

**Reflection on Software Quality.** Review the article by McCall, Richards & Walters (1977). Select a timelier academic article on software quality. Discuss, in 300 words, the major differences in relation to software quality between the two articles.

McCall et al. (1977) outline the following software quality factors after completing a thematic grouping of factors identified within existing literature:

1. Correctness
2. Reliability
3. Efficiency
4. Usability
5. Integrity
6. Maintainability
7. Testability
8. Flexibility
9. Portability
10. Reusability
11. Interoperability

The field has evolved in complexity as it is argued there are increased expectations on developers due to general society's increasing reliance on modern technologies (Turing, n.d.). Bansiya & Davis (2002) propose a hierarchical Quality Model for Object-Oriented Design (QMOOD) to which they arrived to by considering multiple levels of quality – quality attributes (Level 1) design properties (L2), metrics (L3) and components (L4). The initial quality attributes they selected from ISO 9126 – functionality, reliability, efficiency, usability, maintainability and portability – are all present in the McCall's model, however they adapted their final model to consist of

reusability, flexibility, understandability, functionality, extendibility and effectiveness, with latter four missing from McCall's model. McCall argue understandability cannot be measured, however the QMOOD model specify that understandability is directly related to complexity, and they propose it can be measured with metrics such as Data Access Metric (DAM, related to Encapsulation property), Number of Polymorphic Methods (NOP, related to Polymorphism property) and others. Interestingly, QMOOD separate flexibility and extendibility, whereas McCall club extendibility (expandability) under flexibility. Extendibility is seen as a property in an existing design that permits an update based on new requirements by QMOOD. In McCall's analysis, expandability is directly related to data storage requirements, which is a simplistic view. It could be argued that extendibility has become a more critical feature nowadays given the popularity of Agile methodologies as a response to increasing competitiveness in the software industry.

In conclusion, the QMOOD model has narrowed down the number of dimensions used and developed their model in line with current approaches and challenges in software development. It is clear McCall's initial work continues to hold influence at a high-level, but more focus is being placed on ensuring measurability of quality.

#### References:

Bansiya, J. & Davis, C.G. (2002) A hierarchical model for object-oriented design quality assessment. *IEEE Transactions on software engineering*, 28(1): 4-17.

McCall, J. A., Richards, P. K., & Walters, G. F. (1977) Factors in Software Quality, Concept and Definitions of Software Quality. *General Electric Company*. Available from: <https://apps.dtic.mil/sti/pdfs/ADA049014.pdf> [Accessed 10 October 2024]

Turing (n.d.) Software Development: Is Complexity Killing it? *Turing*. Available from:  
<https://www.turing.com/kb/software-development-complexity#what-resulted-in-the-complexity-of-software-development>? [Accessed 10 October 2024]