

THE EVALUATION OF DIFFERENT VALIDATION TECHNIQUES FOR SOFTWARE DEVELOPMENT PROCESSES

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ABSTRACT

The increasing demand for software in the last decades led to a most intensively use of specific software development processes. Although there are several software development processes with different characteristics in the literature [1], such processes are not enough to encompass the numerous fields of software applications, especially for the use in conjunction with scientific software development. The practices of development differ among the developers and, therefore, sometimes it is necessary to improve or join processes already known to guarantee one needs. Consequently some software producers are still in need of specific processes that can attend their particular interests and, in some situations, forcing them to conceive new processes.

In relation to scientific research, in the last three years an investigation has been done in order to conceive a development process specific to this kind of software [2, 3]. The proposed process, named Specific Development Process for Scientific Software, has been formalised and is currently being evaluated. However, the guarantee of its success depends upon a clear and well defined validation technique. A process can only be checked for correctness and efficiency after being thoroughly tested and validated. The validation is conceptually complex and related to a wide range of issues, many of them very subjective, what leads to a possible absence of guidelines or benchmarks to validate a process for development of software.

In software, verification refers to a set of activities that certifies that the product performs correctly a specific function, and validation refers to a set of different activities that ensures that the built software corresponds to the real requirements of the customer [1]. Hence, the definition of Verification & Validation (V&V) encompasses activities that are incorporated by the software quality assurance, for example, technical formal revisions, quality auditing, performance checking, feasibility study, walkthrough, among others.

In this point, it is important to emphasise that a development process is something conceptual, or logical, and that the application of verification would not make any sense. Verification analysis and test techniques need a physical or implemented product. In the present context, one is not interested to say that the product was built correctly, in

accordance with the process, but to assure that the process is paying the proper attention to the necessities of the developers in relation to the Software Engineering issues. In other words, the process must represent with correctness the activities of communication, planning, modelling, construction, deployment and maintenance in the perspective intended by the people of the project, which is just the idea of validation.

Similarly to software, the process validation can be applied in different ways, in accordance with each particular case. Yet, for obvious reasons, it is not prudent that the creators carry out the validation. Several principles used to software can be also employed in the validation of the process. For example, the validation effort must be spread throughout the whole life span of the process; the attained results can be partially presented at the end of each iteration so that errors can more easily be fixed (if the process really needs to be iterative), and; the documentation produced during validation must be part of the final documentation.

The present work considers the analysis and evaluation of software V&V techniques [3] to check their adaptation in the validation of software development processes. In particular, the investigation includes the validation of processes for the development of software created to be used in scientific research.

Finally, this research aims to apply the validation of software development process, as it is carried out for any software, having the participants working closely with the team who created the process under study. Besides, it should use documented and proven directives of software V&V to answer the following questions (1) “Is the software development process satisfactory to the objectives for which it is created?” and (2) “Is the software development process tangible to be followed?”. The questions should then be answered in the coherent, methodical and relatively simple form.

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