The benefits of using XML for Web site management derive primarily from its property of separating a document's content from its presentation. This enables that content to be managed more efficiently in a single source file. The principle behind single source is that one document contains all the content independent of presentation attributes. When a change is made to that content, it is made in only one place and automatically propagated to all the places it is used and displayed (Web pages, PDF pages, etc.)

The following is a list of some of the benefits that CTG and the Testbed participants found in their experience using XML for Web site content management.

Automatic Generation of Multiple Formats

The XML source document is processed with an XSL (Extensible Stylesheet Language) file to produce a variety of outputs including HTML pages, PDFs, and RTFs. This technique is frequently referred to as reusing and repurposing content. The ability to create a variety of outputs from a single source can save time and ensure consistency, which has a direct impact on the return on investment.

Consistency Across Multiple Formats and Devices

In addition to repurposing content, XML's single source capability decreases errors in content and ensures consistency of format throughout entire Web sites and between formats for multiple devices. With today's fast pace of information flow, changes to content can be frequent. Since content often appears in more than one place on a Web site, executing those changes can also be challenging. Without a single content source, a Webmaster might not be able to update all instances of the outdated content and thus risk inconsistency of presentation.

Clear Content Ownership and Coordinated Publication Process

The use of a single source document can also foster collaboration between staff at organizations, which would not be accomplished as easily with HTML. XML encourages version control through the single-source document. This guards against multiple authors using different versions, and against any single individual claiming exclusive control of the content. All stakeholders involved in the publication process need to work together and design a workflow that allows the benefits of XML use to be realized.

Potential for Data Exchange

In addition to content management, there are other general benefits that can be obtained by using XML. For example, XML's data structure requirements provide an effective method to share and exchange data within and across organizations. It also provides a standard mechanism to access data in legacy systems through standard, non-proprietary formats.

Accessibility Compliance

Using XML can also have a direct effect on accessibility. Converting and maintaining thousands of HTML pages to be in compliance with Section 508 regulations (http://www.section508.gov/) that "require Federal agencies to make their electronic and information technology accessible to people with disabilities," can be an imposing task. However, a typical XML-based Web site, in which thousands of HTML pages are automatically and consistently produced by a few dozen XSL files, can make this task highly manageable. Changing one XSL file can immediately bring hundreds of HTML pages produced by that XSL file into compliance. Also, multiple formats (HTML, PDF, printer friendly, etc.) that increase accessibility options are more easily created and maintained in an XML-based environment.

Device Independence

XML is device independent, which is growing in importance as wireless, mobile, and portable devices enter mainstream use. XML/XSL can deliver to PDAs, cell phones, and other wireless devices with the same ease as to desktop computers.

Content Personalization

XML allows for the potential to personalize data. Because XML separates content from presentation, different stylesheets can be applied to customize data for different audiences. XML also increases the speed and aggregation of content. For instance, RSS (Real Simple Syndication / Rich Site Summary), which is an XML-based format, can locate and deliver updated content immediately to users' Web browsers, email clients, or mobile devices — based on their preferences and customizations.

Standard Format

Because XML, by definition, stores content in a standardized, open format, it offers greater long-term benefits for information longevity and value. The Computer Age has already experienced many examples of "data obsolescence" — think of 5.25 inch floppy tasks, DOS files, or early word processing formats. Because XML is not proprietary, any software that recognizes the XML standard will be able to view and process XML files well into the future. Furthermore, because XML separates the content from the presentation, that content can be preserved as presentation technologies change over time. Since HTML is primarily intended to display content in a Web browser, its format mixes the content with the presentation in a way that makes it difficult, if not impossible, to separate out only the content for preservation.

Costs and Time Savings

Any agency that produces several publications understands the challenge of managing multiple versions. Each time a content author changes the text, the Web pages must also be edited. This can take a Webmaster hours searching for the exact places where the changes were made both in the text and in the HTML document. Again, with XML, the Webmaster needs only to change the XML source document. This significantly reduces time spent on changes to existing publications.

As Figure 3 illustrates, under existing HTML-based Web technologies (bottom figure), the Web team's resources are increasingly used up in routine maintenance and operational tasks. Eventually, resources for new development opportunities are completely squeezed out. Using the new XML-based Web technologies (top figure), routine operational and maintenance tasks are increasingly automated and demand less time, so the opportunity for new development increases dramatically. The Web team can devote more time to higher-skill, higher value development projects. (This data is based on CTG's ROI analysis of its own Web site conversion to XML, which is covered in more detail in CTG's publication, **Return on Investment In Information Technology: A Guide for Managers,** http://www.ctg.albany.edu/publications/guides/roi **)**

Figure 3. Costs Trends Analysis of XML Implementation.