Characteristics of Good (Software) Metrics

Quality of the Metric

1. **Valid**: clearly related to the feature being measured e.g. monotonically increases as the feature increases
2. **Objective**: independent of personal opinion
3. **Reproducible**: measurements can be consistently repeated
4. **Precise**: sensitive to changes in the feature measured
5. **Robust**: not easily manipulated or sensitive to extraneous factors
6. **Comparable**: highly correlated with other metrics measuring the same feature
7. **Universal**: can be translated into sub-metrics for lower parts of the product or process

Costs of the Metric

8. **Economical**: does not consume significant resources for collection; preferably a by-product of other activities
9. **Standardised**: the metric uses a mathematically appropriate scale
10. **Sustainable**: likely to be valid in the future so that trend forecasts based on the metric will be effective
11. **Cost-Effective**: benefits from the data obtained justify the cost of gathering that data
12. **Useful**: supports the goals of the organisation

(source T. Woodings 1999, Revised R.Cardell-Oliver 2003)

Dangers and Pitfalls of Software Measurement

1. **What gets measured gets improved; What doesn’t get measured gets ignored**: metrics such as lines of code are intended to be used as indicators for programmer productivity; however the measurements might also be used to judge programmers; in this case programmers will be tempted to increase the verbosity of their code
2. **Lack of rigour**: incorrect application of experimental design, statistical analysis, validation of results
3. **Narrow applicability**: problem: results in one environment may not be applicable in another; solution: conduct your own measurements, use more than one metric
4. **Uncertainty of success**: the results of well designed measurement experiments may be inconclusive; a risk when introducing a measurement programme to an organisation; Political misrepresentation: Management clients for measurement data may have their own agenda; the real significance of results may be distorted; important to manage the expectations of those who will make measurement based decisions (e.g. limited accuracy of predictions, margin of error)

(source Hughes, Practical Software Measurement 2000)