THE MEASUREMENT GOAL

Assignment A2- Part I

Software Metrics (PA 1407)

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I. ABSTRACT

This paper is a partial answer to the three-part assignment related to measuring web usability. In the present project, we evaluated the usability in terms of maintainability of a children's website http://pbskids.org. A measurement goal is presented based on the Goal-Question-Metric (GQM) framework of measurement. This document aims to improve web usability by reducing maintenance costs. All viewpoints mentioned in this document are based on the users' perspective. A GQM tree is introduced to illustrate the proposed metrics to follow while carrying out the project.

Keywords: *web usability, metrics, measures and GQM framework.*

II. WORK DISTRIBUTION TABLE

Although there was an equal contribution from all the members of the group towards this project, we present here the work distribution (in Table 1) that illustrates the activities initiated by the members, thus giving credit to their efforts.

PROJECT ACTIVITY	GROUP MEMBERS		
	Navneet Chamala	**Eada Priyanudeep**	**Dilip Somaraju**
Background Study	X		
Planning and organization	X	X	X
Follow up and review		X	X
Corrections & improvements	X	X	
Finding reference articles			X
Documentation	X		X

Table 1 Work distribution table.

III. INTRODUCTION

The aim of this paper is to present a measurement goal keeping in mind the user's perspective. The fundamental idea is to improve the web usability in terms of reducing maintenance cost of this website by making use of the Goal-Question-Metric (GQM) framework. We present a GQM tree to illustrate the detailed view of the various aspects that were chosen for evaluation. In doing so, we classified the users of this website into two categories: *parents* and *kids*. This division influenced the framing of relevant questions pertaining to the proposed measurement goal. Also, research papers related to application of GQM framework were referred from scientific databases

such as *Inspec* and *Compendex*. Reference articles such as [1] and [2] gave us an idea to identify questions and corresponding metrics and above all, apply the GQM framework.

As the objective of inspection is to analyse a children's website, it is essential to consider important criterion before measuring usability of the website. We have refereed relevant literature to analyse such criteria. For instance, the user interface of a website plays a pivotal role in making it more usable. The prime attributes of a webpage are the objects like buttons, icons and symbols etc. Thus, it is important for the buttons and signs on a website to be intuitive. In [13] the researchers have clearly elucidated the importance of the buttons and signs to be intuitive. Navigability is another attribute of a website which is a key for a usable website. According to [11] and [13] a navigable website makes it more structured and also improves the accessibility of the website. Navigability thus makes it easy for the user to hop across the website.

About the website: After exhaustively studying the behaviour of the website, it is inferred that http://pbskids.org is an education and entertainment website whose targeted audience are children below 10 years of age. The site has many videos and games that can be played online along with a provision to buy them. Such sections were separated into a different category dedicated to parents. It is reported here that although the website was studied by all team members to gain insight, the entire website, however, was not inspected. Therefore, in the sections to follow, based on our findings, we present a measurement goal to improve usability.

Owing to the dynamic nature of the website, revisions are a common sight. Therefore, during our analysis the website may be subjected to changes. It is here that we mention that we analyse the website in the way it was as on the start date, without considering the changes. This is done by referring the Internet Archive if necessary.

The rest of the document is organised in the following way: section IV presents our measurement goal that is followed by a diagrammatic representation of GQM tree in section V. Section VI gives a brief discussion and critical reflection of the relevant literature. Towards the end, section VII summarizes our work.

IV. THE MEASUREMENT GOAL

Present day websites are subjected to many revisions for sustaining competition. Although much care and caution is taken before any new release by following several rule books, the users are yet faced with usability issues. These fundamentally crop up because of poor estimation of user choice or lack of clear understanding from the perspective of a user. Therefore, in this section, we present a measurement goal that was designed using the template provided in [9].

- **Purpose**

  Evaluate the impact of website revisions on its maintenance activities, in order to reduce the maintenance cost and effort.
- **Perspective**

  Examine the impact of factors such as availability, navigability and search in a website from the users' perspective.
- **Environment and Constraints**

– Majority of the users visiting this website are children below ten years of age. However, there are dedicated sections for the parents too.
– The website being analysed is already developed and is in the maintenance phase.
– To understand and identify the suitable metrics that are appropriate for the website, two research papers ([10] and [11]) were provided for detailed study.
– The website is inspected between 2014-04-28 and 2014-05-19.
– There is no control over any changes that occur in the website during our proposed evaluation period.
– The children's and parents' behaviour is also studied during our inspection period.

V. GQM TREE

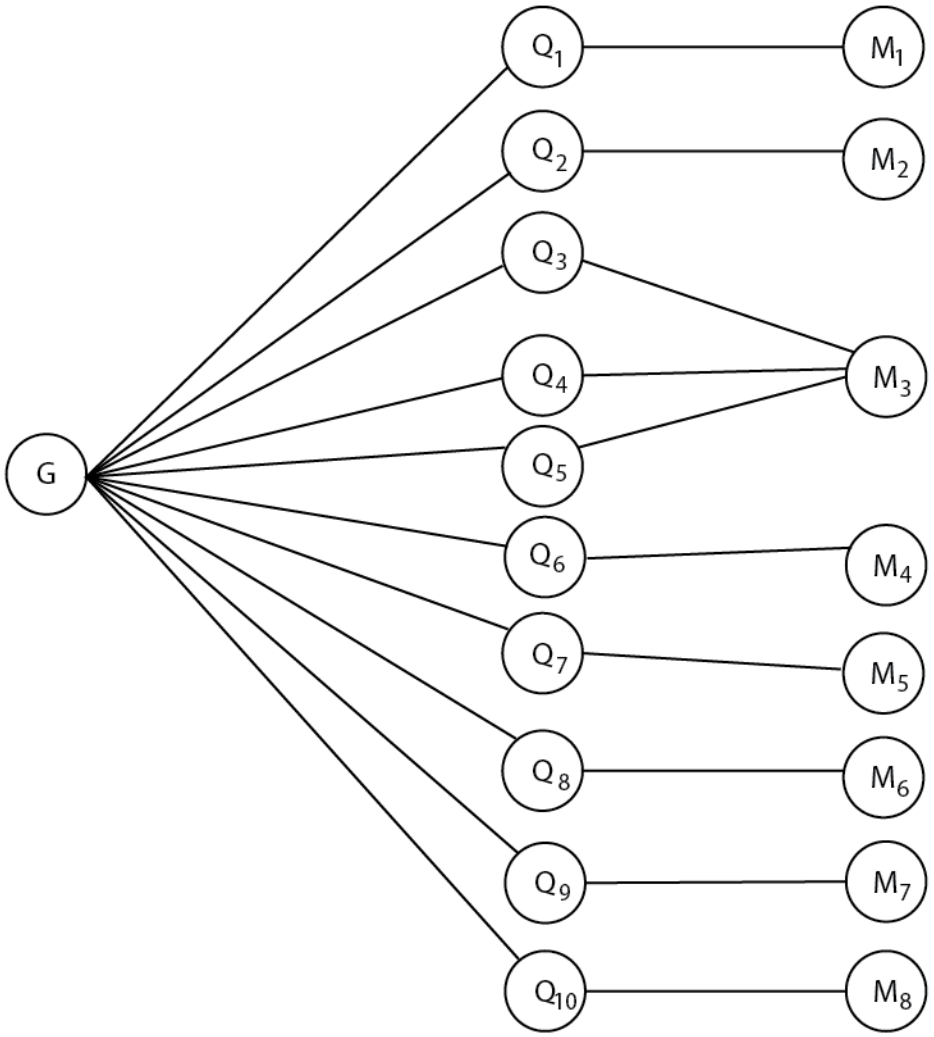

Figure 1 GQM Tree

Goal	
G	To evaluate the maintenance activity of a website to improve its usability
Questions	
Q_1	Can the user visit all pages of the website?
Q_2	How effective are the error and prompt messages?
Q_3	How long does it take to load a video or game after it is selected?
Q_4	How long it takes to respond to a query submitted by the user?
Q_5	How frequently is the website subjected to revisions?
Q_6	How well are the changes made in a website accepted by users?
Q_7	Is the website available at any given point of time during a day?
Q_8	Can users search the website for specific topic or content?
Q_9	How effectively are the users redirected to the site from search engines?
Q_{10}	Are the buttons used in the website conveying appropriate message?
Metrics	
M_1	Number of web pages visited during one visit.
M_2	Ease of understanding the displayed messages.
M_3	Time.
M_4	Acceptance by a user.
M_5	Number of users online at an instant.
M_6	Search options in a website.
M_7	Indexed pages by search engines.
M_8	Intuition of buttons.

Figure 2 Description of goal, questions and metrics

VI. DISCUSSION

In this section, the significance of each question chosen to evaluate the metrics is discussed. Motivation for the choice of selecting the specific metrics is provided by citing relevant literature. The following is a detailed explanation of each goal question:

- **Q_1** is measured by analysing the number of web pages visited during one visit. This is motivated by the findings presented in [13], in which the effectiveness of this metrics use is detailed. By answering this question, the navigability of the website is analysed. Further, the reference guides [10] and [11], too, speak about this attribute.
- **Q_2** is aimed to measure the ease of understanding of a website as cited in [11]. The metric used to measure this question is the user's level of understanding.
- **Q_3, Q_4** and **Q_5**are measured using time scale. Since all the questions mentioned are dealing with capturing the time taken between two concrete checkpoints, the use of time as a measuring unit best suites.
- **Q_6** is about assessing the user acceptance of a feature or aspect of a website. As discussed in [11], the changes made in a website must be readable and easy to understand by users for better usability. Therefore the acceptance of users is considered as metric for evaluation.
- **Q_7** analyses the availability of a website. Several metrics were identified as probable metrics to measure this feature. As presented in [14], the number of clicks to a website, the number of users online at an instant or a combination of both serves as suitable metric. However, we have chosen the latter i.e. the number of users online at an instance as decided by majority of the group members.
- **Q_8** evaluates the content in a website such as relevant search buttons, checkboxes, messages etc. In particular, if a specific content can be searched or not is inspected by exploring for search options available in a webpage. The suitability of this metric is motivated by the literature provided in [11].
- **Q_9** is measured by analysing the number of index pages a search engine flags. As given in [15], this metric is used to measure and also compare effectively with standard results.
- **Q_{10}** evaluates the intuitiveness of the content on a webpage from the user's perspective. For doing so, we decided to measure the appropriateness of the content.

A close observation of the above metrics shows that most of them were chosen from refereed and peer reviewed journal and conference articles. Although reference articles [10] and [11] were given as guidelines to identify suitable metrics, few of them were not considered as it was felt that they were obsolete. For instance, use of bold fonts and highlighting words with colours is an out dated practice. However, taking these principles as inspiration, we have explored other possible metrics taking into account the state-of-the-art design features of a website.

VII. SUMMARY

From a practical perspective, we tried to gain an insight about the application of the GQM framework. Few of the metrics presented in the papers provided for reference were identified to be obsolete, for example: change of colour of a hyperlink after a website is visited. This formed the motivation for not considering few of the metrics from the papers given as guidelines. Nevertheless, all metrics presented in the paper were elicited considering the contemporary web standards from relevant literature to the extent possible.

In the assignments that follow, we investigate the mapping of the metrics proposed in this paper to the entities and attributes to be measured. Further, the scale types that suite the metrics mentioned in this paper are also discussed. Towards the end of the project, we present a suitable research approach to carry out the measurement goal.

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