A Conceptual Organization for Websites Metrics, E-Government Websites: A Case Study

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ABSTRACT

E-government websites contain sensitive and important information where security and reliability are crucial. However, due to the large number of visitors, they are expected to be user friendly and provide services quickly. There are several methods to evaluate websites. Quality attributes of a website depend on several characteristics such as: its domain, type of information, and services it provides. This paper examines several e-government websites in Jordan for a comprehensive list of possible metrics, attributes and tools for evaluating websites. Websites and tools that can gather the described metrics are used to compare results. Results showed that such metrics have important information related to the overall properties and quality of those websites. This paper examines this list of metrics to evaluate e-government websites because such websites should have a combination of several high quality attributes that most other websites may not need to have. Similar to e-commerce websites, they need to provide high end quick secure services to a large number of users. Further, due to the type of sensitive data that they hold, they can be targets for a large number of hackers or invaders. Without the continuous evaluation and assessment for all required attributes such websites may fail catastrophically and cause a significant damage to data and reputation.

Keywords: E-Business, E-Government, Security, Software Metrics, Vulnerability, Website Evaluation, Website Quality

1. INTRODUCTION

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 a 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 can’t 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. 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.

A. 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 use a website and its information or services. There are many internal attributes that can be measured as part of evaluating usability (which is an external attribute). This may include:

- Success rate (i.e., whether users can perform the intended tasks or not).
- The time each task in the website requires to accomplish. In some cases, a similar metric called “ease of use” is evaluated by users. It can be also measured subjectively through users’ response or satisfaction.
- The time it takes for users to know, get used, and complete tasks with the website features and services (i.e., training time).
- The error average or rate for typical or average users. This can be also measured based on a ratio between successful to failure tasks executed by the users.
- User satisfaction.
- Number of features or commands used from the website by users (also called usefulness).
- The number of available help files, documents and any other features that can help users perform tasks easier and faster.

Other attributes which are parts or related to usability include: efficiency, effectiveness, user satisfaction, learnability and memorability. Efficiency includes all previous internal attributes related to the ability of users to perform tasks quickly such as: Time to complete a task, time to learn, time spent on errors, percent or number of errors, frequency of help or documentation use, and number of repetition or failed commands. Effectiveness related attributes include: Percent of tasks completed, ratio of successes...
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