

Software Product Certification using ISO/IEC 25000

Software quality is currently a key feature for organizations owing to its impact on the final costs and because it is a competitive differentiator for customers. Moreover, when considering the losses that quality problems can cause and the real situation that exists in software development projects at present, according to the Standish Group's latest report "The CHAOS Manifesto", only 39% of software projects end in the estimated amount of time, with the planned resources and with acceptable quality. Considering the importance of software quality, the aim of this paper is to present a pilot project, which has been achieved to evaluate, improve and certify the quality of the software product.

Despite the proliferation of software quality processes certifications (ISO / IEC 15504, CMMI, etc.), there is little evidence that conformance to process standards guarantees good products. In fact, critics of this view suggest that process standards guarantee only uniformity of output and can thus institutionalize the production of mediocre or bad products. Thus, the idea that software evaluations should be based on direct evidence about the product's attributes, not circumstantial evidence about the process that are used to build it, is becoming more widespread. Therefore, it is ever-increasing number of organizations concerned not only by the quality of the processes, but also for the quality of the products they develop and / or acquire, because once the product has been implanted in their servers, they have serious quality problems.

The new ISO/IEC 25000 family of standards, also known as SQuaRE (Software Product Quality Requirements and Evaluation), appears to meet these needs. ISO/IEC 25000 aims to create a common framework with which to evaluate software product quality, replacing the previous ISO/IEC 9126 and ISO/IEC 14598 and becoming the cornerstone of this area of software engineering.

ISO/IEC 25000 is composed of several divisions, of which we highlight ISO/IEC 25040 which defines the process of evaluating software product quality, and [ISO/IEC 25010 which determines the software product characteristics and sub-characteristics that can be evaluated.](#)

AENOR (*Asociación Española de Normalización y Certificación*), which is a member of IQNet (The International Certification Network) in collaboration with AQC (Alarcos Quality Center), a spin-off of the University of Castilla-La Mancha, have conducted an evaluation and certification pilot project with the new ISO/IEC 25000 family of standards. This pilot project was initially focused on the quality characteristic of maintainability, principally because:

- Maintenance is one of the most expensive phases in the software life cycle and can reach up to 60% in some cases.
- Maintainability is currently one of the features that are most frequently requested by software customers. It must be possible for them to evolve the software products that they acquire either themselves or via the intervention of a third party.
- Maintenance work on products with little maintainability is more likely to introduce new bugs into the software product.

The evaluation and certification based on this family of standards provide software development companies and companies that acquire such software with a set of benefits, of which we can highlight those presented in this [link](#).

For this project, it was first necessary to create the AQC Lab laboratory, which is responsible for carrying out the software product quality evaluation process. [This laboratory performs evaluations by conducting the five activities proposed in ISO / IEC 25040](#).

It is also necessary to consider that the family of ISO/IEC 25000 standards defines models and processes in order to assess the quality of software products, but does not establish a correlation between the metrics and thresholds needed to identify the specific level of quality that a software product has. The laboratory has therefore defined not only a model and a quality process, that are aligned with ISO/IEC 25000, but also has identified a set of measurable quality properties from the source code of the software product.

The evaluation process, the quality model and the properties, along with a measurement environment, allow Laboratory to evaluate a software product and calculate its quality values.

Thanks to this framework, the laboratory has achieved accreditation from ENAC (*Entidad Nacional de Acreditación*), a member of ILAC (International Laboratory Accreditation Cooperation) under ISO / IEC 17025 as a laboratory for quality software product evaluation as regards the ISO/IEC 25000 family of standards.

Once companies evaluated and improved their software products, they could choose to certify these products (Figure 1). To do this, the certification entity (AENOR in this case) has additionally developed [a process for product certification and has defined the communication flow](#).

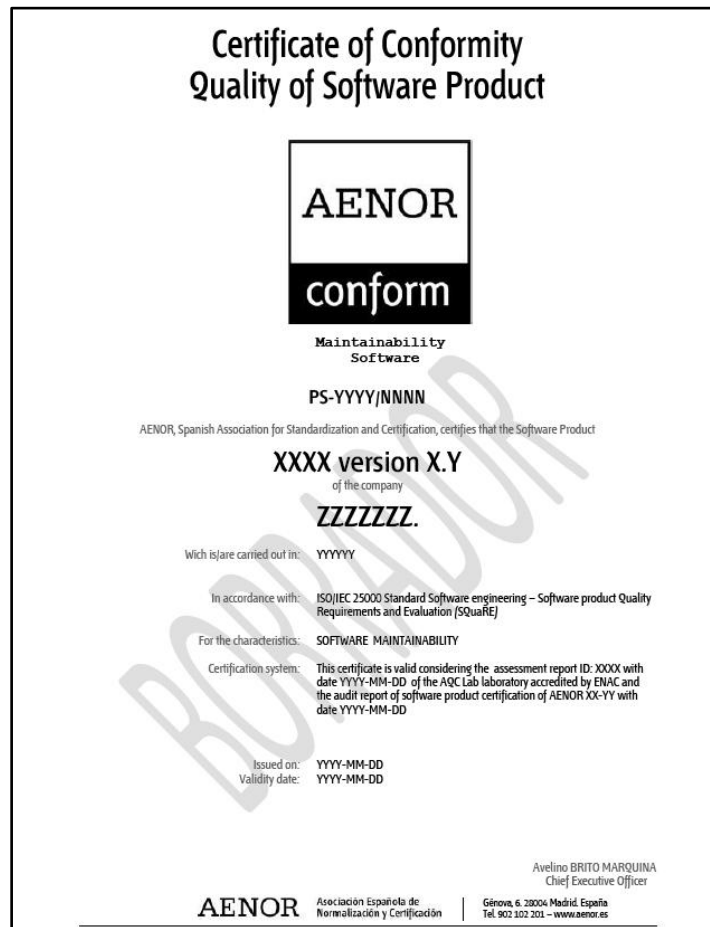


Figure 1. Example of Software Product Certificate

Several assessments and refactoring cycles were necessary during the pilot project. Three companies eventually attained quality certifications for their software products: A document management system, a digital library for mobile platforms and one supplying application software to healthcare centers. The CIOs of the companies that achieved certification have stated that among the main benefits for their certified software they can highlight:

- The code developed was reduced to 40%.
- Increased execution and load speed applications.
- The corrective maintenance effort was reduced to 90%.
- Incorporation of product quality evaluations in the software development lifecycle.



This pilot project has gained wide acceptance by the participating companies, both as regards those that succeeded in certifying their products and those that did not obtain the certificate, since they were able to detect the principal maintainability problems so as not to repeat them in the future. This pilot project has also shown that the software development sector is able to address the certification as regards not only the quality of the processes, but also the quality of the software product, using a scheme of international standards as is the ISO / IEC 25000 family. Finally, after this first pilot project, the scope of laboratory evaluations is now being broadened to include new quality characteristics of ISO / IEC 25000, such as functionality, usability, or performance. On the other hand, AENOR will support also the certification of the new quality characteristics, and they will work to align the software product certification with the software process certification.