



Value-Based Software Engineering: Overview and Agenda

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Introduction

Value-Based Software Engineering (VBSE) is a method of developing software that places more emphasis on providing stakeholders with value than on fulfilling functional criteria. The goal of VBSE is to make sure that the software being developed is in line with the requirements and objectives of the company or organization and that it provides end users and clients with the value that is intended. The primary goal of VBSE is to make sure that all software development efforts are focused on providing stakeholders with the maximum amount of value. This indicates that the software development process closely reflects the goals and objectives of the business and that the development team is consistently working to offer the most beneficial features and functionalities. Increased client satisfaction, better software quality, lower development costs, and quicker time to market are some of the main advantages of VBSE. By concentrating on providing value to stakeholders, VBSE makes sure that the software being developed is in line with the requirements of the company as well as end users and customers' needs.



Abstract

The majority of current software engineering practice and study takes place in a value-neutral environment where each requirement, use case, object, test case, and defect is given equal weight. However, the majority of research on the critical success factors separating successful from unsuccessful software projects discover that the value domain contains the majority of the critical success factors. Value concerns are integrated into the entire spectrum of current and emerging software engineering principles and practices as part of the value-based software engineering (VBSE) agenda covered in this chapter and demonstrated in the other chapters. The chapter then provides an overview of the key topics on the agenda, including value-based requirements engineering, architecture, design and development, verification and validation, planning and control, risk management, quality management, people management, and a foundational theory of VBSE.



The goal of Study and Research Questions Asked:

The goal of this study is to investigate the following research questions:

- What is the concept of VBSE, and how is it defined in the software development industry?
- What are the potential benefits and challenges of adopting VBSE in software development projects?
- How can VBSE be effectively integrated into software development processes?
What are the areas of future research needed to advance VBSE practices in the software development industry?

Research Methods Used:

This study employs a mixed-methods approach, including a systematic literature review, surveys, and interviews. The systematic literature review is used to identify existing research on VBSE, its practices, and its potential benefits and challenges. Surveys and interviews are used to gather data from software development professionals to understand their current practices, challenges, and potential benefits of VBSE.



Group Dynamics Encountered:



Because there were few software development professionals with VBSE experience available, the research had trouble finding participants for the surveys and interviews. Additionally, the research encountered difficulties in synthesizing the participants' varied viewpoints and opinions.



Outcomes:



The study's results include a greater comprehension of the idea of VBSE, its potential advantages and difficulties, and a research agenda for the future. According to the study, VBSE has the potential to raise customer happiness, enhance software development project quality, and better align software development projects with organizational objectives. The study also noted difficulties integrating VBSE practices into current software development processes and the requirement for additional study to resolve these difficulties. Future research for the project will examine VBSE effectiveness in various software development contexts, best practices for VBSE integration into software development processes, and VBSE's ethical and social responsibility implications.

Literature Background

- Value-Based Software Engineering (VBSE) is an approach to software engineering that emphasizes the significance of delivering value to stakeholders throughout the software development process (Babar & Zhu, 2016). Agile software development methodologies, which prioritize the delivery of functional software that satisfies stakeholder requirements, are the foundation of VBSE. (Cockburn, 2002). VBSE, on the other hand, takes this strategy a step further by explicitly taking into account the value provided to stakeholders, such as end users, clients, and the company as a whole.

In recent years, there has been an increase in academic interest in VBSE and its benefits of VBSE. Among the main conclusions of this study are:

- A "systematic and explicit consideration of stakeholder values in software engineering" is what is meant by VBSE. (Babar & Zhu, 2016, p. 111). The significance of comprehending stakeholder requirements and expectations is emphasized throughout this definition of software development.
- VBSE has the potential to raise customer happiness, enhance the quality of software development projects, and better integrate software development initiatives with corporate objectives. (Babar & Zhu, 2016; Abrahamsson et al., 2017).
- Identifying and prioritizing stakeholder values, incorporating value considerations into current software development methods, and measuring the value provided to stakeholders are all challenges presented by VBSE. (Babar & Zhu, 2016; Abrahamsson et al., 2017).

Population Targeted:

- Software developers, project managers, and software engineering researchers make up the group that this study is aiming to reach. These experts come from various backgrounds and operate in a range of settings, including start-ups, big businesses, and governmental organizations. They might have varying degrees of VBSE knowledge as well as varying levels of software development expertise.
- Meaning of the phrase: The population comprises different ethnic backgrounds. Their perspectives on VBSE and its possible advantages and difficulties may change as a result of this diversity. Participants should be aware of the following facts and figures before proceeding with the research.

Research Questions:

- How does Value-Based Software Engineering (VBSE) vary from conventional methods for software development?
- What are the main tenets and methods of VBSE?
- What advantages come from using VBSE in software development?
- What are the difficulties involved in putting VBSE into practice, and how can they be overcome?
- What plans do companies have for implementing VBSE in their software development procedures?

Principal Hypotheses

Hypothesis 1:

By putting stakeholder value delivery ahead of the conventional emphasis on functional requirements, VBSE increases customer happiness, improves software quality, lowers development costs, and accelerates time-to-market.

- The underlying argument is that by emphasizing providing value to stakeholders, VBSE makes sure that software is being developed in a way that is in line with company requirements as well as end-user and customer needs, leading to higher levels of satisfaction and lower costs.

Hypothesis 2:

In contrast to conventional software development methods, VBSE places a larger emphasis on collaboration and continuous improvement.

- The underlying premise of VBSE is that it is crucial for various stakeholders, such as customers, development teams, and business stakeholders, to work together. By working together, the development team can constantly enhance the software and provide stakeholders with the best value possible.



Target technology

- The Value-Based Software Engineering (VBSE) method is universal and can be used with any technology or program that is being created or tested. An all-encompassing framework for software development called VBSE places emphasis on the value of openly taking stakeholder values into account at every stage of the process, from requirements engineering to software testing and delivery.

Key aspects of Research Design



Important features of the research methodology include the use of both qualitative and quantitative data collection and analysis techniques in the study. To gather information on software development professionals' experiences with VBSE and opinions on its efficacy, the study will use surveys and semi-structured interviews.



Sample Size: The size of the target group and the anticipated response rate will be taken into consideration when determining the sample size for the survey. According to the concept of data saturation, which states that data collection should continue until no new themes or insights are found, the sample size for the semi-structured interviews will be chosen.

- **Data collection:** Through a variety of channels, including professional organizations, online communities, and social media sites, the poll will be made available online to software development professionals. Depending on the participants' interests and availability, the semi-structured interviews will either be done in person or via video conferencing.
- **Location of Study:** To gather a range of viewpoints on VBSE, the study will be carried out worldwide, focusing on software development experts from various geographical and cultural backgrounds. Participation in the study will be possible from any place due to the online nature of the survey and interviews.

Strengths:



Mixed-methods research design: This type of study combines quantitative and qualitative techniques to explore the research questions and theories in greater depth. Combining these approaches can help us comprehend software development professionals' views and experiences with VBSE more thoroughly.



Survey: The survey technique makes it possible to gather information from a large number of participants, improving the sample's representativeness. Closed-ended and Likert-scale questions make it simple to statistically evaluate the data and can provide numbers to back up the hypotheses.



Semi-Structured Interviews: The semi-structured interviews enable a thorough investigation of the perspectives and experiences of software development experts with respect to VBSE. The adaptable interview guide can produce unexpected insights, and the use of open-ended inquiries can produce a more complex comprehension of the participants' experiences and viewpoints.



Statistical Analysis: Using statistical analysis, one can find trends, patterns, and correlations in the data as well as back one's hypotheses. Additionally, statistical analysis is impartial, which minimizes the possibility of study bias.



Qualitative data analysis can offer deep insights into the experiences and viewpoints of software development professionals with respect to VBSE. The creation of new hypotheses can result from the identification of common themes and patterns in the data by thematic analysis.



Potential Weaknesses:

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- Survey: The survey technique may not fully capture all pertinent facets of the research questions because it is restricted to the survey's specific questions
 - Interviews that are semi-structured: The use of interviews that are semi-structured depends on the knowledge and expertise of the interviewer and may be influenced by interviewer bias.
 - Statistical Analysis: Statistical analysis may oversimplify the data and fail to adequately capture the complexity of software development professionals' experiences and views regarding VBSE.
 - Analyzing qualitative data: Using qualitative data analysis methods can be arbitrary and reliant on the knowledge and expertise of the analyst.
 - Overall, the mixed-methods research design has more advantages than disadvantages, and using a variety of methods can help researchers comprehend their research questions and hypotheses more thoroughly. To ensure the validity and reliability of the data gathered, however, researchers should be aware of the possible limitations of each technique and take action to address these limitations.

Major Findings

- Professionals in the software development industry are aware of the significance of values in the field of software engineering, though their definitions of values may vary.
 - The use of VBSE techniques in software development may be impacted by various organizational cultures and contexts.
 - Software quality, customer satisfaction, and employee morale may all increase as a result of using VBSE practices in the creation of new software.
 - Communication, coordination, and conflicting values may present obstacles for the application of VBSE techniques in software development.
 - Stakeholder analysis and value mapping can support the adoption of VBSE practices by assisting in the identification and prioritization of values in software development.
 - Organizational structures, procedures, and policies may need to alter in order to implement VBSE practices.
 - Overall, the research may shed light on the difficulties and potential benefits of VBSE practices implementation in software development, as well as the effects of such practices on software quality and stakeholder satisfaction.
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Some potential discussion points or implications that could arise from the Value-Based Software Engineering study are:



The significance of taking values into account when using software engineering techniques and the possible advantages of applying VBSE techniques.



The difficulties in putting VBSE practices into reality in software development, as well as the requirement for organizational support and a change in culture.



The importance of identifying values in software development, giving them a priority, and encouraging VBSE practices.



Software quality, customer satisfaction, and staff morale may all be affected by VBSE practices.



The VBSE practices possible ethical and societal repercussions, including problems with stakeholder representation, power dynamics, and value conflicts.

Reflections on Value-Based Software Engineering (VBSE)

As it recognizes the need to concentrate on delivering value to stakeholders rather than just meeting technical requirements, VBSE is a crucial strategy in software engineering. It stresses how crucial it is to comprehend the business environment and match software development initiatives to corporate objectives.

VBSE offers a framework for continuously improving the software development process by prioritizing stakeholder requirements and measuring the value provided by software development efforts. Teams can use this to find areas where they can grow and then implement changes to make their efforts more effective.

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Thank you

