

Determining System Quality Attributes from the Architectural Decision-Making Process

Trevor Harrison Dr. Thong Nguyen

PhD Student, University of SA Research Program Manager, D.S.T.O.

Trevor.Harrison@postgrads.unisa.edu.au

Thong.Nguyen@dsto.defence.gov.au

Defence and Systems Institute, University of South Australia

ABSTRACT

The less uncertainty in a project, the less risk. Design is an ongoing process for reducing significant uncertainty. Quality attributes of any system are directly related to the quality of the system architecture design. The problem is that software design is (1) the least defined of all engineering processes despite detailed software design methodologies, and, (2) there are so few software design artefacts; many data points are needed for continuous tracking of "ongoing reduction of uncertainty". Both quality assurance of the design process and quality control of design artefacts appear compromised where software is required. Following a multi-discipline literature review, this paper proposes a solution which builds on a draft international standard and maturing research into "architecture decision rationale". Each treats software architecture as a multitude of networked decisions. Existing research can be enhanced by inclusion of sensitivity to timing of decisions and influencing factors. Unattended, highly personalised decision analysis will be claimed as the catalyst for accurately tracking reducing uncertainty as software architecture design progresses and system qualities become more predictable. The end vision is traceability between quality architectural decision-making and actual real-life fielded quality of software-intensive systems. The application of this traceability is in systems acquisition. The acquirer has a need to evaluate early design artefacts (architecture) and determine the level of unfinished design i.e. gauge the level of risk of not meeting system quality goals. A secondary need is determining a realistic rate/throughput of further design decision-making to reach a required system quality and acceptable risk.

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