CISQ Quality Characteristic Measures and the ISO/IEC 25000 Series

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Summary: The 4 CISQ Quality Characteristic measurement standards were developed directly from definitions provided in ISO/IEC 25010. They supplement the primarily external, behavioral measures defined in ISO/IEC 25023 by providing measures of the internal, structural characteristics of software source code that cause these external behaviors. CISQ will participate in the recently initiated revision of ISO/IEC 25010.

CISQ and ISO/IEC 25010: The four CISQ Quality Characteristic measures (Reliablity, Security, Performance Efficiency, and Maintainability) approved as standards of the Object Management Group (OMG) are directly related to the ISO/IEC 25000 (SQuaRE) series of software quality standards. The software quality model in ISO/IEC 25010 provides conceptual definitions of 8 quality characteristics and the subcharacteristics that compose each of them. The 4 CISQ Quality Characteristic measures quantify 4 of the ISO/IEC 25010 quality characteristics. The subcharacteristics were used to ensure that each CISQ measure covered the relevant space of quality issues defined for its associated quality characteristic in ISO/IEC 25010. Thus, **the 4 CISQ Quality Characteristic measures are drawn from and conform to software quality model definitions provided in ISO/IEC 25010**.

CISQ and ISO/IEC 25023: ISO/IEC 25023 defines measures for each of the quality characteristics and subcharacteristics defined in ISO/IEC 25010. However, ISO/IEC 25023 has an identified weakness in that the quality characteristic measures it defines primarily relate to the external behavior of a software product, rather than to the internal structural elements of the source code that cause the behavior. Consequently, in many cases it has been difficult to distinguish between ISO/IEC 25023's product quality measures and ISO/IEC 25022's measures of quality in use. ISO/IEC 25023 does not provide measures of structural flaws in software source code that affect the quality characteristics described in ISO/IEC 25010. ISO/IEC 25023 measures are primarily taken post-production rather than pre-production, and cannot be used to evaluate the risk of a software product prior to entering it into production. The CISQ Quality Characteristic measures are pre-production measures of the internal, structural characteristics of a software product. The CISQ measures are based on detecting and counting severe violations of good architectural and coding practice in the source code that need to be fixed because of the operational or cost risks they create. For instance, whereas ISO/IEC 25023 measures Reliability as hours of availability, CISQ measures Reliability by quantifying circular dependencies, poor error handling, and other flaws detected in the source code that can cause outages. Similarly, whereas ISO/IEC 25023 measures Security by unauthorized penetrations, CISQ measures Security by the existence of structural flaws in the source code such as buffer overflows or SQL injection opportunities that can be exploited for unauthorized entry. Thus, **the 4 CISQ Quality Characteristic measures supplement ISO/IEC 25023** by providing internal, structural measures the source code, that when triggered, can cause the behaviors quantified by measures in ISO/IEC 25023. As a result, the 4 CISQ Quality Characteristic measures add a level of risk and cost prediction and prevention that is not available from measures defined in ISO/IEC 25023.

CISQ and the ISO/IEC 25010 revision: A revision of ISO/IEC 25010 has been initiated under the leadership of Nigel Bevin (UK) to improve the clarity of its definitions and to increase emphasis on the internal, structural aspects of non-functional quality characteristics. When this revision has been completed and approved, it is anticipated that other ISO/IEC 25000 series standards will be revised as necessary to conform to the revised software quality model. For instance, ISO/IEC 25023 could undergo future revision to add significant coverage for measures of internal, structural quality related to each of the non-functional quality characteristics. **CISQ will contribute to the ISO 25000 series revisions** by submitting its 4 quality characteristic measures through OMG's fasttrack to ISO.