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# Evolutionary Coupling Measurement: Making Sense of the Current Chaos

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## Abstract

*Objective:* The aim of this research is to evaluate the measurement of evolutionary coupling (EC) in software artefacts from a measurement theory perspective.

*Background:* Evolutionary coupling (EC) can be defined as the implicit relationship between two or more software artefacts which are frequently changed together. Previous studies on EC show that EC measures which are based on software change history information play an important role in measuring software quality and predicting defects. The many previous EC measures published are disparate and no comprehensive evaluation of the current EC measures exists. Therefore it is hard for researchers and practitioners to compare, choose and use EC measures.

*Methods:* We define 19 evaluation criteria based on the principles of measurement theory and metrology. We evaluate previously published EC measures by applying these criteria.

*Results:* Our evaluation results revealed that current EC measurement has the particular weaknesses around establishing sound empirical relation systems, defining detailed and standardised measurement procedures as well as scale type and mathematical validation.

*Conclusions:* We provide information about the quality of existing EC measures and measurement methods. The results suggest that there is more work to be done to put EC measurement on a firm footing that will enable the reliable measurement of EC and the accurate replication of EC measurement.

*Keywords:* Evolutionary coupling, Measurement, Measurement Theory

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