

## **D-WAB4 Unified Web Evaluation Methodology (UWEM 1.2 Core)**

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Please see Appendix A for the document license.

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# 1 Executive summary

This document contains the core documentation of the Unified Web Evaluation Methodology (UWEM) version 1.2. For the sake of conciseness and document usability, UWEM version 1.2 has been split in two documents: the core documentation (this document), and the tests per-se. UWEM is a methodology for evaluating conformance of web sites to Web Content Accessibility Guidelines 1.0 [WCAG10], a recommendation published by the World Wide Web Consortium (W3C) in 1999. For this purpose, UWEM contains:

1. Descriptions of evaluation procedures (Section 3);
2. Recommendations for sampling resources ("web pages") and expressing the scope of a conformance claim (Section 4);
3. Tests for the WCAG checkpoints at priority levels 1 and 2 (checkpoints and levels are defined by WCAG 1.0) (see accompanying document *UWEM version 1.2 Tests*),
4. Recommendations for reporting evaluation results by means of a conformance claim, a text-based report, a machine-readable report and/or a scorecard report. It also includes recommendations on scoring and aggregating evaluation results (Section 5),
5. Templates and data definitions (in RDF Schema) to support evaluators (see Appendices).
6. License terms.

UWEM is the result of the combined efforts of three projects that make up the Web Accessibility Benchmarking cluster (WAB cluster<sup>1</sup>). The methodology supports both expert evaluation and fully automated evaluation. It aims to generate consistent results when different evaluators apply it to the same web site. UWEM is suitable for detailed evaluations of single web pages, entire sites (regardless of size) and sets of web sites. It is a suitable basis for web accessibility observatories (the explicit goal of the EIAO project), for the development of certification schemes (the SupportEAM project) and for developing test cases for benchmarking evaluation tools (the BenToWeb project).

UWEM is organized into the following sections.

Section 2 outlines the requirements, the target audience and the technologies addressed by the document and serves as a description of the basic properties of UWEM.

Section 3 describes different evaluation procedures.

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1 <http://www.wabcluster.org/>

Section 4 describes techniques for scoping and sampling to provide a resource list for evaluation. The procedures are designed to ensure that the identified samples are representative so that the evaluation results are reliable.

Section 5 describes how the accessibility of the evaluated resources can be scored and describes various ways to report the evaluation results: conformance claims, text-based reports, machine readable reports using Evaluation and Report Language (EARL) and scorecard reports (for high-level overview). It also describes the different conformance claims.

Sections 6 and 7 contain a glossary and bibliographical references, respectively.

Appendices provide additional information for users of UWEM.

The accompanying document *UWEM version 1.2 Tests* defines tests for each of the priority 1 and 2 checkpoints of WCAG 1.0. Priority 3 checkpoints are not covered. These tests cover HTML 4, XHTML 1, CSS 1 and 2, objects that may be embedded into web pages, and relevant uses of JavaScript.

## 2 Introduction

The Unified Web Evaluation Methodology should ensure that evaluation tools and methods developed for large scale monitoring or for local evaluation, are compatible and coherent among themselves and with W3C/WAI. This document is the result of a joint effort of three European projects with 23 organisations collaborating in the WAB Cluster to develop UWEM.

The UWEM describes a methodology for evaluation of conformance with the W3C Web Content Accessibility Guidelines 1.0 [WCAG10]. For practical reasons, this version of the methodology focuses on the current WCAG 1.0 guidelines. The WCAG 1.0 guidelines are broadly accepted and form a stable factor in accessibility since May 1999. Already in 2002, the EU recommended that they should be adopted by the public sector in Member States. In some countries, they found their way into legislation.

The purpose of the UWEM is to provide a basis for evaluating the methodology with regard to the intended types of testing: expert and automatic evaluation of Web resources. The evaluation of the UWEM is also planned to provide feedback and contribute to W3C/WAI for future guidelines or versions of guidelines. W3C/WAI staff have reviewed and provided input into previous drafts of this document in order to minimize potential fragmentation of technical content. This does not imply W3C or WAI endorsement of any part of this document in any way.

Part of the materials presented in the complementary document UWEM version 1.2 Tests, are annotations of W3C documents. In particular, we are targeting the following two documents:

- Web Content Accessibility Guidelines 1.0 [WCAG10],
- Techniques for Web Content Accessibility Guidelines 1.0 [WCAG10-TECHS], and other Techniques documents linked from this one.

According to the Intellectual Rights FAQ from W3C,<sup>2</sup> the aforementioned document falls under an annotation "... that does not require the copying and modification of the document being annotated."<sup>3</sup> Therefore, all references to guidelines and checkpoints are duly quoted, and the URL to the original document is included. W3C is not responsible for any content not found at the original URL, and the annotations in this document are non-normative.

### 2.1 Methodology definition

The Unified Web Evaluation Methodology provides an evaluation procedure offering a system of principles and practices for expert and automatic evaluation

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<sup>2</sup> <http://www.w3.org/Consortium/Legal/IPR-FAQ-20000620>

<sup>3</sup> <http://www.w3.org/Consortium/Legal/IPR-FAQ-20000620#annotate>

of Web accessibility for humans and machine interfaces. The Methodology is designed to be conformant with WCAG 1.0 priority 1 and 2 checkpoints with regard to technical criteria.

The UWEM aims to increase the value of evaluations by basing them on a shared interpretation of WCAG 1.0 and a set of tests that are sufficiently robust to give stakeholders confidence in results. Web content producers may also wish to evaluate their own content and UWEM aims to also be suitable to these users.

The methodology is designed to meet the following requirements:

- Technical conformance to existing Web Accessibility Initiative (WAI) Recommendations and Techniques documents.
- Tool and browser independence: questions and tests are given in a 'pure' form, making them as tool independent as possible.
- Unique interpretation: questions shall have only one way of being interpreted.
- Replicability: different Web accessibility evaluators who perform the same tests on the same site should get the same results within a given tolerance.
- Compliance with Regulation (EC) No 808/2004 of the European Parliament and of the Council of 21 April 2004 concerning Community statistics on the information society.

In the methodology we have included information about:

- Scope and sampling.
- Reporting, interpretation and integration/aggregation of results.

## **2.2 Target audience of the document**

The target audiences for this document include, but are not limited to:

- Web accessibility benchmarking projects (European Commission, national governments, disability groups, EDeAN, and research institutions)
- Possible Certification Authorities
- Web content producers wishing to evaluate their content
- Developers of Evaluation and Repair Tools
- Policy makers and Web site owners

- Other organisations evaluating Web sites

The European Commission, national governments and other organisations who wish to benchmark Web accessibility will be able to use the UWEM to carry out the evaluations and compare their results in a meaningful way.

The UWEM is an evaluation methodology and is not intended to provide information for Web content producers wishing to produce content conformant with WCAG 1.0. This information is provided in the WCAG 1.0 Techniques Documents that are available through the W3C/WAI web site [WCAG10-TECHS].

## 2.3 Target technologies of this document

The UWEM primarily covers methods to evaluate documents based on the following technologies:

- HTML 4.01,
- XHTML 1.0 and 1.1,
- CSS 2.x, and
- other embedded objects in (X)HTML resources.

## 2.4 Expertise for evaluating Accessibility

The W3C Evaluation suite<sup>4</sup> extensively describes the expertise necessary for the evaluation of the accessibility of Web content for people with disabilities. Evaluation activities require diverse kinds of expertise and perspectives. Individuals evaluating the accessibility of web content require training and experience across a broad range of disciplines. A collaborative approach can bring better results for individuals evaluating web content.

The W3C/WAI evaluation suite writes:<sup>5</sup> "Effective evaluation of Web accessibility requires more than simply running an evaluation tool on a Web site. Comprehensive and effective evaluations require evaluators with an understanding of Web technologies, evaluation tools, barriers that people with disabilities experience, assistive technologies and approaches that people with disabilities use, and accessibility guidelines and techniques."

This document describes the expert and automatic evaluation methodology. Automatic evaluation can significantly reduce the time and effort needed for an evaluation but please note that many accessibility checks require human judgement and must be evaluated manually. This is described in more detail in the accompanying document describing the UWEM tests.

More information on using tools can be found in the W3C/WAI evaluation suite

4 <http://www.w3.org/WAI/eval/>

5 <http://www.w3.org/WAI/eval/reviewteams.html>

section "selecting tools".<sup>6</sup>

## 2.5 Changes from previous UWEM versions

The main focus of the work on UWEM 1.2 was to increase the usability of the methodology. The sections describing the reporting have been restructured to make the document more coherent. Moreover, the continued quality assurance of the test procedures has led to updates in the test document. The statistical background of the methodology has been revised to ensure repeatability and comparability of evaluation outcomes. Many organisations and persons used the opportunity to deliver comments during the public review period. These comments have been used to improve the document. A summarized list of changes is given below.

- Changes to the document:
  - Ambiguities were removed and additional clarifications were added.
  - The tests document offers guidance on test applicability, including use of XPath, handling of content generated by client-side scripting, and checking of CSS.
  - Use cases are added in section 3 and clarifications have been made following review comments
  - Tests are moved to a separate self-contained document.
- Clarification of reporting options:
  - All reporting options are covered in one section, with a detailed explanation of which option should be used in which context.
  - The reporting template for expert evaluations was updated.
  - The use of RDF and EARL for reporting will be synchronised with the forthcoming Working Drafts of EARL and HTTP-in-RDF vocabulary.
  - The colour coding of the score card was changed to a traffic light colour scheme for easier understanding.
  - The tool conformance claim was simplified. It no longer offers two levels.
- Revision of statistical background:
  - The automated sampling algorithm was simplified.
  - The statistical model underlying the score calculation was simplified to

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<sup>6</sup> <http://www.w3.org/WAI/eval/selectingtools.html>

make UWEM results more transparent. All calculations are illustrated with examples.

- Relation of UWEM to W3C documents:
  - A new appendix describes the steps for the migration of UWEM to WCAG 2.0. This appendix will be published on the Web Cluster website.

## 2.6 Acknowledgements

The following organizations worked on this UWEM document:

Accessibility Foundation (The Netherlands, Cluster coordinator); University of Agder (Norway, EIAO coordinator); Fraunhofer Institute for Applied Information Technology FIT (Germany, BenToWeb coordinator); Association Braillet (France, SupportEAM coordinator), Vista Utredning AS (Norway); Forschungsintitut Technologie und Behinderung der Evangelischen Stiftung Volmarstein (Germany); The Manchester Metropolitan University (UK); Nettkroken as (Norway); FBL s.r.l. (Italy); Warsaw University of Technology, Faculty of Production Engineering, Institute of Production Systems Organisation (Poland); Aalborg University (Denmark); Intermedium as (Norway); Fundosa Technosite (Spain); Dublin City University (Ireland); Universität Linz, Institut integriert studieren (Austria); Katholieke Universiteit Leuven, Research & Development (Belgium); Accessinmind Limited (UK); Multimedia Campus Kiel (Germany); Department of Product and Systems Design, University of the Aegean (Greece); University of York (UK); ISdAC International Association (Belgium); FernUniversität in Hagen (Germany).

We thank the Web Accessibility Initiative's Team from the World Wide Web Consortium for all the useful comments to the draft versions of this document.

## 2.7 More information about the WAB Cluster

The projects participating in the WAB cluster are funded by the European Union in the second FP6 IST call (2003) of the eInclusion Strategic Objective. The WAB cluster Web site is available at <http://www.wabcluster.org/>. More information about the projects can be found on the project web sites:

- <http://bentoweb.org/>
- <http://www.eiao.net/>
- <http://www.support-eam.org/>

## 3 Evaluation process

The outcome of the UWEM accessibility evaluation can be presented in multiple ways, depending on the type of evaluation and the needs of the organisations commissioning and/or carrying out the evaluation.

There are three main scenarios of application for UWEM.

- If the goal of your evaluation is to determine if a website can claim conformance, please go to section 3.1.
- If the goal of an evaluation is to determine how a web page or a website performs with regard to WCAG 1.0 (Level A or Level Double-A) but not to claim conformance, please go to section 3.2.
- If the evaluation needs to be replicable and allow synchronous or asynchronous comparisons, please go to section 3.3.

### 3.1 Conformance claim

If the goal of an evaluation is to determine if a website (or the set of web pages in the scope of a claim) can claim conformance, the following steps have to be taken:

- **Sampling:** use a random sample (see section 4.3.2 for random sampling) or a non-random sample based on the Core Resource List (see section 4.3.1 for non-random sampling).
- **Tests:** carry out all applicable tests to the corresponding conformance level. (see UWEM TESTS document).
- **Reporting:** report every instance of a test failure or only the first instance(s). If no failures are found, create a conformance claim (see section 5.1).<sup>7</sup> Note that a UWEM Conformance claim includes a list of sampled resources in RDF format.

The steps are summarised in Figure 3.1.

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<sup>7</sup> If failures are revealed during the evaluation, the reporting options of single web site evaluation can be used (see section 3.2).

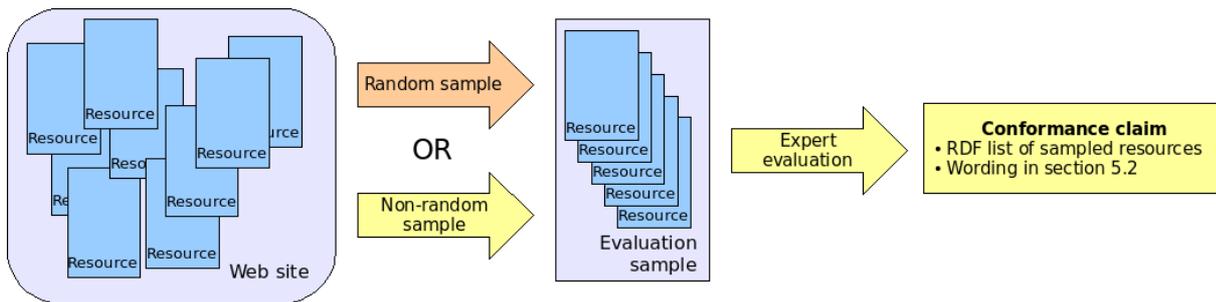


Figure 3.1: Evaluation goal: Conformance claim

### 3.2 Evaluation of single web site

If the goal of an evaluation is to determine how a web page or a website performs with regard to WCAG 1.0 (Level A or Level Double-A) but not to claim conformance, you can use:

- **Sampling:** use a non-random sample based on the Core Resource List (see section 4.3.1) or a random sample (see section 4.3.2).
- **Tests:** carry out all applicable tests to the corresponding conformance level. (see UWEM TESTS document).
- **Reporting:** report every instance of a test failure or only the first instance(s). Create a text-based template report (see 5.2) or a machine readable report (see section 5.3).

The steps are summarised in Figure 3.2.

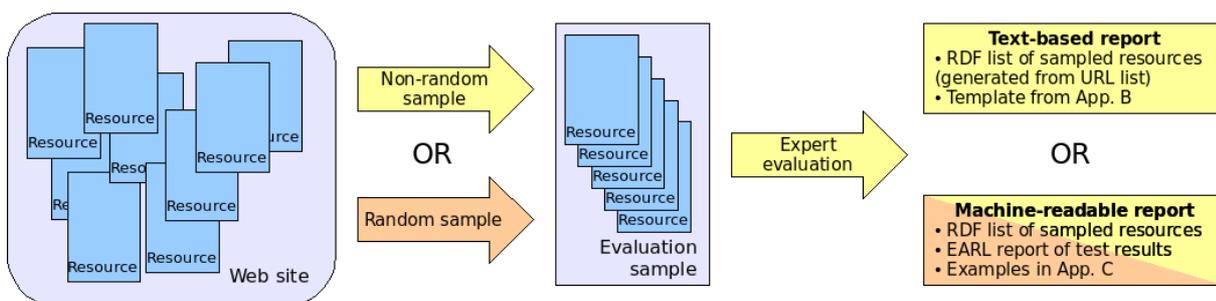


Figure 3.2: Evaluation of single web site

The detailed evaluation of a single web site has to be carried out by an accessibility expert. Many tests require human judgement and therefore have to be carried out manually. However, not the whole evaluation process has to be done by hand. The expert may choose to use tools to support sampling or perform fully automatable tests. To report the results the expert chooses between the **text-based template report** or the **machine readable report** in EARL format.

Note that all of that report targeted at single web sites require the list of sampled resources be provided in RDF format.

### 3.3 Monitoring and comparison of web accessibility

If the evaluation needs to be replicable and allow synchronous or asynchronous comparisons, you must do the following:

- **Sampling:** use a random sample (see section 4.3.2).
- **Tests:** For the purpose of a completely automated process, carry out all fully automatable tests. If resources for expert evaluation are available, carry out all applicable tests (see UWEM TESTS document).
- **Reporting:** report every instance of a test failure. Calculate the UWEM score (see section 5.4) and create a scorecard report (see section 5.5) or a machine readable report (see section 5.3).

The steps are summarised in Figure 3.3.

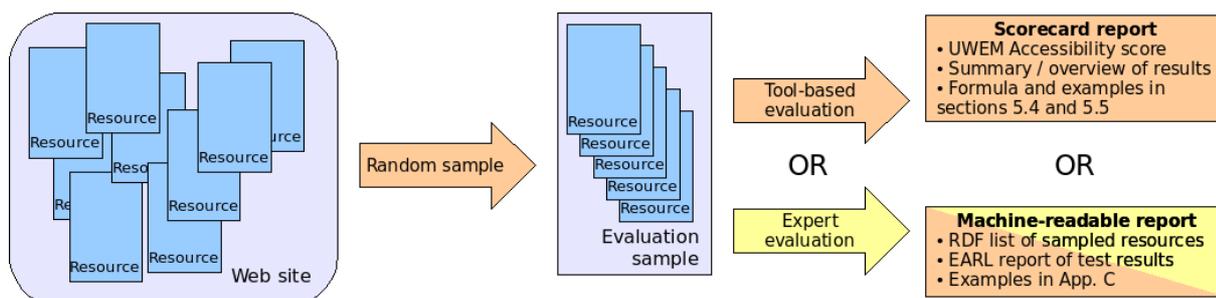


Figure 3.3: Evaluation goal: Monitoring

For the purpose of automated monitoring the accessibility situation of a large number of web sites, the results can be presented as a **scorecard report**. This type of report offers a high level of aggregation. A single number –the UWEM score– is calculated for each web site to allow comparison to other web sites and to previous versions of the same site. Besides the overview report in a scorecard the results for an automatic accessibility evaluation can also be presented in a detailed **machine readable report** in EARL-format.

Note that the scorecard report does not require a detailed list of sampled resources.

### 3.4 Evaluation procedures

Accessibility testing may be done via automatic, expert and user testing. The different types of evaluation methods have a number of strengths and weaknesses.

Figure 3.4 describes three different evaluation methods, from which two

(automatic and expert) are covered in the UWEM. The figure shows, for example, that automatic evaluation (Tool1 or Tool2) can only test for conformance to a subset of the checkpoints (such as the set of tests marked as "fully automatable" in the *UWEM version 1.2 Tests*), which further means that only a subset of deviations from WCAG1.0 can be identified reliably by using automatic testing. Therefore, coverage of automatic evaluation as an overall indicator of accessibility is low, however it can identify many deviations reliably. It may also be applied efficiently to test very large numbers of Web resources within one Web site as well as multiple Web sites. Tool 1 and Tool 2 are here two fully automatic assessment tools that focus on checking accessibility issues, possibly with some overlap of functionality.

Some tools can also act as support systems in an expert evaluation process. The tools provide reliable results for a subset of tests and can not only speed up the process by performing some tasks automatically, but also, by providing hints about barrier locations, indicate areas the expert evaluators should focus on.

User testing is able to identify barriers that are not caught by other testing means, and is also capable of estimating the accessibility for tested web pages. However, user testing is quite specialised, thus it is not generally suitable for conformance testing, since it is not able to test all aspects of the *UWEM version 1.2 Tests*. The best approach to ensure both accessibility and UWEM conformance is to use a combined approach encompassing all evaluation methods: automatic, expert evaluation and user testing of the Web site.

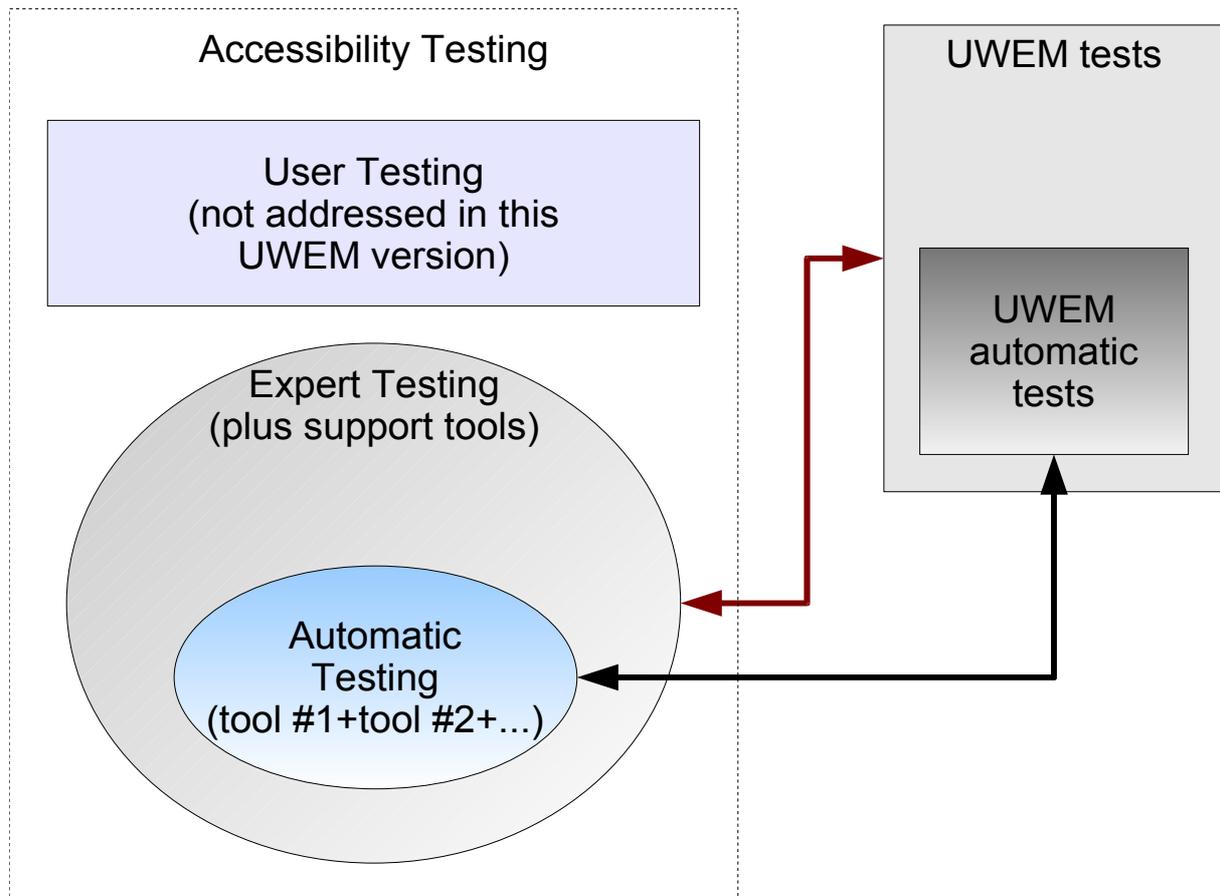


Figure 3.4: UWEM Evaluation Types.

User testing is not covered in this version of UWEM. How to involve users in the evaluation of web content is described also on the W3C/WAI web site, in its evaluation suite.<sup>8</sup>

The main advantages of automatic testing are:

- The method is replicable (although the dynamic nature of some Web technologies mean complete replication is impossible [LEVENE99]).
- It may be applied to very large number of resources on a Web site and to multiple Web sites.

### 3.5 Tool conformance claims

Evaluation tools can also claim conformance to UWEM 1.2. In that way, experts evaluating web sites according to UWEM 1.2 will be able to rely on the results of the tool for the fully automatable tests of the methodology.

To claim conformance to UWEM 1.2, the tool **MUST implement all fully**

<sup>8</sup> <http://www.w3.org/WAI/eval/users.html>

**automatable tests in the document UWEM 1.2 Tests.** This conformance claim must use the following form:

1. The UWEM version and its URI identifier, i.e., <http://www.wabcluster.org/UWEM1.2/>
2. The URI to a document detailing a set of public test files where this conformance claim has been verified.

## 4 Scope and sampling of resources

### 4.1 Definitions

Within UWEM, conformance claims and other evaluation reports need to refer to a list of resources evaluated within the scope of the web site(s). This section provides the background definitions to the different concepts used.

- **Resource:** a network data object identified by a URI [RFC3986]. This definition is adapted from the definition of resource in [RFC2616]. The concept is included for non-HTTP resources like, e.g., those accessed via the FTP protocol. This type of resource must be expressed via an instance of the earl:Content Class (see Appendix C and [EARL10-Schema] for further details).
- **HTTP Resource:** a network data object identified by a **single** HTTP request. This type of resource must be expressed via an instance of the earl:Content Class (see Appendix C for further details), which may contain additional components of the [HTTP-RDF] W3C Note. This distinction on the resources is due to the underlying complexity of the HTTP protocol [RFC2616], where content negotiation can lead to different versions of a resource (e.g., language versions via the `Accept-Language` HTTP header).
- **Web page:** a set of resources intended to be rendered together.<sup>9</sup> This includes for example:
  - a single (X)HTML resource,
  - an (X)HTML resource using one or more CSS resources or
  - a set of (X)HTML resources intended to be rendered together such as a frameset including the frame pages. Note that if the individual frame pages are reachable outside of the frame set, these must also be treated as individual web pages.
- **Web site:** For the purposes of the UWEM a Web site is defined as an arbitrary collection of hyper linked Web pages.
- **Resources list:** Conformance claims in UWEM are related to a given resources list, which is expressed as an RDF sequence of resources (of any type). Appendix C describes the RDF syntax used to express a resources list. The other UWEM reporting options can also use the RDF format to convey the list of resources included in the evaluation.

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<sup>9</sup> Note that this definition is slightly different from the definition of a web page in WCAG 2.0 (<http://www.w3.org/TR/WCAG20/>), since UWEM 1.2 focuses on measuring rendered samples of web pages, which means that we need to separate the individual appearances of a frameset from each other. Otherwise we would have to define a sub-page sample for, e.g., framesets.

According to the needs of different applications of UWEM, this resources list may be specified by a variety of different participants in the evaluation process – such as a site owner, a site operator, an inspection organisation, etc. This document only explains how such a list should be unambiguously expressed.

## **4.2 Procedure to express the scope**

For the purposes of the UWEM a Web site is defined as an arbitrary collection of hyperlinked Web resources, each identified according to the procedure described in section 4.1.

The purpose of UWEM is to support replicability of results. For this reason, the unambiguous identification of evaluated resources is essential for the aggregation and comparison of results. Blanket statements such as "http://example.org/ conforms to UWEM 1.2 Level 1" are not acceptable in UWEM 1.2 conformance claims. Such a statement would imply that a set of "seed" resources have been crawled to the end following certain pre-determined limits or constraints. However, bearing in mind the wide variety of existing crawlers, and the different technologies that they use, it is not possible to verify the reliability of those statements. Furthermore, the different RFCs related to Domain Names leave open room for interpretation in regard to the concept of subdomain and its resolution.

Therefore, for UWEM 1.2 conformance claims, the scope of a Web site MUST be expressed in the form of a list of resources (see Appendix C).

## **4.3 Procedures to generate evaluation samples**

In general it will not be practical to test all site resources against all evaluation criteria. Accordingly, after determining the list of resources to be evaluated and the goal of the evaluation, a subset or "sample" of resources can be selected for evaluation.

UWEM offers two procedures to generate evaluation samples. It can be generated by a tool using automated, uniform random sampling as described in section 4.3.2. As an alternative to the tool assisted sampling, an expert doing a manual evaluation of a web site can also select the evaluation sample manually (see section 4.3.1).

If the evaluation needs to be replicable and allow synchronous or asynchronous comparisons (like monitoring) the evaluation sample must be generated by a uniform random procedure. If replicability is not crucial (e.g. in the evaluation of a single web site), a non-random manual sample can also be used.

### **4.3.1 Non-random sampling: The Core Resource List**

The Core Resource List is a set of generic resources, which are likely to be

present in most Web sites, and which are core to the use and accessibility evaluation of a site. The Core Resource List therefore represents a set of resources which should be included in any expert accessibility evaluation of the site. The Core Resource List cannot, in general, be automatically identified, but requires human judgement to be selected. The Core Resource List should consist of as many of the following resources as are applicable:

- The "Home" resource. This is defined as the resource identified by a URL consisting only of a HTTP protocol component followed by the host name. The mapping from this URL to the Home resource may rely on server side redirection. This resource is required to be present on the site (though it may be differently named).
- The "Contact Information" resource (if any).
- The generic "Help" resource (if any).
- The "Site Map" resource (if any).
- The resources comprising the "Primary Site Search" service (if any). This shall include at least one resource where a search can be initiated and at least one resource showing the results from a sample search.
- Resources describing accessibility features and / or the accessibility policy of the site (if any).
- Examples of resources representative of the primary intended uses of the site (if identifiable).
- If the site provides services which involve a user systematically traversing a sequence of resources (e.g., a multi-page form or transaction), then representative resources accessed at each step of each such key scenario should be included (if applicable and only if within the scope).
- Resources representative of each category of resources having a substantially distinct "look and feel" (typically representative of distinct underlying site "templates") (if identifiable).
- Resources representative of each of the following distinct web technologies (where they are in use):
  - forms,
  - frames,
  - data tables,
  - client-side scripting,

- Cascading Style Sheets,
- applets, plug ins, multimedia, etc.

If the evaluation sample is created manually, it must contain the core resource list. If the core resource list contains fewer pages than the required sample size, additional resources from the following categories must be added:

- Resources representative of the primary intended uses of the site (if identifiable).
- If the site provides services which involve a user systematically traversing a sequence of resources (e.g., a multi-page form or transaction), then representative resources accessed at each step of each such key scenario should be included (if applicable and only if within the scope).
- Resources representative of each category of resources having a substantially distinct "look and feel" (typically representative of distinct underlying site "templates") (if identifiable).
- Resources representative of each of the following distinct web technologies (where they are in use):
  - forms,
  - frames,
  - data tables,
  - client-side scripting,
  - Cascading Style Sheets,
  - applets, plug ins, multimedia, etc.

Of course, any single resource may belong to more than one of the categories above: the requirement is simply that the Core Resource List as a whole should, as far as possible, collectively address all the applicable sampling objectives. Any given resource should appear only once in the evaluation sample.

### 4.3.2 Random sampling

For evaluations targeted at comparability of results, e.g. monitoring and synchronous or asynchronous comparisons, a random sample must be used. Note that a fully random sample can not be generated without a tool.

To generate a representative and unbiased evaluation sample, a **uniform random selection** from the set of all resources belonging to the web site is required.

There are different ways to determine the **list of all resources belonging to a web site**. In some cases the list of resources is known beforehand, e.g. because it is provided by a site owner commissioning the evaluation. If the list of resources is unknown, the site has to be explored prior to the evaluation. This will typically be done by a web crawler automatically exploring the web site by following links. The crawl starts out from one or more "seed resources" , e.g. the home page.

If a web site is very large or if a large number of web sites are included in a monitoring evaluation, it may not be feasible to identify a complete list of resources belonging to a web site. In this case the evaluator may choose to stop the crawling process when a sufficiently large number of resources has been identified.<sup>10</sup>

The evaluation sample is chosen from the list of resources belonging to the web site using **uniform random sampling without replacement**.

Note that both the crawling and sampling algorithm used, and any further restrictions limiting or biasing the result, including, but not limited to the set of restrictions below, should be explicitly disclosed in any evaluation report:

- restriction to pages without form interaction,
- restriction by content type (e.g., not JavaScript/Flash/PDF),
- restriction by linkage depth from any seed resource,
- restriction by the `robots.txt` protocol,
- restriction on the specific seed resources used,
- restriction on the total number of resources in the list of resources.

### 4.3.3 Size of evaluation samples

In case of an expert evaluation the minimum number of resources in the sample, depends on the estimated web site size. The minimum sample size consists of 30 unique resources (if available), adding 2 unique resources per 1000 available resources up to a maximum of 50 resources in the evaluation sample.

If the results of the evaluation are intended to be presented as a score card report an adaptive sample strategy can be used, which stops when the required precision is reached. For further details about the score calculation see section 5.4.

Starting with a minimum sample size of 30 resources, continue sampling until the average web site score is within a given error margin  $m$  for a given confidence level. Note that UWEM requires the sampled error margin and confidence interval

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<sup>10</sup> The number of identified resources should be substantially larger than the required sample size.

to be disclosed.<sup>11</sup>

If the total number of resources  $N$  belonging to the site is unknown,<sup>12</sup> the first formula should be used. Otherwise, the error margin calculations take into account the total number of resources  $N$ .

$$m = \pm \left\{ \begin{array}{l} z \frac{\sigma(s)}{\sqrt{n}}, N \text{ unknown} \\ z \frac{\sigma(s)}{\sqrt{n}} \sqrt{\frac{N-n}{N-1}}, N \text{ known} \end{array} \right\} \quad (1)$$

Where  $m$  indicates the margin of error,  $z$  is the value of the standard normal distribution corresponding to the chosen two-tailed confidence level,<sup>13</sup>  $\sigma(s)$  is the standard deviation of the average score for sample  $s$ ,  $N$  is the total number of resources in the web site, and  $n$  is the size of the evaluation sample.

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11 Note that UWEM requires that the error margin and confidence interval for the measurements are disclosed, but does not require any specific error margin and confidence interval values. It is up to policy makers to operationalise UWEM with requirements to these parameters that ensure sufficient precision for the intended statistics.

12 The total number of pages  $N$  may be unknown, e.g., for some very large web sites, that it is not feasible to map exhaustively.

13 For example a confidence level of 99% corresponds to  $\alpha = 0.01$  and  $z = 2.58$ .

## 5 Reporting of evaluation results

The outcome of the UWEM accessibility evaluation can be presented in multiple ways, depending on the type of evaluation and the needs of the organisations commissioning and/or carrying out the evaluation.

For web accessibility evaluations carried out by an expert there are three reporting options. If the test outcome is positive, i.e., all relevant tests have passed this can be presented as a **conformance claim** of the selected level. To provide more details of the accessibility evaluation the expert chooses between the **text-based template report** or the **machine readable report** in EARL format.

For the purpose of automated monitoring the accessibility situation of a large number of web sites, the results can be presented as a **scorecard report**. This type of report offers a high level of aggregation. A single number –the UWEM score– is calculated for each web site to allow comparison to other web sites and to previous versions of the same site. Besides the overview report in a scorecard the results for an automatic accessibility evaluation can also be presented in a detailed **machine readable report** in EARL-format.

Note that all of the three report types targeted at single web sites (conformance claim, text-based report, machine readable report) require the list of sampled resources be provided in RDF format. If the evaluation sample is generated by a tool, it is straightforward to produce an RDF list. The scorecard report does not require a detailed list of sampled resources.

The following subsections provide detailed information on each of the report types including some examples.

### 5.1 Web site conformance claims

A conformance claim determines if a web site meets the accessibility tests described in the document *UWEM version 1.2 Tests*. To claim conformance with the UWEM, it is minimally required that:

1. The resources sample and the scope for the evaluation is defined according to section 4.
2. All resources in the sample pass all applicable tests to the corresponding conformance level.

The conformance levels to the UWEM replicate those of [WCAG10], i.e.:

- Conformance Level 1: all tests relevant to [WCAG10] Priority 1 checkpoints are satisfied (see *UWEM version 1.2 Tests*).

- Conformance Level 2: all tests relevant to [WCAG10] Priority 1 and Priority 2 checkpoints are satisfied (see *UWEM version 1.2 Tests*).

More information on the meaning of priorities can be found in: <http://www.w3.org/TR/WCAG10/#priorities>.

The claims of accessibility conformance according to the UWEM methodology must use the following form:

1. The UWEM version and its URI identifier, i.e., <http://www.wabcluster.org/UWEM1.2/>
2. The URI to a document detailing the scope and the sample (see section 4) to which the claim refers.
3. The level of conformance.

## 5.2 Text-based report

W3C/WAI provides a model template that evaluators can use to author evaluation reports. Appendix B proposes this template with some additions required by the Unified Web Evaluation Methodology (UWEM). If used, the template presents the results of a UWEM evaluation in a text-based report. The report contains all information about the evaluator and the evaluation of the web site including, but not limited to, a list of the resources tested and the conformance claim.

## 5.3 Machine readable report using EARL

Reporting of test results under UWEM needs to be unambiguously defined. To that end, the most suitable language is the Evaluation and Report Language EARL [EARL10-Schema], soon becoming a candidate recommendation within W3C. For an example of how an EARL document looks like see Appendix C. However, it must be acknowledged that this format is not the more suitable for expert evaluation, especially when there might be neither tools at hand that support EARL nor RDF knowledge by the expert. Therefore, UWEM offers the possibility of an alternative format to EARL following a descriptive approach following the template of Appendix B.

The proposed minimal detail level of reporting for expert evaluation is per checkpoint for the entire sample. More detailed reporting (such as reporting per test and/or reporting for each sampled resource) is optional.

## 5.4 The UWEM score function

The evaluation of a web site produces a number of single test results. In the context of large scale web accessibility monitoring, it is important that the individual results can be aggregated into an end result that is easy to understand

and has a clear interpretation. Calculating the end result summarises the accessibility status of the web site into a single number. In doing so, it becomes possible to compare the status of different web sites or to investigate the differences between several versions of the same web site. The end result is called the **UWEM web accessibility score** (or UWEM score) and it is calculated by the **UWEM score function**.

The UWEM score can also be interesting for policy makers. The European Commission regulation 808/2004 concerning community statistics for the Information Society explicitly states that one characteristic to be provided is barriers to the use of ICT, Internet and other electronic networks, e-commerce and e-business processes. This section describes how to calculate the UWEM web accessibility score for single Web pages and Web sites. It also describes the main properties and includes some example calculations.

The remainder of this section focusses on automated evaluation of web accessibility. The UWEM score can also be calculated from an expert evaluation, provided that the results of the single tests are sufficiently detailed.<sup>14</sup> The presentation of a UWEM score must disclose which UWEM tests are included in the calculation.

#### 5.4.1 Definition of the UWEM web accessibility score

For each web page  $p$  and UWEM test  $t$  the application of the tests yields two values:

- $N_{pt}$ : the number of times test  $t$  has been applied within web page  $p$ .
- $B_{pt}$ : the number of "Fail" results from test  $t$  within web page  $p$ .

For example, assume a web page  $p$  contains four img elements and no other non-text content supporting the alt attribute. Then for test  $t_1$  1.1\_HTML\_01 we have  $N_{pt_1}=4$ . If furthermore, one of the images does not have an alt attribute and the other three images have one, then we have  $B_{pt_1}=1$ .

By adding up the values for all test types included in the evaluation, aggregated values can be calculated.

- $N_p = \sum_{t \in T} N_{pt}$  : the total number applications of all tests in test set  $T$  within page  $p$ .
- $B_p = \sum_{t \in T} B_{pt}$  : the total number of "Fail" results from all tests in test set  $T$  within page  $p$ .

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<sup>14</sup> If changes are necessary to accommodate results from expert tests this is mentioned explicitly.

The *UWEM web accessibility score of a single web page*, denoted by  $f(p)$ , is computed as the ratio of "Fail" test outcomes and total number of applied tests, i.e. the failure rate.

$$f(p) = \frac{B_p}{N_p} \quad (2)$$

For example, if 45 tests have been applied to web page  $p$  and 18 of the test outcomes are "Fail", then we have:  $f(p) = \frac{18}{45} = 0.4$

In the context of UWEM a web site is defined as a set of web pages. In the course of accessibility evaluation a sample from the web site (usually a subset) is taken into account. The sample is denoted by  $s = \{p_1, p_2, \dots, p_n\}$  where  $n$  is the sample size.

To calculate the *UWEM web accessibility score for a web site*, denoted by  $F(s)$ , the results from all pages in the sample are combined by adding the numerators and the denominators.<sup>15</sup>

$$F(s) = \frac{B_{p_1} + B_{p_2} + \dots + B_{p_n}}{N_{p_1} + N_{p_2} + \dots + N_{p_n}} \quad (3)$$

For example, if sample  $s$  consists of three pages with values

$$f(p_1) = \frac{18}{45}, \quad f(p_2) = \frac{37}{86}, \quad \text{and} \quad f(p_3) = \frac{26}{83},$$

then the UWEM score is  $F(s) = \frac{18 + 37 + 26}{45 + 86 + 83} = \frac{81}{214} \approx 0.38$ .

#### 5.4.2 Background and motivation

The UWEM score function has been selected to meet the requirements of presenting large scale web accessibility monitoring results. The requirements fall into three main groups: mathematical properties of the output values, expected behaviour in the presence of varying test results, and stability and comparability requirements.

<sup>15</sup> Some UWEM tests apply to the web site as a whole and not to individual web pages:

13.3\_HTML\_01 checks for information about the general layout of the site, for instance the availability of a sitemap. 13.4\_HTML\_01 checks the use of consistent navigation mechanisms. In these cases the numbers are denoted by  $B_{st}$  and  $N_{st}$ . The UWEM web site score is computed by the formula:

$$F(s) = \frac{B_{p_1} + B_{p_2} + \dots + B_{p_n} + \sum_{t \text{ on site level}} B_{st}}{N_{p_1} + N_{p_2} + \dots + N_{p_n} + \sum_{t \text{ on site level}} N_{st}}$$

### 5.4.2.1 Mathematical properties

1. The score covers a continuous range of values.
2. The score is bounded, i.e., there are minimum and maximum values.<sup>16</sup>
3. The score can get arbitrarily close to the extreme values (taking into account the behaviour of the function as well as the expected properties of the input data).

The use of continuous score values is a primary requirement of large scale web accessibility monitoring. A discrete quantification, e.g., into three or four categories, would be too coarse in the intermediary calculations of average values and other statistics. Furthermore, the first property enables the creation of differentiated ranking lists. Apart from ranking the presented data, the score function should also support comparisons in general, for instance to compare different versions of the same site and thus monitor changes over time. A bounded score (property 2) facilitates comparison over time because the extreme values of the maximum and minimum score establish a frame of reference for the results. Saturation of the range of values (property 3) backs up the frame of reference. Additionally, this is a useful requirement when it comes to presentation of the data.

The proposed UWEM score function has all three properties. The calculation of the ratio yields continuous results with a minimum of 0, in case no barriers are found. On the other hand if all tests fail each time they are applied the score reaches its maximum value 1. This also shows that the UWEM score function really takes the extreme values.

### 5.4.2.2 Behaviour in the presence of varying test results

1. The page score gets worse if more (different types of) tests have failed. The score improves if fewer (different types of) tests have failed.
2. The score gets worse if a test fails more often (anywhere within the site). The score improves if a test fails less often.
3. Each barrier type contributes equally to the score.
4. The score is insensitive to page size.

These properties have been selected because the objective of the score function is to be as accurate as possible and to present useful and meaningful information. The first two properties reflect the common understanding that more "Fail" test results stand for poorer accessibility of a web site. Property (3) represents a compromise. The view that all barriers are equally severe is a simplification. However, it would be a difficult, complex task to determine reliably the severity of different barrier types. Therefore, equal severity is assumed.

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<sup>16</sup> Note that every bounded score can be normalised into [0,1].

Finally, property (4) is introduced to avoid a bias toward short pages. A score based on absolute number of passes or fails, would put an advantage on short pages with fewer tests applied. The use of a relative value balances the influence of page size.

#### **5.4.2.3 Stability and comparability**

1. Scores are comparable over time, i.e. measuring improvement or changes over time is possible.
2. Scores are still comparable if a new test is added to the test set.<sup>17</sup>

These requirements describe stability needs in different dimensions. On the time dimension the repeatability and comparability of results over time is postulated. These two requirements are closely related to the sampling strategy. A uniform sampling approach with adequate choice of statistical parameters (sample size and confidence level) yields a representative sample. The score function is not affected by the absolute size of the sample.

The inclusion of further tests in the test set changes the input for the score function and will therefore also result in a score change. If the fraction of fail results for the newly added tests is similar to the fraction within the existing test, then the score will also be similar. If the outcome of the newly added tests is better, the score will improve. Analogously the score will decrease if the new tests perform worse.

#### **5.4.3 Limitations and underlying assumptions**

The UWEM score function has some limitations because some aspects of web accessibility rating can't be covered by the model. The variety of identified barriers is not taken in account. For instance, the score does not reflect whether one test fails ten times or whether ten different tests each fail once.

It would be highly desirable to have different scores for different types of disabilities. This could be achieved by the introduction of parameters expressing the degree in which a user with a certain disability will be affected by the barrier. However, if the parameters cannot be estimated with sufficient accuracy, problems will arise on several levels. The effort to estimate / define parameter values would be very high. Furthermore, the credibility of the findings of an automated web accessibility evaluation based on UWEM might be undermined because the diversity of disabilities can not be represented adequately by a small number of disability groups.

The UWEM score function is based on the assumption that all pages in a web site have the same importance. All pages contribute equally to the end result. The score function does not support weighting of web pages.

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<sup>17</sup> This property is especially relevant if an automated evaluation is enhanced by the results from expert evaluation.

A failure occurring in one place might have a much higher impact than the same failure occurring in another context. For instance if the first prevents the user from proceeding to other parts of the web site. The UWEM score function does not take this difference into account. Every test gets the same weight regardless of where with a web site it is applied.

The different elements of a web site are not totally independent. Some barrier types are probably related to each other. If several tests are applied to the same element the applicability constraints are designed to ensure that each problem is counted only once. In this way most of the dependencies can be avoided.

## 5.5 Scorecard report

The balanced scorecard is an approach to strategic management developed by Kaplan and Norton [KAPLAN96]. The balanced scorecard method is amongst others used by the European Commission in the Bologna process<sup>18</sup> to measure the progress made in three areas in higher education. This is done to visualise the status and improvements in the process.

Scorecards give the “big picture” of status and progress, and allow to monitor a set of indicators. The scorecard approach defined by UWEM allows synchronic and diachronic comparisons of websites and sets of websites: for example, different sets of websites, e.g. grouped by country, can be compared at a given point in time (synchronous comparison), and a fixed set of websites can be scored at regular time intervals to monitor progress in time (diachronic comparison). The overview perspective is useful to direct additional evaluation resources to areas where the results are especially interesting or alarming.

### 5.5.1 Scores indicating barrier status

[Table 1](#) explains the colour and letter codes used for the UWEM barrier score. The barrier scores are coded with letter codes and coloured fields with A and dark green indicating the best score, and E and red indicating the worst (no data is indicated with “n/a” and grey field).

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18 [http://www.bologna-bergen2005.no/Bergen/050509\\_Stocktaking.pdf](http://www.bologna-bergen2005.no/Bergen/050509_Stocktaking.pdf)

Scorecard		Interpretation
Letter	Colour	
<b>A</b>		No accessibility tests failed.
<b>B</b>		Few accessibility tests failed.
<b>C</b>		Some accessibility tests failed.
<b>D</b>		Many accessibility tests failed.
<b>E</b>		Most accessibility tests failed.
<b>n/a</b>		Not available or not tested.

Table 1: UWEM barrier score represented by letter and colour to accessibility status.

The scorecards presented in Table 1 can be used to describe the assessment of single Web sites or groups of Web sites based on UWEM. Note that the results for different web sites are comparable only if they were obtained using the same set of tests.

### 5.5.2 Cut-off values for the scorecard categories

Full accessibility (Letter 'A', dark green) is the highest score that can be reached. It will only be awarded if the web site produced no "Fail" results. The ranges of the other four scorecard categories are proportioned equally:

Scorecard		Score value $F(s)$
Letter	Colour	
<b>A</b>		$F(s) = 0$
<b>B</b>		$0 < F(s) \leq 0.25$
<b>C</b>		$0.25 < F(s) \leq 0.5$
<b>D</b>		$0.5 < F(s) \leq 0.75$
<b>E</b>		$0.75 < F(s) \leq 1$

Table 2: Cut-off values for the UWEM scorecard categories.

### 5.5.3 Scores indicating barrier change

If a set of web pages was previously evaluated using the same assessment method, the score for indicating the barrier probability change can be determined. This score simply indicates direction of change compared to the previous evaluation. An increase in accessibility is indicated with an arrow pointing up, a decrease with an arrow pointing down. No change is indicated with a horizontal bar, and no previous data with the text "n/a".

<b>Code</b>	<b>Scorecard level change since previous evaluation</b>	<b>Accessibility change</b>
↑	Scorecard level decreased	Accessibility improved
—	Scorecard level unchanged	Accessibility unchanged
↓	Scorecard level increased	Accessibility declined
n/a	No previous evaluation available	No previous evaluation available

Table 3: UWEM score change represented by a symbol indicating the direction of change.

To provide consistency between status and change scores, the change score relates to a change in the actual status scorecard (see Table 3) rather than to changes in the score value (a change in the scorecard colour is needed to trigger a decrease/increase in the change score).

### 5.5.4 Aggregation and further statistics

When sets of websites are evaluated and monitored, it can be useful to aggregate the results into a single score for use in a scorecard. UWEM defines the aggregated score of a set of websites as the average of the UWEM scores of the individual websites. UWEM does not define criteria for selecting sets of web sites. However the aggregated score will only make sense for homogeneous sets or groups of web sites sharing a common feature. Examples of criteria for grouping web sites include:

- NACE (Nomenclature générale des Activités Economiques dans les Communautés Européennes)<sup>19</sup> business sectors, and
- NUTS (Nomenclature of Territorial Units)<sup>20</sup> regions.

The scores are then computed as averages over the UWEM score of the web sites in the relevant group.

If a larger group of web sites is evaluated, e.g., in the context of monitoring the web accessibility status of a specific country, it is possible to carry out further statistical analysis based on the UWEM score results of the individual web sites. For example, a distribution plot of scorecard categories or of a finer scale (e.g., in 1%, 5%, or 10% partitioning) can be used to visualise the variance within the group of web sites. Quantile plots (Q-Q-plots) can be applied to compare two different groups of web sites.

19 [http://epp.eurostat.cec.eu.int/cache/ITY\\_OFFPUB/KS-BG-06-002/EN/KS-BG-06-002-EN.PDF](http://epp.eurostat.cec.eu.int/cache/ITY_OFFPUB/KS-BG-06-002/EN/KS-BG-06-002-EN.PDF)

20 [http://epp.eurostat.cec.eu.int/cache/ITY\\_OFFPUB/KS-BD-05-001/EN/KS-BD-05-001-EN.PDF](http://epp.eurostat.cec.eu.int/cache/ITY_OFFPUB/KS-BD-05-001/EN/KS-BD-05-001-EN.PDF)

## 6 Glossary

Term	Use in UWEM
Accessibility	Accessibility is here defined as the absence of accessibility barriers for a given checkpoint, Web resource or key use scenario.
Accessibility test	A test referring to one or more Web pages resulting in an EARL report.
Accessibility barrier probability <i>Fp</i>	<b>Fp</b> indicates the probability for an accessibility barrier for a given web page <b>p</b> .
Aggregation	Grouping of data to get an overview of the result set.
Authored units	Some set of material created as a single entity by an author. Examples include a collection of markup, a style sheet, and a media resource, such as an image or audio clip.
Balanced Scorecard	Approach to strategic management developed by Robert Kaplan and David Norton. The approach can be used to monitor progress towards a defined set of goals.
Barrier	A barrier on a Web page can be viewed as an incompatibility between the user and the Web page that causes the user to be not able to accomplish a task in a given key use scenario.
BenToWeb	Benchmarking Tools and Methods for the Web. Project in the WAB cluster: <a href="http://bentoweb.org/">http://bentoweb.org/</a>
Core resource list	The Core Resource List is a set of generic resource types which are likely to be present in most Web sites, and which are core to the use and accessibility evaluation of a site. It represents a <i>minimal</i> set of resources which <i>should</i> be included in any accessibility evaluation of the site. It cannot, in general, be automatically identified, but requires human judgement to select.
CP	Checkpoint
Crawl Web site	Recursively retrieve Web pages, until the whole Web site is downloaded, or until sampling criteria terminates the crawling process.
Data cell	The cells in a data table marked up with td elements.
Data table	Table where content in data cells has a relationship with other content in both the containing row and column.
EARL	Evaluation And Reporting Language
EIAO	European Internet Accessibility Observatory. Project in the WAB cluster: <a href="http://www.eiao.net/">http://www.eiao.net/</a>
Evaluation type	The manner in which the accessibility evaluation is performed. The different evaluation types mentioned in UWEM are automatic, expert and user testing. This version of UWEM describes only automatic and expert testing.

<b>Term</b>	<b>Use in UWEM</b>
Header cell	A cell in a data table marked up with a th element, or a td element with a scope attribute or an axis attribute.
Key use scenario	The sequence of events and Web pages that must be traversed to successfully perform a task on a Web page
A, AA, AAA	Levels of conformance with WCAG 1.0 as defined by W3C.
NACE	Acronym from the French 'Nomenclature statistique des Activites economiques dans la Communauté Europeenne' – Statistical classification of economic activities in the European Community
Non-text content	Content that is not represented by a Unicode character or sequence of Unicode characters when rendered in a user agent according to the formal specification of the content type Note: This includes ASCII Art, which is a pattern of characters. <sup>21</sup>
NUTS	Nomenclature of Territorial Units for Statistics
Preformatted text	Text where layout is defined by whitespace and line break characters and which is typically rendered with a monospace font.
Replicable	If tests are repeated, the same results are expected with certain limitations
Sampling	Procedure to identify a subsets of the Complete Resource Set (a single complete Web site) which are to be evaluated.
S-EAM	Support EAM. Project in the WAB cluster: <a href="http://www.support-eam.org/">http://www.support-eam.org/</a>
User testing	Evaluation by use of a representative set of users for each failure mode
UWEM	Universal Web Evaluation Methodology
WAB	Web Accessibility Benchmark cluster
WCAG	Web Content Accessibility Guidelines

See also <http://www.w3.org/2003/glossary/> for explanation of common Web terms and abbreviations.

<sup>21</sup> This is the WCAG 2.0 definition quoted from <http://www.w3.org/WAI/GL/WCAG20/WD-WCAG20-20060317/appendixA.html#non-text-contentdef>

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[XPATH20] Berglund A et al (eds) (2007). XML Path Language (XPath) 2.0 - W3C Recommendation 23 January 2007. Available at: <http://www.w3.org/TR/xpath20/>

[XPATH-Functions] Malhotra A, Melton J, Walsh N (eds) (2007). XQuery 1.0 and XPath 2.0 Functions and Operators - W3C Recommendation 23 January 2007. Available at: <http://www.w3.org/TR/xquery-operators/>

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## 8 Appendix A: Document License

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## 9 Appendix B: Template for expert evaluation

This appendix presents a template to be used for expert evaluation when presenting the results of a UWEM evaluation. This template is based upon the W3C/WAI template for evaluation reports,<sup>23</sup> with minor changes as some additions required by the Unified Web Evaluation Methodology (UWEM). Please note that some points can only be used if applicable.

[start of proposed template]

### 9.1 Introduction

This evaluation report describes the evaluation of the web site: **http://example.org/**, according to UWEM. The list of resources tested for conformance can be found in: **http://example.org/tests/test1.rdf**

### 9.2 Executive Summary

This report describes the conformance of the **http://example.org/** Web site with UWEM . The evaluation results are described below and are based on the Unified Web Evaluation Methodology (UWEM) as provided by the WAB Cluster on <http://www.wabcluster.org/UWEM1/>.

Based on this evaluation using the UWEM tests for every WCAG1.0 checkpoint of priority 1 and 2, the **http://example.org/** Web site [meets/does not meet] UWEM Conformance Level 1 (identical to WCAG level A) and/or 2 (identical to WCAG double A). Detailed evaluation results are available in section 9.5. Resources for follow-up study are listed in section 9.6. Feedback on this evaluation is welcome.

### 9.3 Background about Evaluation

Conformance evaluation of Web accessibility can be a combination of evaluation tools and manual evaluation by an experienced reviewer. The evaluation results in this report are based on evaluation conducted on the following date(s): \_\_\_\_\_ [and using the following tool(s)\_\_\_\_\_:]. The Web site may have changed since that time. Additional information on the UWEM evaluation process is available at <http://www.wabcluster.org/UWEM1/>.

#### 9.3.1 Web Site Evaluated

- [Name of Web site]  
[and purpose of site, if relevant]

---

23 <http://www.w3.org/WAI/eval/template.html>

- [Base URL of site]
- [Scope of the evaluation, with exclusions explicitly disclosed]
- [Link to Sampled Resources List]
- [Exact date, or range of dates, on which the evaluation was conducted]
- [Natural language(s) of Web site]

### 9.3.2 Reviewer(s)

- [Name of reviewer or review team, unless anonymous]
- [Organization with which reviewer(s) is/are affiliated, if relevant and if not anonymous]
- [Contact information for reviewer(s) or reviewer(s) organization, unless anonymous]

### 9.3.3 Evaluation Process

- [WCAG 1.0 Level for which conformance was tested using UWEM, e.g. WCAG 1.0 Level A, Double A]
- UWEM process

## 9.4 Resources List

Description of the sample from UWEM specific for this web site.

The Sampled Resource List set can be found in Appendix [YY/URL].

## 9.5 Check Results

- [Interpretative summary of evaluation results]
  - [e.g. this Web site [meets/does not meet] WCAG 1.0 [Level A, Double A]
  - [accessibility features in which this site is strong include \_\_\_\_\_]
- [Detailed results, structured according to WCAG 1.0 Checklist]
  - [include links to WCAG 1.0 Checkpoints and Techniques for all non-conformant items]
  - [provide links to examples of non-conformances]

- [attach or link to specific reports in appendices, e.g., output of validators and evaluation tools]
- [provide links to recommendations for addressing non-conformant checkpoints]
- [If available, attach more detailed test results as an Appendix to this evaluation]
- [Describe or point to a suggested program of on-going monitoring of Web site accessibility, re-evaluation of authoring tools, etc.]

## 9.6 References

- Web Content Accessibility Guidelines 1.0:  
<http://www.w3.org/TR/WCAG10/>
- WAB cluster: <http://www.wabcluster.org>
- Support-EAM project: <http://www.support-eam.org>
- BenToWeb project: <http://www.bentoweb.org>
- EIAO project: <http://www.eiao.org>
- Checklist for Web Content Accessibility Guidelines 1.0:  
<http://www.w3.org/TR/WCAG10/full-checklist.html>
- Techniques for Web Content Accessibility Guidelines 1.0:  
<http://www.w3.org/TR/WCAG10-TECHS/>
- Evaluating Web Sites for Accessibility: <http://www.w3.org/WAI/eval/>
- Evaluation, Repair, and Transformation Tools for Web Content Accessibility: <http://www.w3.org/WAI/ER/existingtools.html>
- Selecting and Using Authoring Tools for Web Accessibility [draft]:  
<http://www.w3.org/WAI/EO/Drafts/impl/software5.html>
- Review Teams for Evaluating Web Site Accessibility [draft]:  
<http://www.w3.org/WAI/EO/Drafts/review/reviewteams.html>

## 9.7 Appendices

Attach any necessary appendices here.

[end of proposed template]

## 10 Appendix C: RDF Schemas for Resources Lists

### 10.1 Expressing resources

As declared in section 4, resources must be expressed via the `earl:Content` Class [EARL10-Schema]. For a detailed description on how to use them, please refer to the aforementioned document, in combination with the HTTP Vocabulary in RDF [HTTP-RDF]. Depending on the type of resource, some of the properties may be optional. This appendix is subject to change when both vocabularies stabilise.

### 10.2 Resource Lists

Resource lists can be expressed as a simple RDF Sequence containing a list of `earl:TestSubject`. All parts of a web page, and therefore also all parts intended to be rendered together, should be included within one `earl:TestSubject`. Furthermore, since `earl:TestSubject` can be of type `earl:Content`, content negotiation can be included part of the `TestSubject`.

This sections contains examples of how to present resource lists.

The first example is a simple resource list for a server with no content negotiation. The web site in the first example contains a simple (X)HTML page, a (X)HTML page with CSS, a (X)HTML page with CSS from another site and a frameset page:

```
<?xml version="1.0" encoding="UTF-8"?>
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:earl="http://www.w3.org/ns/earl#"
  xmlns:http="http://www.w3.org/2006/http#"
  xmlns:dct="http://purl.org/dc/terms#"
  xmlns:dc="http://purl.org/dc/elements/1.1#"
  xml:base="http://www.example.org/20070604/test/">
  <!-- Resource sequence -->
  <rdf:Seq rdf:ID="listOfResources">
    <rdf:li rdf:resource="index.html" />
    <rdf:li rdf:resource="sitemap.html" />
    <rdf:li rdf:resource="search.html" />
    <rdf:li rdf:resource="framesetpage.html" />
  </rdf:Seq>
  <!-- Web Site description -->
  <earl:TestSubject
rdf:about="http://www.example.org/20070604/test/" >
    <dc:title xml:lang="en">Example of a web site</dc:title>
    <dct:hasPart rdf:resource="#listOfResources"/>
  </earl:TestSubject>
  <!-- Resources as earl:TestSubject without css-->
```

```

<earl:TestSubject rdf:about="index.html" />

<!-- Resources as earl:TestSubject with css-->
<earl:TestSubject rdf:about="sitemap.html">
  < dct:hasPart rdf:resource="default.css"/>
</earl:TestSubject>

<!-- Resource where the CSS is part of another site, outside of
the main base -->
<earl:TestSubject rdf:about="search.html">
  < dct:hasPart
rdf:resource="http://www.example.org/20070604/anothersite/default.css"
/>
</earl:TestSubject>

<!-- Resource of a frame page as earl:TestSubject-->
<earl:TestSubject rdf:about="framesetpage.html">
  < dct:hasPart rdf:resource="default.css"/>
  < dct:hasPart rdf:resource="navigation.html"/>
  < dct:hasPart rdf:resource="heading.html"/>
  < dct:hasPart rdf:resource="framepage.html"/>
</earl:TestSubject>

</rdf:RDF>
    
```

The second example uses HTTP in RDF to describe a POST request to <http://www.example.org:80/application.php> with the following parameters:

Parameter	Value
foo	blah1
bar	blah2

and with the following request headers:

User-Agent	My User Agent
Host	www.example.org

```

<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
xmlns:http="http://www.w3.org/2006/http#">

  <http:Connection rdf:ID="conn">
    <http:connectionAuthority>www.example.org:80</http:connectionAutho
rity>
    <http:request rdf:resource="#req0"/>
  </http:Connection>

  <http:PostRequest rdf:ID="req0">
    <http:abs_path>/application.php</http:abs_path>
    <http:version>1.1</http:version>
    <http:header rdf:parseType="Collection">
      <http:MessageHeader>
        <http:fieldName rdf:resource="http://www.w3.org/2006/http-
header#user-agent"/>
    </http:header>
  </http:PostRequest>
</rdf:RDF>
    
```

```

    <http:fieldValue>My User Agent</http:fieldValue>
  </http:MessageHeader>
  <http:MessageHeader>
    <http:fieldName rdf:resource="http://www.w3.org/2006/http-
header#host"/>
    <http:fieldValue>www.example.org</http:fieldValue>
  </http:MessageHeader>
</http:header>
  <http:body rdf:resource="data:application/x-www-form-
urlencoded;base64,Zm9vPWJsYWgxJmJhcjlibGFoMg==" />
  <http:response rdf:resource="#resp0" />
</http:PostRequest>

<http:Response rdf:ID="resp0" />
</rdf:RDF>

```

Note: "Zm9vPWJsYWgxJmJhcjlibGFoMg==" in the data URI is the result of Base64-encoding the character sequence "foo=blah1&bar=blah2".

The third example describes a resource list where the sitemap is presented depending on the Accept-Language header of the user's User-Agent. The site in this example contains a (X)HTML page and a (X)HTML page with CSS:

```

<?xml version="1.0" encoding="UTF-8"?>
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:earl="http://www.w3.org/ns/earl#"
  xmlns:http="http://www.w3.org/2006/http#"
  xmlns:dct="http://purl.org/dc/terms#"
  xmlns:dc="http://purl.org/dc/elements/1.1#"
  xml:base="http://www.example.org/20070604/test/">

  <!-- Resource sequence -->
  <rdf:Seq rdf:ID="listOfResources">
    <rdf:li rdf:resource="index.html" />
    <rdf:li rdf:resource="sitemap.html" />
  </rdf:Seq>

  <!-- Web Site description -->
  <earl:TestSubject
rdf:about="http://www.example.org/20070604/test/" >
    <dc:title xml:lang="en">Example of a web site</dc:title>
    <dct:hasPart rdf:resource="#listOfResources"/>
  </earl:TestSubject>

  <!-- Resources as earl:TestSubject without css-->
  <earl:TestSubject rdf:about="index.html" />

  <!-- Resources as earl:TestSubject with css-->
  <earl:Content rdf:about="sitemap.html">
    <dct:hasPart rdf:resource="default.css"/>
    <rdf:type rdf:resource="http://www.w3.org/ns/earl#Content" />
    <earl:context rdf:resource="#httpRequest1"/>
  </earl:Content>
  <http:GetRequest rdf:about="#httpRequest1">
    <http:version>1.1</http:version>

```

```

<http:header rdf:parseType="Collection">
  <http:MessageHeader>
    <http:fieldName
      rdf:resource="http://www.w3.org/2006/http-header#accept"
    />
    <http:fieldValue rdf:parseType="Collection">
      <http:HeaderElement>
        <http:elementName>text/html</http:elementName>
        <http:param>
          <http:Param>
            <http:paramName>q</http:paramName>
            <http:paramValue>1.0</http:paramValue>
          </http:Param>
        </http:param>
      </http:HeaderElement>
      <http:HeaderElement>
        <http:elementName>
          application/xml
        </http:elementName>
        <http:param>
          <http:Param>
            <http:paramName>q</http:paramName>
            <http:paramValue>0.9</http:paramValue>
          </http:Param>
        </http:param>
      </http:HeaderElement>
      <http:HeaderElement>
        <http:elementName>*/*</http:elementName>
        <http:param>
          <http:Param>
            <http:paramName>q</http:paramName>
            <http:paramValue>0.01</http:paramValue>
          </http:Param>
        </http:param>
      </http:HeaderElement>
    </http:fieldValue>
  </http:MessageHeader>
  <http:MessageHeader>
    <http:fieldName
      rdf:resource="http://www.w3.org/2006/http-header#accept-language"
    />
    <http:fieldValue rdf:parseType="Collection">
      <http:HeaderElement>
        <http:elementName>de-DE</http:elementName>
        <http:param>
          <http:Param>
            <http:paramName>q</http:paramName>
            <http:paramValue>1.0</http:paramValue>
          </http:Param>
        </http:param>
      </http:HeaderElement>
      <http:HeaderElement>
        <http:elementName>de</http:elementName>
        <http:param>
          <http:Param>
            <http:paramName>q</http:paramName>
            <http:paramValue>0.75</http:paramValue>
          </http:Param>
        </http:param>
      </http:HeaderElement>
    </http:fieldValue>
  </http:MessageHeader>
</http:header>

```

```

        </http:param>
    </http:HeaderElement>
    <http:HeaderElement>
        <http:elementName>en</http:elementName>
        <http:param>
            <http:Param>
                <http:paramName>q</http:paramName>
                <http:paramValue>0.25</http:paramValue>
            </http:Param>
        </http:param>
    </http:HeaderElement>
    <http:HeaderElement>
        <http:elementName>*</http:elementName>
        <http:param>
            <http:Param>
                <http:paramName>q</http:paramName>
                <http:paramValue>0.01</http:paramValue>
            </http:Param>
        </http:param>
    </http:HeaderElement>
    </http:fieldValue>
</http:MessageHeader>
</http:header>
</http:GetRequest>
</rdf:RDF>

```

### 10.3 Sample EARL report for test results

The following is two examples of simple EARL reports that presents the results of an evaluation. The first example shows an EARL report of a (X)HTML page with CSS and the content of the resources embedded in the EARL:

```

<?xml version="1.0" encoding="UTF-8"?>

<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:earl="http://www.w3.org/ns/earl#"
  xmlns:dc="http://purl.org/dc/elements/1.1/"
  xmlns:dct="http://purl.org/dc/terms/"
  xmlns:foaf="http://xmlns.com/foaf/0.1/"
  xmlns:bace="http://www.example.org/20070604/test/">

  <earl:Software rdf:about="#tool">
    <dc:title xml:lang="en">checkUWEM</dc:title>
    <dc:description xml:lang="en">The UWEM check tool</dc:description>
    <foaf:homepage
rdf:resource="http://example.org/tools/#checkUWEM"/>
    <dct:hasVersion>1.0</dct:hasVersion>
  </earl:Software>

  <earl:TestSubject rdf:about="sitemap.html">
    <dct:hasPart rdf:resource="default.css"/>
  </earl:TestSubject>

```

```

<earl:TestSubject rdf:about="default.css">
  < dct:isPartOf rdf:resource="sitemap.html" />
</earl:TestSubject>

<earl:Assertion rdf:about="#assertion">
  <earl:subject rdf:resource="sitemap.html"/>
  <earl:assertedBy rdf:resource="#tool"/>
  <earl:test
rdf:resource="http://www.wabcluster.org/uwem/tests/guideline-1/#Test1-
1_HTML_01"/>
  <earl:result rdf:resource="#result1"/>
  <earl:mode rdf:resource="http://www.w3.org/ns/earl#automatic"/>
</earl:Assertion>

<earl:Content rdf:about="sitemap.html">
  <earl:sourceCopy rdf:parseType="Literal" xml:lang="en">
    <html xmlns="http://www.w3.org/1999/xhtml">
      <head>
        <title>Hello World!</title>
      </head>
      <body>
        <p>Hello World! </p>
      </body>
    </html>
  </earl:sourceCopy>
  <dc:date
rdf:datatype="http://www.w3.org/2001/XMLSchema#date">2007-07-
04</dc:date>
  </earl:Content>

<earl:TestResult rdf:about="#result1">
  <earl:outcome rdf:resource="http://www.w3.org/ns/earl#fail"/>
  <dc:title xml:lang="en">Missing alt attribute</dc:title>
  <dc:description rdf:parseType="Literal" xml:lang="en">
    <div xmlns="http://www.w3.org/1999/xhtml">
      <p>The <code>alt</code> attribute is missing in the
      <code>img</code> element.</p>
    </div>
  </dc:description>
  <dc:date
rdf:datatype="http://www.w3.org/2001/XMLSchema#date">2007-07-
04</dc:date>
  </earl:TestResult>

<earl:Assertion rdf:about="#assertion">
  <earl:subject rdf:resource="default.css"/>
  <earl:assertedBy rdf:resource="#tool"/>
  <earl:test
rdf:resource="http://www.wabcluster.org/uwem/tests/guideline-3/#Test3-
3_CSS_01"/>
  <earl:result rdf:resource="#result2"/>
  <earl:mode rdf:resource="http://www.w3.org/ns/earl#automatic"/>
</earl:Assertion>

```

```

<earl:Content rdf:about="default.css">
  <earl:sourceCopy rdf:parseType="Literal" xml:lang="en">
    <earl:sourceCopy xml:lang="en">
      .logo {
        float: left;
      }
    </earl:sourceCopy>
  </earl:sourceCopy>
  <dc:date
rdf:datatype="http://www.w3.org/2001/XMLSchema#date">2007-07-
04</dc:date>
</earl:Content>

  <earl:TestResult rdf:about="#result2">
    <earl:outcome rdf:resource="http://www.w3.org/ns/earl#fail"/>
    <dc:title xml:lang="en">CSS file does no validate according to
formal grammars.</dc:title>
    <dc:description rdf:parseType="Literal" xml:lang="en">
      <div xmlns="http://www.w3.org/1999/xhtml">
        <p>Parsing of the CSS file with a SAC parser caused
errors.</p>
      </div>
    </dc:description>
    <dc:date
rdf:datatype="http://www.w3.org/2001/XMLSchema#date">2007-07-
04</dc:date>
  </earl:TestResult>

</rdf:RDF>

```

The second example shows an EARL report of a web page built with frames. In this example, the content of the resources are not embedded in the EARL:

```

<?xml version="1.0" encoding="UTF-8"?>
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:earl="http://www.w3.org/ns/earl#"
  xmlns:dc="http://purl.org/dc/elements/1.1/"
  xmlns:dct="http://purl.org/dc/terms/"
  xmlns:foaf="http://xmlns.com/foaf/0.1/"
  xmlns:bace="http://www.example.org/20070604/test/">

  <earl:Software rdf:about="#tool">
    <dc:title xml:lang="en">checkUWEM</dc:title>
    <dc:description xml:lang="en">The UWEM check tool</dc:description>
    <foaf:homepage
rdf:resource="http://example.org/tools/#checkUWEM"/>
    <dct:hasVersion>1.0</dct:hasVersion>
  </earl:Software>

  <earl:TestSubject rdf:about="framesetpage.html">
    <dct:hasPart rdf:resource="navigation.html"/>
    <dct:hasPart rdf:resource="default.css"/>
    <dct:hasPart rdf:resource="heading.html"/>
    <dct:hasPart rdf:resource="framepage.html"/>
  </earl:TestSubject>

```

```

<earl:TestSubject rdf:about="default.css">
  < dct:isPartOf rdf:resource="framesetpage.html" />
</earl:TestSubject>

<earl:TestSubject rdf:about="navigation.html">
  < dct:isPartOf rdf:resource="framesetpage.html" />
</earl:TestSubject>

<earl:TestSubject rdf:about="heading.html">
  < dct:isPartOf rdf:resource="framesetpage.html" />
</earl:TestSubject>

<earl:TestSubject rdf:about="framepage.html">
  < dct:isPartOf rdf:resource="framesetpage.html" />
</earl:TestSubject>

<!--Assertion of framepageset -->
<earl:Assertion rdf:about="#assertion">
  <earl:subject rdf:resource="framesetpage.html"/>
  <earl:assertedBy rdf:resource="#tool"/>
  <earl:test
rdf:resource="http://www.wabcluster.org/uwem/tests/guideline-12/#Test-
12.1_HTML_01"/>
    <earl:result rdf:resource="#result1"/>
    <earl:mode rdf:resource="http://www.w3.org/ns/earl#automatic"/>
  </earl:Assertion>

  <earl:TestResult rdf:about="#result1">
    <earl:outcome rdf:resource="http://www.w3.org/ns/earl#fail"/>
    <dc:title xml:lang="en">No title element found</dc:title>
    <dc:description rdf:parseType="Literal" xml:lang="en">
      <div xmlns="http://www.w3.org/1999/xhtml">
        <p>No title element found for the frame pages</p>
      </div>
    </dc:description>
    <dc:date
rdf:datatype="http://www.w3.org/2001/XMLSchema#date">2007-07-
04</dc:date>
  </earl:TestResult>

  <!--Assertion of navigation-->
  <earl:Assertion rdf:about="#assertion">
    <earl:subject rdf:resource="navigation.html"/>
    <earl:assertedBy rdf:resource="#tool"/>
    <earl:test
rdf:resource="http://www.wabcluster.org/uwem/tests/guideline-7/#Test-
7.2_HTML_01"/>
      <earl:result rdf:resource="#result2"/>
      <earl:mode rdf:resource="http://www.w3.org/ns/earl#automatic"/>
    </earl:Assertion>

    <earl:TestResult rdf:about="#result2">
      <earl:outcome rdf:resource="http://www.w3.org/ns/earl#fail"/>
      <dc:title xml:lang="en">Blinking elements found</dc:title>
      <dc:description rdf:parseType="Literal" xml:lang="en">
        <div xmlns="http://www.w3.org/1999/xhtml">
          <p><code>blink</code> element found</p>
        </div>
      </dc:description>
    </earl:TestResult>
  </earl:Assertion>

```

```

    </div>
  </dc:description>
  <dc:date
rdf:datatype="http://www.w3.org/2001/XMLSchema#date">2007-07-
04</dc:date>
  </earl:TestResult>

  <!--Assertion of heading -->
  <earl:Assertion rdf:about="#assertion">
    <earl:subject rdf:resource="heading.html"/>
    <earl:assertedBy rdf:resource="#tool"/>
    <earl:test
rdf:resource="http://www.wabcluster.org/uwem/tests/guideline-1/#Test1-
1_HTML_01"/>
    <earl:result rdf:resource="#result3"/>
    <earl:mode rdf:resource="http://www.w3.org/ns/earl#automatic"/>
  </earl:Assertion>

  <earl:TestResult rdf:about="#result3">
    <earl:outcome rdf:resource="http://www.w3.org/ns/earl#fail"/>
    <dc:title xml:lang="en">Missing alt attribute</dc:title>
    <dc:description rdf:parseType="Literal" xml:lang="en">
      <div xmlns="http://www.w3.org/1999/xhtml">
        <p>The <code>alt</code> attribute is missing in the
          <code>img</code> element.</p>
      </div>
    </dc:description>
    <dc:date
rdf:datatype="http://www.w3.org/2001/XMLSchema#date">2007-07-
04</dc:date>
  </earl:TestResult>

  <!--Assertion of css -->
  <earl:Assertion rdf:about="#assertion">
    <earl:subject rdf:resource="default.css"/>
    <earl:assertedBy rdf:resource="#tool"/>
    <earl:test
rdf:resource="http://www.wabcluster.org/uwem/tests/guideline-3/#Test3-
3_CSS_01"/>
    <earl:result rdf:resource="#result4"/>
    <earl:mode rdf:resource="http://www.w3.org/ns/earl#automatic"/>
  </earl:Assertion>

  <earl:TestResult rdf:about="#result4">
    <earl:outcome rdf:resource="http://www.w3.org/ns/earl#fail"/>
    <dc:title xml:lang="en">CSS file does not validate according to
formal grammars.</dc:title>
    <dc:description rdf:parseType="Literal" xml:lang="en">
      <div xmlns="http://www.w3.org/1999/xhtml">
        <p>Parsing of the CSS file with a SAC parser caused
errors.</p>
      </div>
    </dc:description>
    <dc:date
rdf:datatype="http://www.w3.org/2001/XMLSchema#date">2007-07-
04</dc:date>
  </earl:TestResult>

```

```
<!--assertion for framepage -->
<earl:Assertion rdf:about="#assertion">
  <earl:subject rdf:resource="framepage.html"/>
  <earl:assertedBy rdf:resource="#tool"/>
  <earl:test
rdf:resource="http://www.wabcluster.org/uwem/tests/guideline-1/#Test1-
1_HTML_01"/>
  <earl:result rdf:resource="#result5"/>
  <earl:mode rdf:resource="http://www.w3.org/ns/earl#automatic"/>
</earl:Assertion>

<earl:TestResult rdf:about="#result5">
  <earl:outcome rdf:resource="http://www.w3.org/ns/earl#fail"/>
  <dc:title xml:lang="en">Missing alt attribute</dc:title>
  <dc:description rdf:parseType="Literal" xml:lang="en">
    <div xmlns="http://www.w3.org/1999/xhtml">
      <p>The <code>alt</code> attribute is missing in the
        <code>img</code> element.</p>
    </div>
  </dc:description>
  <dc:date
rdf:datatype="http://www.w3.org/2001/XMLSchema#date">2007-07-
04</dc:date>
  </earl:TestResult>

</rdf:RDF>
```

## **11 Appendix D: Contributors to this and previous versions of this document**

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