FRAMEWORK FOR STAKEHOLDER QUANTIFICATION AND REQUIREMENTS PRIORITIZATION FOR VALUE-BASED SOFTWARE DEVELOPMENT

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I declare that this thesis entitled "*Framework for Stakeholder Quantification and Requirements Prioritization for Value-Based Software Development*" is the result of my own research except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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This dissertation is dedicated to my family for their endless affection, support and encouragement.

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ABSTRACT

This research focuses on the Value-Based Software Development (VBSD) with respect to the Stakeholder Identification and Quantification (SIQ) process and Software Requirement Prioritization (SRP). The VBSD deals with implementation of the user needs in order of priority, services, processes, decision support and return on investment. Two major issues of stakeholder analysis and the SRP scalability are considered in this research for the VBSD. The existing SIQ approaches are complex, non-uniform and do not provide in-depth details of the SIQ process. Hence, the existing SIQ approaches are difficult to apply in the VBSD. Moreover, the existing SRP techniques are not scalable and are unable to solve the problem of VBSD with respect to the large number of requirements. Hence, a framework for the SIQ process and SRP is proposed in this research. The framework consists of SIQ process StakeMeter and a scalable system PHandler for the SRP. The SIQ process StakeMeter solves the issues of stakeholder quantification, higher time consumption, complexity and process initiation. Moreover, StakeMeter selects the critical stakeholders for the VBSD with less judgmental error. In the case of StakeMeter, the stakeholder value induces complexity in stakeholder inclusion and exclusion criterion. Moreover, the involvement of many experts in the SIQ results in biases. Hence, a decision support system SPHandler is proposed based on the stakeholder factors, neural network and fuzzy c-means. SPHandler solves the problems of biasness and scalability to quantify large number of stakeholders. The requirements, in the case of VBSD, vary from few to hundreds or thousands. Hence, a decision support system PHandler is proposed to solve the scalability issue of the existing SRP techniques. The PHandler comprises of value-based intelligent requirements prioritization approach, stakeholder values, neural network and analytical hierarchy process. Finally, the proposed framework helps in the selection of success-critical stakeholders and valuable requirements for the VBSD.

ABSTRAK

Kajian ini memberi tumpuan kepada Pembangunan Perisian Berasaskan Nilai (VBSD) berkenaan dengan Pengenalan Proses Pemegang Kepentingan dan Kuantifikasi (SIQ) dan Keperluan Perisian Keutamaan (SRP). VBSD menangani pelaksanaan keperluan pengguna mengikut keutamaan, perkhidmatan, proses, sokongan keputusan dan pulangan ke atas pelaburan. Dua isu utama analisis pihak berkepentingan dan kebolehan skala SRP dipertimbangkan dalam kajian ini untuk VBSD. Pendekatan-pendekatan SIQ sedia ada adalah kompleks, tidak seragam dan tidak memberikan maklumat yang mendalam tentang proses SIQ. Oleh itu, pendekatan-pendekatan SIQ sedia sukar untuk diaplikasikan ke dalam VBSD. Selain itu, teknik-teknik SRP yang sedia ada tidak boleh skala dan tidak dapat menyelesaikan masalah VBSD berkenaan dengan bilangan besar keperluan. Oleh itu, satu rangka kerja bagi SIQ dan SRP dicadangkan dalam penyelidikan ini. Ia merangkumi proses SIQ StakeMeter dan sistem PHandler boleh skala untuk SRP. Proses SIQ StakeMeter menyelesaikan isu-isu kuantifikasi pihak berkepentingan, penggunaan masa yang lebih tinggi, kerumitan dan proses permulaan. Selain itu, StakeMeter memilih pemegang kepentingan kritikal untuk VBSD dengan kurang kesilapan pertimbangan. Dalam kes StakeMeter, nilai pihak berkepentingan mendorong kerumitan kriteria kemasukan dan pengecualian. Selain itu, penglibatan ramai pakar dalam keputusan SIQ menyebabkan berat sebelah. Maka, keputusan sistem sokongan SPHandler dicadangkan berdasarkan faktor pihak berkepentingan, rangkaian neural dan min-c kabur. SPHandler menyelesaikan masalah kecenderungan dan skala untuk mengukur jumlah besar pihak berkepentingan. Keperluan, dalam hal VBSD, berbeza-beza dari beberapa ke beratus-ratus atau beribu-ribu. Oleh itu, sistem sokongan keputusan dipanggil PHandler dicadangkan untuk menyelesaikan isu skala dalam teknik SRP sedia ada. PHandler adalah berdasarkan pendekatan keutamaan keperluan pintar berasaskan-nilai, nilai pihak berkepentingan, rangkaian neural dan proses analisis hierarki. Akhir sekali, rangka kerja yang dicadangkan membantu dalam pemilihan kejayaan-kritikal pihak berkepentingan dan keperluan yang bernilai untuk VBSD.

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