

## THESIS / THÈSE

### DOCTOR OF SCIENCES

#### Methodology for automating web usability and accessibility evaluation by guideline

Beirekdar, Abdo

*Award date:*  
2004

*Awarding institution:*  
University of Namur

[Link to publication](#)

#### General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal ?

#### Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.



Facultés Universitaires  
Notre-Dame de la Paix

# **A Methodology for Automating Guideline Review of Web Sites**

**Abdo Beirekdar**

Thesis submitted in fulfillment of the requirements for the degree of Doctor of Sciences  
(Computer Science Option)

- August 30th, 2004 -

Director: Professor M. Noirhomme-Fraiture  
Co-director: Professor J. Vanderdonckt, Université Catholique de Louvain, Belgium  
Jury: Professor F. Bodart  
Professor J.-L. Hainaut (President)  
Professor Ch. Kolski, Université de Valenciennes, France  
Professor Ph. Palanque, Université Paul Sabatier - Toulouse III, France

**Institut d'Informatique  
NAMUR**

---

# Chapter 7

## Cost-Benefit Analysis

In this chapter we will discuss the different aspects related to the costs and benefits of using the proposed GDL and the KWARESMI evaluation tool.

### 7.1 Usability of the GDL

We can consider two criteria related to the GDL usability: human readability and machine processability.

GDL structures are readable as any XML documents, but are generally long and hard to read by non GDL experts. In addition, we do not pay big attention to this criterion in the context of our work because we think that a GDL editor is needed in any attempt of exploiting our methodology. One purpose of this editor is to facilitate structures readability by presenting them in a convenient manner: graph, tree, etc. and by providing some visualization facilities like zooming, custom hiding/showing of details, etc.

The more important criterion is the ability to process GDL structures, because the interpreter needs to read the structures, extract all needed information and parse Web pages accordingly. This is totally feasible because structures are XML-compliant.

### 7.2 KWARESMI tool

#### 7.2.1 Utility

Our objective is to overcome major shortcomings of existing automated evaluation tools, but this does not mean that our tool will be able to automate the evaluation of all ergonomic aspects. It still needs to be used in conjunction with other evaluation methods. A good candidate is a *manual* review of guidelines that can not be automated with the tool.

In addition, the tool can assist Web designers to quickly identify ergonomic problems, especially on very large Web sites. A possible scenario of such cooperation is to start scanning the evaluated Web site by KWARESMI to evaluate some guidelines and to identify pages where there are a high number of problems. These pages are then presented to designers to correct the problems.

#### 7.2.2 Cost and Benefits

In this section we will provide a simple cost/benefit analysis of the tool underline its benefits in evaluating a Web site compared to conducting the evaluation manually.

## KWARESMI Evaluation

Having a set of guidelines, there are three kinds of effort in using the tool:

- **Effort for Incorporating the guidelines into the tool (IncE):** this includes preparing the guidelines, structuring them and adding them to the tool's database. These efforts can be considered as:
  - *Unique*, because their associated tasks are generally accomplished only once.
  - *Fix*, for the same reason.
- **Effort for Evaluating the Web site (EvaE):** this includes selecting guidelines to be evaluated, configuring the evaluation session. These efforts are generally:
  - *Repetitive*, because they must be accomplished at every evaluation session.
  - *Variable*, because they depend on the selected guidelines sub-set and evaluated Web site.
- **Effort for Interpreting the evaluation results (ResE):** it is usually necessary to review the generated evaluation results and to interpret them by the evaluator in order to make his final judgment.

In the special case of repetitive evaluation of the same Web site and same guidelines, we can minimize the evaluation efforts by storing some of them in a configuration file.

Let us note that we did not mention efforts for capturing and analyzing evaluation data because this is done automatically by the tool.

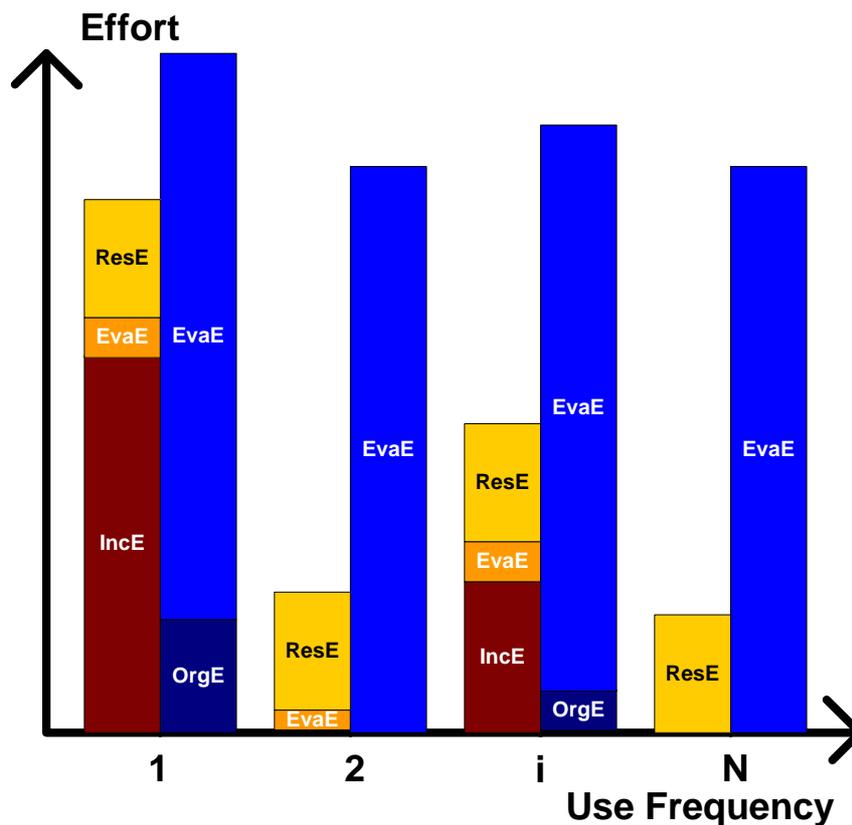
## Manual Evaluation

In this case, we can also classify efforts into:

- **Effort for organizing guidelines (OrgE):** this includes tasks like determining what are the targeted aspects, classification of guidelines according to some criteria, how to check them in Web pages, etc. As KWARESMI incorporation efforts, these efforts can be considered as *Unique* and *Fix* for the same reason.
- **Efforts for evaluating the Web site (EvaE):** this includes the determination of aspects to be evaluated, navigating the site, capturing and analyzing evaluation data. These efforts are *Repetitive* and *Variable*. They generally represent the major effort of manual evaluation because they include the usually heavy capturing and analysis tasks. Let us note that we incorporated interpretation of evaluation results (ResE) into these efforts because, in manual evaluation, the evaluator usually analyses data and interprets the result as soon as he detects them.

In fact, we can not minimize the EE for manual evaluation because the major tasks must be repeated every time (at least for modified pages).

Figure 7.1 summarizes the relationship (Effort/ number of use) for the evaluation of a set of guidelines.



**Figure 7.1:** a comparison between evaluation efforts for evaluating a Web site with KWARESMI assistance (first column) or manually (second column). We can see the rapid effort minimization when using KWARESMI for the same set of guidelines. On the other hand, every time we incorporate new guidelines or modify existing ones, a one time relatively high effort will be needed (Use i). New organization effort will also be needed for manual evaluation but it is usually less important than incorporation effort.

Figure 7.1 shows that effort for using KWARESMI augments when incorporating or modifying used guidelines. This means that it demands significant effort as soon as the used set of guidelines is not stabilized.

### 7.2.3 Exploitation

Considering the current state of automatic Web evaluation tools, we estimate that KWARESMI would have a big chance to be a serious competitor if the proposed version is able to evaluate the two major sets of guidelines (WAI and Section508) at least. This evaluation must be feasible for HTML sites of any kind and size. The added value of KWARESMI will surely be considerable if we provide other guidelines sets and if it proves to be flexible enough to support a wide range of ergonomic aspects.

Another important factor in KWARESMI success is the underlying GDL, especially its flexibility of expressing evaluation logic. We are trying to provide in the GDL and to implement in KWAMESMI a rich set of functions to guarantee acceptable flexibility level.

Of course, we must not forget the marketing aspect: we will need a big publicity, and we will have to provide online and local versions of the tool.

## 7.2.4 Actors

We can classify potential users of KWARESMI into the following categories (based on the corresponding tasks):

### **A) Provider of guidelines database**

This database is the heart of our tool.

#### **Guideline Interpreter**

The first thing to do is to study the original guideline in order to evaluate the possibility to re-express it more concretely (partially or totally). As we remain at natural language informal level, this task is usually accomplished by HF expert who will give the new expression or leave the guideline as it is if he judges that it is already concrete enough or, on the contrary, it can not re-expressed because it deals with abstract aspects. We are not speaking here about the quality and the reliability of the guidelines because we consider that the HF expert is responsible for this verification. In addition, we do not exclude the possibility of using our tool to evaluate any non established set of guidelines.

As we want the interpretation to be as HTML oriented as possible, the ideal profile for this role is a HF expert with some HTML experience.

#### **Interpretation Structurer**

If the guideline interpretation is provided, the structurer provides the corresponding GDL formal structure. He identifies needed HTML elements and provides the formal expression of the interpretation.

The structurer must be experienced with GDL and have very good HTML knowledge. In addition, the generated structure must be review by the interpreter and structurer together to validate it or to modify it if necessary.

### **B) Evaluators**

The structured set of guidelines can be evaluated at pre publication (by designers) or post publication (by HF experts) of Web sites. In both cases, the evaluator does not need to have any particular GDL knowledge. Our aim is to provide highly customized evaluation reports to meet the needs of both evaluators in term of structure and content of the evaluation report.



