Chapter 86
Website Performance Measurement:
Process and Product Metrics

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ABSTRACT

Some tasks will be easier to implement and test, and others will either be un-applicable or difficult to test and implement in comparison with testing in traditional software development environments. For engineering management, product and process quality evaluation are important assessment tools by which managers can have significant indicators of the evaluated project or product. There are many ways and characteristics by which websites can be evaluated. Quality attributes can be external or internal. They can be measured based on the developed product (i.e. the website) or the developing process. In this chapter, the author describes in detail some of the product and process metrics by which websites can be evaluated. They are described based on the major classification: process and product metrics. In each one of those two major classes, the author describes possible measurements, how they can be evaluated, and examples of attributes and tools used in this measurement. Values of measurements can in combination provide useful information for project management and planning. Focusing on only one or two attributes can possibly be insufficient or misleading.

INTRODUCTION

In engineering projects in general and software projects in particular, project manages need to have the right information at the right time to be able to make proper decisions. In software projects, project management tasks include: cost estimation, staff selection and allocation, tasks scheduling, quality assessment, budget distribution and allocation, risk analysis and assessment, etc. In this chapter, the focus is on the goals, approaches, tools, and deliverables of the quality assessment and evaluation task.

Initially, the word "quality" is large, vague, generic, and complex by nature. No single or even several parameters can be enough to assess

DOI: 10.4018/978-1-4666-4301-7.ch086

the overall quality of a product. Quality can have several types, levels, and attributes. Some of those quality elements can be directly assessed while many others can be unstructured or subjective to the person who evaluates, or to the nature and the environment of the project and many other environmental factors that can affect the value of such quality attribute. In some cases, complex formulas are built to list all or most of the attributes that can impact the product quality along with the level of impact or effect such attribute can have on the product overall quality.

Product quality attributes can be also external visible to users or internal that need a white box access to the product (e.g. software code) to be able to measure it.

Software metrics are units of measurements that describe one or more attributes of the software. An attribute is a property or a characteristic that the software have. For example, size is a software attribute that gives an indication on how large is a code project (i.e. whether it is small, medium, or large). Lines of Code (LOC) metric is a software metric that is used as an indicator or one of the metrics for this size. Metrics in this sense work as units of measure where you can have several different metrics or units of measure as indicators for size where while they can be different in numbers but generally they should have high positive correlation.

Another related term in the software metrics field is "measurement." While some references do not show differences between the terms: "metrics" and "measurements," other references distinguish the "metrics" from "measurements" where metrics represent more complex formulas relative to measurements that may include one or more of the software attributes.

Attributes can be further divided into external and internal attributes. While literature also may include different definitions of those terminologies, however, generally internal attributes are the actual characteristics that a software or website have and in which, a numerical value can be collected or calculated from the software or website for that attribute. On the other hand, external attributes are high-level attributes that can be measured indirectly from one or more internal attributes. In other words, we can say that "external attributes are the goals or what we want to know or measure, while internal attributes is what we can directly measure). For example, website usability is a popular website external attribute. This attribute cannot be measured directly (i.e. we cannot say for example that for website A, usability = 5, etc., i.e. a numerical value). On the other hand, several website internal attributes (e.g. time to learn, number of help features, documents, etc.) can be measured from a website, which collectively can be used to assess the website usability.

Website metrics can be collected manually or automatically through tools. Many tools are developed to collect metrics and attributes automatically. On the other hand, due to their subjective natures, some attributes and metrics require the help of surveyed users or testers to give their "personal" opinion on those attributes.

In the domain of websites, we conducted an extensive survey to find all used and described attributes and metrics for websites. The experiment showed that there is an extensive mix in research documents and published articles between websites attributes and metrics. In the next section, we will provide a list of several described attributes and metrics. Later on, we will classify them according to our proposed conceptual model.

In this chapter, the focus will be on major project quality characteristics. Those are: process and product quality metrics. Focusing on websites as the subject products, we will describe several quality attributes for both product and process.

Product Attributes

1. **Websites usability:** Usability is one of the popular software attributes that is extensively investigated in literature. Through usability, we measure how much it is easy for users to