CITS3220 Software Requirements and Project Management 2012

Handout for lecture 2 on Metrics

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 bi-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 distortedimportant 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)