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EDITED AND REVIEWED BY
Martin Shepperd,
Brunel University London, United Kingdom

*CORRESPONDENCE

Javed Ali Khan
✉ j.a.khan@herts.ac.uk

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Editorial: Human-centered approaches in modern software engineering

Javed Ali Khan*

Department of Computer Science, University of Hertfordshire, Hatfield, United Kingdom

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Editorial on the Research Topic

Human-centered approaches in modern software engineering

Introduction

Due to the increasing applicability of software applications in people's daily lives, ranging from education to health, e-commerce, finance, and social media, software engineering is no longer predominantly a technical domain. Instead, along with the technical domain, including algorithms, complexity, efficiency, and architecture, end-users are a central part of software applications, contributing to their success and failure. Therefore, it is essential to develop and propose human-centric software development approaches that address the pressing needs of modern software engineering and ensure the success of software products. Conversely, if ignored, it causes harm in terms of financial losses and reputational damage. Considering this pressing need, research has begun to focus on human-centric and value-based software engineering approaches, including value-based requirements engineering, value-sensitive design & software development, and value-first software engineering to improve user experiences and satisfaction.

Following this trend, there has recently been increasing interest in identifying human-value violations in software artifacts. For this purpose, research explores different social media platforms, including app stores, software APIs, and developers' discussion forums, to identify frequently violating human values. However, several of these approaches are exploratory and manual. At the same time, modern software development is not limited to in-house users. Instead, software app users are distributed globally, sharing their experiences through user reviews in app stores, discussing & arguing on user forums, and asking questions and seeking clarifications on developers' specific forums. Software vendors and developers can harness the power of machine learning, deep learning, and large language models to extract useful information for human-centric software development and evolution by identifying human-value violations to improve app performance based on end-user experiences. Researchers have, however, proposed user-centric review approaches powered by machine learning and deep learning, but these approaches are specific to certain human values, including ethical considerations, privacy, and security. Moreover, holistic, user-centric approaches that identify more fine-grained human value violations, along with technical software-related information, would meet the demands of modern software engineering by semi-automating the software evolution process based on user experiences.

The Research Topic on *Human-Centered Approaches in Modern Software Engineering* aimed to explore recent state-of-the-art approaches to human-centric software engineering to improve software quality and user experience by better satisfying end-user needs and requirements. The various articles accepted for the Research Topic span different approaches to human-centered software engineering. For example, [Chelly et al.](#) proposed a user persona-based approach to mitigate and prioritize user-centered design and usability challenges experienced by the open-source software (OSS) developers. Whereas, Personas are fictional characters that represent actual end-user groups and help developers better understand user needs, thereby improving user-centered design. To enhance the effectiveness of the proposed approach, an experiment was conducted with 3 OSS projects, namely Lichess, Audacity and Moodle, and software developers show high credibility, consistency and friendliness in using personas in OSS projects. [James Falana et al.](#) proposed a hybrid research approach that employs fuzzy Analytical Hierarchy Process (AHP) and game-theoretic methods to address pressing user privacy concerns on social media platforms, including X and Meta. Their proposed approach helps in lowering privacy hazards while game theory enables various stakeholders to collaborate on developing efficient privacy prevention measurements. [Fatima et al.](#) developed a gamification-based approach, ReGile, to equip and educate software engineering students with agile-based requirements engineering activities. Their approach keeps students engaged and helps them grasp human-centered agile requirements engineering while interacting with various stakeholders. The ReGile was evaluated with 87 software engineering students using the M-3 approach, and students reported satisfaction with its usability and achieved 72.14% accuracy in answering questions related to agile and requirements engineering. [Qayyum et al.](#) conducted a detailed survey to identify the human factors involved in the intertwining of crowdsourced software development (CSSD) and agile software development. They aim to identify the challenges software developers encounter and develop possible mitigation strategies. The authors grouped challenges and their mitigation strategies into six categories. These challenges and identified strategies could help propose novel software development approaches that aim to integrate CSSD with agile development to improve user-centric development. [Hani et al.](#) proposed a machine learning-based approach to predict and analyse hackers' personality profiles using the Big Five personality model. For this purpose, the author used the K-means algorithm to determine hackers' personality traits. The authors achieved an accuracy of 94% using a cross-validation approach and evaluated on a dataset. Finally, [Ciancarini et al.](#) conducted an exploratory study to investigate the social problems encountered in conducting modern code review (MCR) to assess code quality, with the aim of improving software quality. For this purpose, the authors used grounded theory and goal-question-metric approaches to collect data from

software developers on MCR. Later, they conducted interviews with 25 developers and 13 vendors to extract information on the social problems' implications on MCR. Their findings show that interpersonal relationships have significant consequences on the MCR.

To summarize, the published papers highlight the importance of user-centric approaches for modern software engineering, aiming to enhance the quality of software applications by emphasizing user involvement in the software development process. As this field is evolving, we hope that these research publications will further encourage software researchers and vendors to contribute to human-centric software engineering by proposing innovative research approaches. We are thankful to the authors for their contributions to the field and for their submission to the Research Topic. Also, we are grateful to the reviewers for their contributions in evaluating the research approaches to improve their quality and readability. Furthermore, we are thankful to the Frontiers team for their continuous support and guidelines throughout the process.

Author contributions

JK: Writing – review & editing, Writing – original draft.

Conflict of interest

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Generative AI statement

The author(s) declared that generative AI was not used in the creation of this manuscript.

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