] combines gamification and playful interactions in sustainable behavior, communication, and social connections/embeddedness in a network with the promotion of an environmentally friendly food waste and recycling behavior.

4 Challenges for Business and Information Systems Engineering

The discipline of Business and Information Systems Engineering has, for a long time, contributed towards the development of organizations, their processes and systems while focusing less on technologies than on actors/stakeholders. However, several challenges remain when looking at technologies from a different perspective. The diversity of approaches and opportunities should – as a next step – be operationalized to concrete research strands in the BISE community. Positive computing might move from initial application domains like e-health or e-learning to further domains such as banking or the insurance sector. A variety of design-oriented issues can be identified.

4.1 Organizational and Process Design

One key issue for organizations is to create processes which include positive impact for both, the organization and individual stakeholders. From an organizational perspective, this means that strategies need to be designed which value employees' well-being and focus on the relevance of well-being for organizational performance. From a process perspective, it is important to consider effects and impacts of changes (e.g., adopting new systems and processes). It will be necessary to include processes which ensure/improve well-being of participants. On top of this, well-being aspects could provide a new basis for key-performance indicators that allow to control the quality of processes. Also, the overall process needs to follow a different paradigm; instead of addressing barriers, refusal, and fears, a positive approach needs to be used from the very beginning. One core research question that needs to be addressed is therefore: How is it possible to create technology-induced changes which improve the employees' situation and are perceived as positive?

4.2 System Design and Development

For systems development, a similar positive paradigm needs to be explored and taken into account in practice. For example, this paradigm has a strong implication on the acceptance of assistance systems, especially in home environments. Therefore, different phases and levels of development processes should be addressed. In early stages, such as the requirements elicitation, it should be taken into account which aspects can contribute towards the well-being of actors. This means that not only process and systems' requirements, but also non-functional requirements need to be collected and extended towards quality of life or the creation of positive experiences. Moreover, it should be considered in later design phases how positive interactions and positively perceived user interfaces can be created. This design approach will lead to frequent interactions with stakeholders as well as to new assessment methods.

4.3 Theories, Methods, and Metrics

The positive computing paradigm is not yet reflected in current theories in the IS domain. In general, more interdisciplinary research is necessary to integrate traditional IS approaches with new theories and methods from positive psychology or even happiness research. To provide some examples, models such as the IS success model or the TAM need to be extended towards more holistic ones. This includes the development of new metrics beyond systems quality or ease of use: adoption and diffusion processes need to be validated regarding their effects on organizational performance as well as individual well-being or even quality of users' life. A discourse on theories, methods, and metrics should be initiated in the IS and related communities.

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[1] http://www.aal-europe.eu/projects/silver-game/.

[2] https://www.superbetter.com/.

[3] https://openlab.ncl.ac.uk/bincam/.

To summarize research challenges and questions, the impact of including positive computing into BISE research and development appears to be tremendous. The design of organizations, processes and systems needs to be approached from a different, extended perspective. As a consequence, the whole design process might be re-considered, starting from strategy and process design up to fine-grained interaction design. This leads to challenges for both the theoretical and methodological perspective as well as for design-oriented research and practical development.

5 Conclusion

Positive computing can be seen as a paradigm for organizational, process and systems development. The article has described the roots of the concept in positive psychology and further sketched recent developments in related disciplines. The BISE community seems to be a promising community to explore the paradigm further; not least since BISE is traditionally seen as a bridge between different disciplines. The positive computing paradigm cannot only change research and development processes but moreover lead to a different view on technologies in society.

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