MAPPING THE FOOTSTEPS OF THE GREEN ANOLE: A TEMPLATE FOR PUBLISHING ECOLOGICAL DATA ON THE WORLD WIDE WEB

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MAPPING THE FOOTSTEPS OF THE GREEN ANOLE: A TEMPLATE FOR PUBLISHING ECOLOGICAL DATA ON THE WORLD WIDE WEB*†

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ABSTRACT

In the handful of years since the World Wide Web (WWW or Web) came into being, Web sites have developed at an astonishing rate. With the influx of Web pages comes a disparity of site types, including personal homepages, commercial sales sites, and educational data. The variety of sites and the deluge of information contained on the Web exemplify the individual nature of the WWW. Whereas some people argue that it is this eclecticism which gives the Web its charm, we propose that sites which are repositories of technical data would benefit from standardization. This paper proffers a methodology for publishing ecological research on the Web. The template we describe uses capabilities of HTML (the HyperText Markup Language) to enhance the value of the traditional scientific paper.

1.0 INTRODUCTION

The International Standards Organization (ISO) has provided rules for processing hypermedia documents in Standard Generalized Markup Language (SGML). These standards include ISO 8879 and ISO 12083 (ISO/IEC, 1996).

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For the presentation of this paper at Eco-Informa '96, we will use materials compiled while researching the green anole lizard (Truett, 1993) to demonstrate a model for publishing ecological information on the Web (Carnes et al., 1996). Just as most scientific hard-copy publications follow a particular pre-arranged format, our template also incorporates this pertinent information. However, papers published on the Web need not be linear descriptions of research ventures. Our template uses hypertext and multimedia to enhance the paper and engage the reader.

Publishing on the Web has problems [e.g., URL (Uniform Resource Locator) citation], but the benefits are enormous (e.g., timeliness and availability). As technology expands rapidly, the dissemination of eco-information must keep pace. The necessity of keeping abreast with the technology cannot be overstated, for information that is out-dated prior to publication is ineffective in influencing policy decisions.

2.0 TEMPLATE EXPLAINED

From the HTML main page (also called "homepage," particularly with personal URLs) through auxiliary pages, the proposed template synthesizes common features of the printed page and capabilities of the WWW.

2.1 MAIN PAGE

As the main page of the Web publication is typically the first page viewed by browsers, a graphic (logo, photo, etc.) at the top can represent the sponsoring entity (journal, university, corporation) or subject area. However, graphics slow transmission time, so we recommend using compressed graphics and limiting the logo's file size. The title of the paper and authorial information (complete with hypertext links to the author's homepage or e-mail address and to the homepage of the author's affiliation) are the first and most noticeable text on the main page. The date of the paper's publication on the WWW must be provided along with browser configuration information.

Following the header-title information, the paper's abstract (short, approximately 125 words) summarizes the contents of the paper. A to-the-point abstract is important, as many people (particularly those not affiliated with major research institutions) do not have direct ethernet connections, and boot-up time from browsers is both time-consuming and expensive.

The Hyper-Contents serves the purpose of the old-fashioned, linear Table of Contents and follows the standard scientific paper format: Introduction, Materials and Methods, Results, Discussion, Conclusion, References. Each topic is linked to auxiliary pages (which incorporate additional internal links) so that readers can jump directly to sections of the paper which most interest them. The Contents includes a link to a Keywords page which can link either to headings in the paper or to a Glossary page (which could then link to particular parts of the paper).

The bottom of the main page includes additional citation information such as who owns the data, who programmed the page, the date of the latest revision, and copyright information (if any).

2.2 AUXILIARY PAGES

The auxiliary pages contain the same type of textual information that would appear in a hard-copy journal article but employ the enhancements available through publishing on the Web.

2.2.1 *Introduction and Materials and Methods Pages*

The text on the Introduction and Materials and Methods pages has hot links to the Glossary page and to additional information (internal to the paper and available throughout the global Web). Also, scanned-in photos of experiments and laboratories can be integrated into the Materials and Methods auxiliary page. Tables and graphs link to additional figures. (These graphics no longer have to be black and white line drawings but can incorporate color and "3-D" effects.) These sections also take advantage of video capability, though some machines do not recognize video. (It is becoming increasingly popular to create "browser sensitive" Web pages – pages that detect the capabilities and only provide relevant multimedia.) Today's technology (summer 1996) doesn't readily accommodate large videos or high-resolution graphics (without the use of ample compression) because of the amount of memory required for these multimedia formats. However, it is predicted that within the next year videos (using both .avi and .wav files simultaneously), both in their "standard" format and in the new QuickTime and VRML (Virtual Reality Markup Language) formats, will be available to a larger user community and will require less disk space.

2.2.2 Results and Discussion Pages

The Results of the research and a Discussion of findings make up additional auxiliary pages. Part of the Discussion can be a form for readers to fill out and submit with their questions, comments, disagreements, recommendations, etc. (If a form is included, someone must respond to and process the information sent by readers. If the paper is published in an electronic journal (or e-Zine), the existence of such a person is quite likely; if not, the individual responsible for this task must have a dependable e-mail address.)

2.2.3 References Page

Non-cyber citations have standard reference formats; however, standard procedures for citing URLs do not exist. The majority of the citation suggestions from electronic journals incorporate the URL's author's name, the document's title (if available), the date composed *and* the date accessed (unlike static hard-copy publications, Web information

often varies from day to day as pages are revised and updated), and the URL. (The placement of this information within the citation is still being debated.) Note that, unlike typical citations, a URL citation makes no mention of page numbers or length of the article, as such information depends on a multiplicity of factors and varies between users, machine setups, and browsers. URLs included in the reference list should be linked directly to their source pages.

2.2.4 Glossary and Keywords Pages

As noted above, keywords for a scientific paper can be handled in several ways. Hypertext allows links from important words to a Glossary page or to a definition (which could appear at the bottom of the page which the word is on, with capability to return to the original place in the text). We recommend linking keywords to an auxiliary page which is set up for the sole purpose of providing definitions and explanations. While such a page adds to the overall amount of information placed on the Web server, the advantage of having a clearly delineated Glossary page usually outweighs this concern.

2.2.5 Index Page

Web Indexes are intriguing enigmas. It is quite simple to link words from the Index to the Glossary or to a single textual cross-reference. However, when indexed words appear in multiple instances, multi-linking becomes necessary, which presents the dilemma of how much freedom to give the reader on proceeding further or retracing the search.

3.0 HTML ISSUES

Before placing text on the Web, one must first consider some software and hardware basics as well as some fundamental issues of HTML and the browser environment. Web publishing encourages the use of color, which hard-copy publishing can seldom afford without escalating publishing costs. But publishing ecological data in a script font on a psychedelic background does not ensure easily readable text. Dark text on a light background remains one of the easiest combinations to read. Even if you find that perfect match of lavender text on an azure background, light fonts on dark screens often don't print (or they print white text on white paper) unless the HTML is coded to convert the font settings. Similarly, tables and graphs and graphics that have been scanned should be "test-printed" prior to publishing the data.

The main page should fit on one or two screens. Auxiliary pages should be separate files to enhance performance, particularly on under-powered computers. Each auxiliary page should be limited to five or six screens with no more than five graphical elements to avoid downloading numerous graphics in segments. These criteria are difficult to control, however, given the numerous settings users can employ on their individual machines and the variety of browsers and browser display options/techniques. An alternative to limiting

the number and complexity of the graphics is to provide "thumbnail" images for fast downloading with options to click for the full-sized versions. It can generally be assumed that the majority of readers will be using HTML 2.0 (soon 3.0) compliant browsers.

Each auxiliary page should have buttons which allow the user to return to the main page of the document (with the Hyper-Contents) and buttons which navigate throughout the current page (e.g., go to the top or bottom). Buttons which allow the user to jump to the next auxiliary page in the document can be used, though doing so implies a linear format, which is not required in Web-writing.

3.1 ADVANTAGES OF HYPERMEDIA AND WEB PUBLICATION

Perhaps the most obvious bonus of publishing ecological data on the Web is the ability to synthesize the proven effectiveness of the traditional scientific paper with cutting-edge technology. With Web publishing, papers can have as many color photographs as their authors submit, at no extra charge for publication. Animation video (from simple screen shots to VRML) and sound enhance a reader's understanding and appreciation. Additionally, documents published on the Web can link to supporting and related research. The linkages made in the hyperworld carry endless potential.

Response from the scientific community can be almost instantaneous. Readers have the option of completing a form or sending e-mail directly from the document. These letters can be addressed to go directly to the e-Zine's editor or be simultaneously routed to both the editor and the original author, speeding the turn-around time for rebuttals and responses. Because of this interactive question-and-answer capability, future research with other scientists is merely a keystroke away!

Because of its international accessibility, the WWW is immensely popular. Web publishing is much more efficient than its hard-copy counterpoints in going from research discovery to "printed" page.

3.2 DISADVANTAGES OF WEB PUBLICATION

Although one of the advantages of Web publishing is the accessibility of information, students may not be able to discriminate between sloppy/poor research and well-grounded findings. This drawback is partially attributed to the lack of standards on the Web and the fact that anyone with server space can "publish." Also, the quicker publication timelines for e-Zines may in part be due to the lack of extensive peer reviews which may cause errors to be published as fact. Thus, Web articles are often less prestigiously received, particularly with "self-published" findings.

Other disadvantages of Web publishing include the following: (1) there is no established citation style for references, (2) the accessibility of Web information increases the potential for copyright infringement, (3) there is no guarantee of permanency (there

are no dusty, heavy tomes on the Web), and (4) there is often "information overload" with too much casual information which must be sifted through to find the useful facts. Restricted access to Web sites and the lack of established pricing practices for subscriptions to electronic journals may prevent libraries from acquiring e-Zines. These expenses may also prohibit private individuals access (both from subscription costs and in hook-up expenses).

4.0 CONCLUSIONS

Using examples from a research project in zoology studying the green anole, we offer a template for adapting ecological data for Web publication. From a linear, traditional format, our template transforms the information into a user-specified, interactive framework which is linked by hypertext hotspots both internally and externally to related information. Text, tables, and line graphs are enhanced with photos, color images, videos, and sound. The proven effectiveness of the traditional scientific paper is maintained but overhauled to consolidate technological advancements and capabilities of the Web; the formerly highly technical and (at times!) dull document becomes the paper of the present: highly technical and engagingly entertaining! Our template recommends a standard format for scientific data presentation on the Web. Standardization provides familiarity; innovation guides invention.

5.0 REFERENCES

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