
**Software Engineering — Recommended
Practice for the Internet — Web Site
Engineering, Web Site Management, and
Web Site Life Cycle**

*Ingénierie du logiciel — Pratique recommandée pour Internet —
Ingénierie du site web, management du site web, et cycle de vie du site
web*

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(Revision of IEEE Std 2001-1999)

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**IEEE Recommended Practice for the
Internet—Web Site Engineering, Web
Site Management, and Web Site Life
Cycle**

IEEE Computer Society

Sponsored by the
Internet Best Practices Working Group



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Sponsor

Internet Best Practices Working Group
of the
IEEE Computer Society

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Abstract: Recommended practices for World Wide Web page engineering for Intranet and Extranet environments, based on World Wide Web Consortium (W3C®) and related industry guidelines, are defined in this recommended practice. This recommended practice does not address stylistic considerations or human-factors considerations in web page design beyond limitations that reflect good engineering practice.

Keywords: Extranet, Internet, Intranet, Web page, Web site, Web site engineering, Web site life cycle, Web site management, well-engineered Web page, World Wide Web

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Introduction

(This introduction is not part of IEEE Std 2001-2002, IEEE Recommended Practice for the Internet—Web Site Engineering, Web Site Management, and Web Site Life Cycle.)

The World Wide Web is expanding and its value is increasing as a method for locating and delivering information. This creates a significant engineering challenge. Locating applicable information requires that indexing information be incorporated into Web page development. Once an applicable page has been located, essential information may not be present, resulting in user frustration and a failure of the Web application to meet its purpose.

This is a revision of the 1999 accumulation of Web site management “recommended practices.” This revision is based on IEEE Std 2001-1999, extending it based on recommendations since it was developed, addressing “site-wide” issues as well as “managed” Web sites (as opposed to just Intranet and Extranet sites). These can serve to improve the effectiveness of Web pages for users, Web page developers, and the value of the Web in corporate and organizational applications. This recommended practice is focused on managed Web sites, Intranet (within an organization), and Extranet (between a group of collaborating organizations). Other projects are being evaluated by the Internet Best Practices working group (IBPwg) within the IEEE Computer Society. See <http://dx.doi.org/10.1041/standard/2001> for current details.

Web page engineering often is done with little consideration for the immediate or ongoing implications of Web site design or implementation. Some sites reflect “state of the art” delivery that can only be accessed with the most recent tools. This may be inconsistent with the business objectives for that site. Some sites will languish beyond their applicable life, occupying valuable resources (particularly as these are incorporated into organizational indexes, and delivered as prospective “query returns” by indexing and search services). Poor Web page engineering results in lost productivity and user frustration, and can result in legal liabilities.

There is no clear prediction of when the World Wide Web or a specific site will be obsolete. There is a legitimate engineering concern that this lifespan may be significantly underestimated or disregarded entirely in many Web site designs. Vendor products—past and future versions, format preferences, or selection of implementation languages—may require future re-engineering as vendors and products fade. Corporate Web sites may not need to live beyond the life of the corporation, however, public sector and other institutional sites may well span centuries. A significant portion of the content of these sites may not require updating, except in cases of shortsighted design. The Magna Carta and the works of Shakespeare are examples of fairly stable content.

The recommended practices and requirements set forth in this recommended practice are aimed to reduce the risks associated with Web page investments. Further revision of this recommended practice is expected, partially to reflect changes in the Web environment, but also to reflect increased understanding of “recommended practices” in Web page engineering. There is a popular awareness of “Web years,” characterized by rapid advances in the platform technology for clients and servers. There is a potentially expensive, misinformed conclusion that might be drawn from this, which is that Web pages (and more directly, information content and services delivery) either are, or should, move forward at this same rate. Some of today’s Web pages will warrant long-term retention, and within the context of business operations (which is the core of managed sites), re-engineering of last year’s Web pages is an investment that requires justification. The value of Web-based operations is the delivery of the right information and services to the right persons at the right time with the least amount of effort. Success in Web-based operations is based more on engineering design in response to an understanding of the target-user community and information, than it is on the rapidly evolving technology for Web platforms.

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IEEE Recommended Practice for the Internet—Web Site Engineering, Web Site Management, and Web Site Life Cycle

1. Overview

This recommended practice provides guidance for designing and implementing well-engineered Web pages for use in managed Web sites. The goal of this recommended practice is to improve the productivity of managed Web operations in terms of:

- a) locating relevant information,
- b) facilitating ease of use,
- c) reducing legal liabilities, and
- d) providing for efficient development and maintenance practices.

This recommended practice will focus on vendor- and product-independent considerations.

This recommended practice provides guidance for persons designing and developing Web pages, and managers responsible for establishing guidelines for Web site development.

1.1 Scope

This document defines recommended practices for World Wide Web page engineering for Intranet and Extranet environments, based on World Wide Web Consortium (W3C[®]) and related industry guidelines.

This recommended practice does not address stylistic considerations or human-factors considerations in Web page design beyond limitations that reflect good engineering practice. Annex B contains topics which are not sufficiently mature or where there are not specific recommendations for inclusion in the current issue of this recommended practice.

1.2 Purpose

This recommended practice is intended to provide guidance to Web page developers in Intranet (organizational internal), and Extranet (amongst a limited domain of organizational participants) Web environments on recommended practices for Web page engineering. The objective is to improve the productivity of Intranet/Extranet Web operations in terms of locating relevant information, and efficient development and maintenance practices.

The 2002 revision of this recommended practice addresses items identified in Annex A of IEEE Std 2001-1999 [B14]¹ which can be well-defined and to respond to emerging technology and changes in practice that have resulted in new material or changes to approved recommendations. Conformance to this recommended practice in developing and publishing a Web site provides a basis for a well-engineered Web site.

¹The numbers in brackets correspond to those of the bibliography in Annex A.

1.3 Conformance

This recommended practice defines two forms of conformance: “IEEE Std 2001-2002-conforming Web page” and “IEEE Std 2001-2002-conforming Web page generation tool.” Throughout this recommended practice, the use of the verb *shall* indicates a requirement of the standard; the use of the verb *should* indicates a recommendation; and the use of the verb *may* indicates an option or variation that is permitted by the recommended practice. Although users of this recommended practice are strongly encouraged to consider the recommendations made within, the implementation of recommendations is not a requirement of Web page conformance.

1.3.1 IEEE Std 2001-2002-conforming Web page

A conforming Web page implements all the requirements of this recommended practice. A Web page that conforms to this recommended practice may indicate this by the use of the following tag:

```
<span class="IEEEstd2001">  
  <a href= "http://dx.doi.org/10.1041/standard/2001/2002/logo/use"  
    <img src= "http://dx.doi.org/10.1041/standard/2001/2002/logo"  
      alt="IEEE Computer Society Best Practices axV2 Logo"  
      width="80" height="40" />  
  </a>  
</span>
```

NOTE—The HTML Reference Designator (HREF value will change with each version of this recommended practice. Tools should use the HREF value to determine the version of the standard being used.

The image file may be downloaded and referenced using relative Uniform Resource Identifiers (URIs), but the target HTML file must be referenced by an absolute URI.

Consistent with 4.1.10 of this recommended practice, a meta statement indicating conformance to this recommended practice may be included. This statement is:

```
"<meta name="guideline" content="computer.org/2001/2002" />
```

1.3.2 IEEE Std 2001-2002-conforming Web page generation tool

A product for generating well-engineered Web pages dynamically, or as an authoring tool, conforms to IEEE Std 2001-2002 if it satisfies all of the following conditions:

- a) It generates pages that conform to the XHTML DTD recommendation of the W3C, or it documents which DTDs it supports.
- b) It generates pages which comply with the DTD selection of the user.
- c) For versions HTML 3.2 and higher, or XML; it supports Cascading Style Sheets (CSS) 1.0 or higher, or it supports XSL and, in either case, it documents the use of this function and identifies which recommendations are supported.
- d) It generates pages that conform to all of the requirements, recommendations, and options of this recommended practice. Tools may allow for creation of non-conforming pages as a user option (in which case the IEEE 2001 tag cannot be included on the page.)
- e) It supports the Web Consortium’s Authoring Tool Accessibility Guidelines (see 2.8).

ENGINEERING, WEB SITE MANAGEMENT, AND WEB SITE LIFE CYCLE

2. References

This recommended practice shall be used in conjunction with the following publications. When the following specifications are superseded by an approved revision, the revision shall apply. See Annex A for informative bibliographic references. Uniform Resource Locators (URLs) provided in this recommended practice are current as of the date submitted for publication². See <http://dx.doi.org/10.1041/standard/2001/2002/REFERENCES> for a list of normative and informative reference URLs on-line.

36 CFR 1194 –Electronic and Information Technology Accessibility Standards, Federal Register Dec. 21, 2000; Code of Federal Regulations (CFR).³

Authoring Tool Accessibility Guidelines 1.0, W3C Recommendation 3 February 2000, Guidelines required by Web page generation tools to support accessibility requirements.⁴

HTML 4.01 Specification, W3C Recommendation 24 December 1999.^{5,6}

ISO 639-1:2002, Codes for the Representation of Names of Languages—Part 1: Alpha-2 Code.⁷

ISO 639-2:1998, Codes for the Representation of Names of Languages—Part 2: Alpha-3 Code.

ISO 3166-1:1997, Codes for the Representation of Names of Countries and their Subdivisions—Part 1: Country Codes.

ISO 4217:2001, Codes for the Representation of Currencies and Funds.

W3C REC-CSS1-19900111, W3C Recommendation Cascading Style Sheets, level 1—W3C Recommendation, 17 Dec. 1996, revised 11 Jan 1999.^{8,9}

W3C REC-CSS2-19980512, W3C Recommendation Cascading Style Sheets, level 2 CSS2 Specification—W3C Recommendation, 12 May 1998.^{10,11}

²If direct access to W3C recommendations is not possible, they can be located from the primary site: <http://www.w3.org>.

³For information on this document, please visit <http://www.access-board.gov/sec508/508standards.htm>.

⁴For information on this document, please visit <http://www.w3.org/TR/ATAG10/>.

⁵This specification defines the HyperText Markup Language (HTML), the publishing language of the World Wide Web. This specification defines HTML 4.01, which is an update of HTML 4. In addition to the text, multimedia, and hyperlink features of the previous versions of HTML (HTML 3.2 [HTML32]—see [B60]—and HTML 2.0—see [B20]), HTML 4 supports more multimedia options, scripting languages, style sheets, better printing facilities, and documents that are more accessible to users with disabilities. HTML 4 also takes great strides towards the internationalization of documents, with the goal of making the Web truly World Wide. HTML 4 is an SGML application conforming to ISO 8879:1986 [B43].

⁶For information on this document, please visit <http://www.w3.org/TR/1999/REC-html401-19991224>.

⁷ISO publications are available from the ISO Central Secretariat, Case Postale 56, 1 rue de Varembe, CH-1211, Genève 20, Switzerland/Suisse (<http://www.iso.ch/>). ISO publications are also available in the United States from the Sales Department, American National Standards Institute, 25 West 43rd Street, 4th Floor, New York, NY 10036, USA (<http://www.ansi.org/>).

⁸This document specifies level 1 of the Cascading Style Sheet (CSS1) mechanism. CSS1 is a simple style sheet mechanism that allows authors and readers to attach style (e.g., fonts, colors, and spacing) to HTML documents. The CSS1 language is human readable and writable, and expresses style in common desktop publishing terminology. One of the fundamental features of CSS is that style sheets cascade; authors can attach a preferred style sheet, while readers may have a personal style sheet to adjust for human or technological handicaps. The rules for resolving conflicts between different style sheets are defined in this specification.

⁹For information on this document, please visit <http://www.w3.org/TR/REC-CSS1>.

¹⁰This specification defines Cascading Style Sheets, level 2 (CSS2). CSS2 is a style sheet language that allows authors and users to attach style (e.g., fonts, spacing, and aural cues) to structured documents (e.g., HTML documents and XML applications). By separating the presentation style of documents from the content of documents, CSS2 simplifies Web authoring and site maintenance.

CSS2 builds on CSS1 and, with very few exceptions, all valid CSS1 style sheets are valid CSS2 style sheets. CSS2 supports media-specific style sheets so that authors may tailor the presentation of their documents to visual browsers, aural devices, printers, Braille devices, hand-held devices, etc. This specification also supports content positioning, downloadable fonts, table layout, features for internationalization, automatic counters and numbering, and some properties related to user interface.

¹¹For information on this document, please visit <http://www.w3.org/TR/REC-CSS2/>.

W3C WAI Web Content 19990505, W3C Recommendation Web Content Accessibility Guidelines 1.0, WAI Page Author Guidelines—W3C, 5 May 1999.^{12, 13}

XHTML™ 1.0: The Extensible HyperText Markup Language, A Reformulation of HTML 4 in XML 1.0, W3C Recommendation 26 January 2000.^{14, 15}

¹²These guidelines explain how to make Web content accessible to people with disabilities. The guidelines are intended for all Web content developers (page authors and site designers) and for developers of authoring tools. The primary goal of these guidelines is to promote accessibility. However, following them will also make Web content more available to all users, whatever user agent they are using (e.g., desktop browser, voice browser, mobile phone, automobile-based personal computer, etc) or constraints they may be operating under (e.g., noisy surroundings, under- or over-illuminated rooms, in a hands-free environment, etc). Following these guidelines will also help people find information on the Web more quickly. These guidelines do not discourage content developers from using images, video, etc, but rather explain how to make multimedia content more accessible to a wide audience.

¹³For information on this document, please visit <http://www.w3.org/TR/WCAG10>.

¹⁴This specification defines XHTML 1.0, a reformulation of HTML 4 as an XML 1.0 application, and three DTDs corresponding to the ones defined by HTML 4. The semantics of the elements and their attributes are defined in the W3C Recommendation for HTML 4. These semantics provide the foundation for future extensibility of XHTML. Compatibility with existing HTML user agents is possible by following a small set of guidelines.

XHTML is a family of current and future document types and modules that reproduce, subset, and extend HTML 4.0. XHTML 1.0 provides the basis for a family of document types that will extend and subset XHTML, in order to support a wide range of new devices and applications, by defining modules and specifying a mechanism for combining these modules. This mechanism will enable the extension and subsetting of XHTML 1.0 in a uniform way through the definition of new modules.

¹⁵For information on this document, please visit <http://www.w3.org/TR/xhtml1>.