Every time a new software technology finds a market, someone has corralled, structured and put to work a new information type, from accounting and payroll systems to CAD, spreadsheets and multimedia. Most text-related tools (e.g., text retrieval, document management and document routing) deal with text from the outside, as opaque objects. Word processors assist in text manipulation, but text has resisted efforts to make its internal structure explicit and automatically manipulable for a long time. The fact that valuable documents are often lengthy, complex, self-referencing and encrusted with graphics, videos and other stuff has made the job more difficult. One of the most important advances in making text more useful is the Standard Generalized Markup Language (SGML), which we covered at length in Release 1.0, 7-91.

SGML brings database capabilities to raw text collections. It allows people to manipulate fields within large documents. They can define and find abstracts, subsections, captions, bulleted or numbered lists, copyright notices, bibliographies and other document elements easily and re-use them in other contexts. People can limit text searches to specific parts or elements of a document, which greatly improves query precision and recall. SGML also smooths text exchange between organizations with dissimilar computer systems.

The greatest use of SGML has been in vertical markets where certain organizations need to exchange well-specified kinds of information with each other, or where a dominant buyer -- say, the Department of Defense or Ford Motors -- requires SGML for new documentation. With SGML, the US military has streamlined the way it manages documentation, from procurement to training and maintenance. Pharmaceutical companies store volumes of drug-test information marked up so that they can be easily searched and scanned. Scientists publish and share research worldwide. Humanities scholars encode and share poems and novels. SGML allows any of these constituencies to display the same content on-screen, publish it in paper manuals or publish it on CD-ROMs.

SGML blossomed in vertical markets, but hasn't attracted much attention in the general-office or consumer-
retail markets. But lately in a new guise, as part of the Internet's World Wide Web, it has attracted a great deal of attention from companies interested in publishing and communications (see Release 1.0, 1-94). The Web allows people to publish "pages" of information containing mixed text, graphics and sounds that are highly linked to each other. To do so, the Web uses the HyperText Markup Language (HTML), a highly simplified and stylized, network-centric application of SGML. Many people have experimented with HTML, so there are some incompatible variants in use. Standards committees seem to be well on their way to set a new baseline for HTML (see page 8).

Both SGML and HTML define tags embedded in documents to identify different document elements. Most tags are set off from regular text with angle brackets; ending tags start with a slash character. Thus, "<h1>Moby Dick</h1>" causes the interpreting application to identify the text "Moby Dick" as a first-level heading, which may mean it presents it in a larger font size than the normal text, centered and boldface, and prints it twice, once on the title page and again above the table of contents.

This month: acronym co-evolution

Eventually, HTML will probably do more than draw attention to SGML: It may help reframe our understanding of internal document structures and relationships among documents, and their role in the broader information environment. This issue of Release 1.0 examines the co-evolution of HTML and SGML and some of the software products from the companies and consortia who are driving this process.

This is a large subject, so there are areas that we don't cover in this issue, such as secure transaction services, mathematical equations, seals of approval and rules about re-use. We may cover some of those in future issues. Our focus this month is on content in context. Here are some of our conclusions, listed from the practical and short-term to the more abstract and long-term.

- HTML, which many people now deal with in its raw, unadorned state with simple text-editing tools, will disappear behind graphical interfaces (see page 14). In fact, the Web will become more balanced between the creators and users of content. Lightweight authoring and editing tools will replace today's limited browsers, which will lower the barrier for creation of content and links.

- Other tools will get dragged into the mix. SGML and HTML don't provide enough visual control for some applications, most obviously traditional publishing. Soon, Adobe's Acrobat and full-fledged SGML will run on the Web (see page 11). Soon, page-layout, graphic-design and other functions will fit in.

- HTML will be a proper SGML DTD, but will remain a maverick. For example, HTML doesn't need everything to be defined and declared up front. The two communities will adapt to each other.

- HTML's anchor tag, though limited, changes the nature of SGML (see page 12). SGML gives content structure and local context; HTML gives it connectivity and global context.
As people grow more comfortable linking chunks of information, they will create new forms of expression, structures, etc. People will weave their content into the larger context and share the results.

The co-evolution of SGML and HTML will lead to new insights about the intrinsic structure of documents, document collections and the broader realm of information. Of special note are the differences between local and global structure and how to make best use of them in different contexts. We will be better equipped to strike a balance between the formal and the informal, precision and fuzziness, messaging and broadcasting.

The focus on structure and context balances the WYSIWYG obsession that has pervaded much of personal computing for the past decade.

**Design intent**

It's helpful to explore the differences between SGML and HTML by examining the designers' intents. SGML began as a way to gain efficiencies and power in document creation, distribution and re-use. However, its creators rapidly expanded the original scope to an abstract representational scheme that would allow them to manipulate and re-use components of large documents for various purposes across many different industries, and therefore across many document types. Initially, documents were self-contained: They could contain complex structures, subdocuments and many internal references, but they were not linked directly to other documents.

HTML's developers sought to create a way to share information over the Internet, which they regarded as a communication medium. They used SGML as a starting point, since it was already mature and offered a useful framework, but they stripped out many of SGML's features and added Internet-based linking capabilities. More importantly, they ignored some of the SGML community's implicit assumptions. They restricted the number of features they would support, but made the interpreters forgiving. If a browser hits an unknown tag, it will ignore it instead of stopping or crashing the program. They made the system easily extensible and even planned for an evolutionary dynamic which might lead to HTML's replacement over time, if other protocols prove more useful and popular. In a way, SGML was designed to constrain; HTML was designed to empower.

"When you ask SGML people what their environment's topology is, they say it's a hierarchy. When you ask HTML people the same question, they say it's a web."

-- Haviland Wright, Interleaf

**The SGML way**

In the early 1970s, Charles Goldfarb led an IBM research project to develop integrated law-office information systems. In the process, he, Edward Mosher and Raymond Lorie developed a system they called the Generalized
The international standards community picked up the idea, added the word "Standard," and SGML was on its way. In 1986, SGML became an international standard (ISO 8879); now it's the hub of a growing industry and the foundation for millions of documents already online and many more on their way.

SGML is a syntax for defining document frameworks so that organizations can exchange documents easily, manipulate and search them, put them to different uses with shared data or simply revise and reissue them with less effort. SGML is nothing without Document Type Definitions (DTDs), which define in great (but still abstract) detail the valid and expected components for documents. That is, DTDs define how many levels of headings a chapter can have, but not their presentation (what font and style they will show up in). That's the job of a publishing or output-formatting package.

DTDs are designed by their creators to identify structural elements such as titles, authors' names, captions, key words, footnotes, copyrights, illustrations, list items and tables. Developers can also create special tags such as drug names in FDA filings and cross-reference them to data sources. Once identified, these elements can then be parameters for queries or other processes. If you've tagged all the key words in a document, generating an index or cross-reference is easy. So is generating a table of contents to any arbitrary depth, if you've tagged the headings and subheads. So is applying visual formatting.

In the SGML flow

To set up an SGML-based publishing system one must participate in a food chain of sorts. First, administrators define DTDs for their companies. They can do this from scratch in text editors; they can use specialized tools such as MicroStar's Near & Far; or they can choose from industry-standard DTDs, much as they would look for an existing, specific EDI package if they wanted to sell shoestrings to Kmart, for example.

Once DTDs are in place, people can create content that adheres to those definitions with SGML-aware authoring tools such as SoftQuad's Author/Editor, Datalogics' WriterStation or Microsoft's SGML Author for Word (see page 14). If they don't have such tools or are dealing with legacy documents, they can use specific filters or more intelligent conversion programs, such as Avalanche Development's FastTAG,2 that read files in other formats, find patterns, deduce structure and apply markup accordingly. This process isn't always perfect, but it can perform the bulk of the work.

Finally, validation parsers such as Exoterica's Omnimag or those built into SGML authoring software confirm that documents are properly tagged, given a specific DTD. Once documents are in proper SGML, users can store them in document-management systems and use text-retrieval tools that can use the SGML information, such as IDI's BasisPlus. Also, some vendors

1 Goldfarb recently left IBM to form his own consultancy, Information Management Consulting.

2 Avalanche is now a subsidiary of Interleaf.

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create environments that bundle many of these features, such as Electronic Book Technologies' DynaText.

Industry by industry

Early SGML customers could best cost-justify systems for high-value applications, typically within specific industries, so the SGML market quickly developed many submarkets. Some of the most important SGML initiatives are the US military's Continuous Acquisition and Life-cycle Support (CALS); the American Association of Publishers' Electronic Manuscript Project; and the International Committee for Accessible Document Design (ICADD) system for Braille, synthesized voice and large-print editions. Other notable efforts include the Pinnacles Group of semiconductor suppliers and the Text Encoding Initiative for humanities research.

The tendency toward deep, vertical-market DTDs had a negative side. Until recently, SGML "goodness" was measured by how intricate and erudite DTDs were, even if the results were sometimes hard to use. Some SGML purists derided efforts that were useful but not complex or well-behaved, such as HTML. That attitude is changing quickly.

"In the SGML market, as soon as someone puts out a product, everyone wants to measure it against CALS or ATA [SGML specifications]. HTML is a stark statement that an appropriate DTD doesn't look anything like CALS. The focus in SGML is in the detailed stuff; the market opportunity is in the simple stuff."

-- Bill Zoellick, Avalanche Development

The World Wide Web and HTML

In 1989, Tim Berners-Lee wanted to create a way for physicists at the European Laboratory for Particle Physics in Switzerland (CERN), to collaborate more effectively over the Internet, which they already used heavily for e-mail, Usenet newsgroups and ftp (the file transfer protocol). He wanted to create a flexible and forgiving network fabric that could evolve according to its users' needs. Over the next couple of years Berners-Lee developed the World Wide Web, for which he created the HyperText Markup Language, the server-side HyperText Transfer Protocol (HTTP) and Universal Resource Locators (URLs), which are a standard nomenclature to determine where a file or application is and what protocol it runs.

Although Berners-Lee knew SGML and wanted to base the new system on it, he designed HTML from scratch and with the specific intent to avoid much of SGML's baggage. For example, HTML doesn't require all tags or protocols to be pre-declared; it simply ignores things it can't understand. Thus HTML

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3 Previously "Computer-aided Acquisition and Logistics Support."
is not a subset of SGML, but rather is a specific, simple instance of a DTD created specifically for the Web. In Internet style, Berners-Lee put his early prototype code out for others to use and requested that people who tried it send him improvements and suggestions.

HTML and URLs aren't difficult to master, nor are they particularly powerful taken separately. The power comes from the consistency and breadth of use that they get. People can use the simplest of text editors and a pinch of imagination (plus some patience!) to create content for the Web. They don't need advanced degrees to do it. With a little coaching, fifth-grade munchkins can put their own so-called home pages on the Web, as Sun's John Gage demonstrated at the 1994 PC Forum.

Now, like unwitting, collaborating hives of mutant tapestry-weaving ants, people around the world are working to develop hypertext documents and weave them with others on the World Wide Web. The Web is the fastest-growing part of the fast-growing Internet.

The acid test: Will it play in Mosaic?

Many people use awkward combinations of tools to publish on the Web. For example, some people run a text editor such as vi or emacs in one window and Mosaic in another. After they make some changes to their HTML pages, they save them to disk, refresh the browser's display and see if their changes worked. That, strangely enough, is the measure of a "good" HTML page: It's one that will display properly on a majority of the client browser applications, especially Mosaic. If it doesn't, you start over.4

Berners-Lee never intended Web authors to see -- let alone have to know -- HTML.5 The first version of Web software, which Berners-Lee built in NextStep (now OpenStep), had an integrated editor and browser. When Marc Andreessen and his colleagues at the National Center for Supercomputing Applications (NCSA) wrote the Mosaic Web client, they built a read-only browser because Andreessen felt it would be too difficult to do an integrated package. (Andreessen and most of that team are now at Mosaic Communications.) HTML's visibility is largely a result of that decision (and, of course, the fact that we don't all have NeXT workstations).

Features or bugs?

HTML isn't perfect. Until recently, available authoring systems were primitive (see page 14 for some new offerings). Publishers fear that HTML

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4 Recently, Dan Connolly of Hal Computer Systems put a server on the Internet that can validate that HTML pages conform to the HTML 2.0 specification (see Resources, page 19). Mail it a page of HTML, and it sends back a list of comments from SGMLS, a validation parser. Georgia Tech has enhanced this server so you need only send a pointer (URL) to the page in question, not the whole document.

5 Similarly, the developers of the ISO e-mail standard, X.400, never intended for end-users to see the ugly addresses, but X.500 took far longer to finish than they expected.
permanently limits their control over how their material appears on-screen. Information shows up in the client software's fonts, sizes and colors. Even if publishers work within HTML's limitations, its stream-oriented structure limits their creativity: With current tools, text can't flow around images or into multi-column layouts.

The infrastructure is thin, but it's mostly a sign of opportunity. Document- and link-management capabilities are usually limited to what the file system provides. Companies have only begun to create Web publishing systems backed with production databases. As people publish more documents and links proliferate, things can get messy. However, any individual's view of the Web is only as messy as the quality of the sources she chooses to link to. Most HTML links are coarse: They point to documents, not specific objects within documents. Named anchors offer finer granularity, but their use requires write access for the link author. Often these missing features exist in SGML but were sacrificed in order to make HTML as simple as possible. Most of them are addressed either in HTML 3.0 or by companies that see them as opportunities.

The Web way

In their search for more functionality, some people re-interpret HTML's features in unexpected ways; others experiment with their own variants and protocol extensions. HTML invites a host of misunderstandings because it neither definitively answers layout and format questions nor points to a definitive solution. People use the elements inconsistently; they nest elements within each other in ways that aren't supposed to work. From an evolutionary perspective, these experiments may well help strengthen HTML's gene pool. But the inconsistencies threaten the Web's long-term integrity; eliminating them is one of the main targets of the HTML 2.0 specification, described below.

The messy, loose way things get done on the Internet often works better than well-organized, concerted efforts. For example, attempts to extend SGML with multimedia, hyperlinks and prescriptive markup have met with limited success. Two such efforts, HyTime and DSSSL, are not for the faint-hearted. They are criticized as too complex. Few commercial software tools are available for either standard. It is possible that HyTime and DSSSL offer functionality that will be more explicitly necessary several years from now.

In general, the Web offers more reach, less control and less structure than dedicated electronic-publishing, text-management or hypertext systems such as EBT's DynaText and Interleaf's Active Documents (see Release 1.0, 7-91). Internet tools are always more primitive than their task-specific counterparts. They also usually cost far less. The key question developers must answer is not merely whether they can achieve (and users can get) satisfactory levels of functionality, but rather whether the increased reach and

6 HyTime is related to the Standard Music Description Language and was designed for time-sensitive multimedia and hyperlinks. The Document Style Semantics and Specification Language (DSSSL; rhymes with "missile") offers more control over page appearance.
malleability of Internet tools outweighs the specific functionality of other tools.

Version control

Many variants of HTML run on the Web. Some home pages will display on MacWeb, a Mac client, but not on Mosaic, which runs mostly on Windows and X. HTML's shepherds think of the varied stuff in use now (except for forms) as HTML 1.0. HTML 2.0 brings the spec in line with current practice (with forms). Dan Connolly of HaL Computer Systems in Austin leads that effort; he works closely with Berners-Lee. Early on, Connolly developed a reputation as the "SGML Cop." He expects HTML 2.0 to be a published specification by the Internet Engineering Task Force (IETF) meeting this December.

The World Wide Web Consortium and SGML Open

Berners-Lee coordinated HTML’s evolution alone for several years at CERN. Early this year, it became obvious to him that this job would require more people. However, CERN is funded to do atomic physics research, not software development. At the same time, there was a strong call from industry for someone to continue playing a coordinating role for the Web so it wouldn’t lose its interoperability. With so much activity, so many different interests at stake and so much flexibility, there is a real risk of multiple, conflicting standards emerging, with eventual gridlock.

Accordingly, Berners-Lee left CERN to found the World Wide Web Consortium, which has centers at CERN and MIT. It has collaborations with NCSA, INRIA in France, Spyglass and Enterprise Integration Technologies. The Consortium’s goal is to coordinate development of the Web and to maintain its interoperability over time, without any major discontinuities. MIT made sense to Berners-Lee as a home base partly because the center of gravity of Internet research is in the US, and partly because MIT has a track record of honorable consortium behavior with industry to develop broadly useful, public standards such as X Windows.

The Consortium has five staff members at MIT and another five still at CERN. Berners-Lee expects to double the staff by next year; first he must get additional sponsors and perhaps some funds from the US government and the European Community.

The WWW Consortium has an SGML counterpart called SGML Open, which SGML vendors formed in 1991 to promote use of and interoperability between SGML products. (Esther Dyson is on SGML Open's advisory board.) The two groups actively collaborate to set directions for the two standards. SGML Open's chairman Yuri Rubinsky has been a major contributor to the HTML 2.0 specification. All of these collaborators make use of Internet mailing lists, net news, Web and Gopher servers and other information-sharing tools to ensure open discussion. Subscribing to these lists or browsing the information on the relevant servers is a great way to follow what is going on (see Resources, page 19).
The 2.0 specification defines four kinds of elements: a core set that every Web application must support; optional features, such as inline images; interactive form elements for creating more sophisticated Web-based applications; and obsolete elements that may be phased out in the future. The forms capability is particularly powerful. It allows applications to present custom menus, radio buttons and other features, all of which can feed other applications.

HTML 3.0 (originally called HTML+) is already in the works, led by Dave Raggett of Hewlett-Packard’s Bristol Labs in the UK. The 2.0 and 3.0 efforts are both in the same IETF committee, which also has status as an SGML Open Technical Committee. Raggett hopes to show a testbed browser for HTML 3.0 at the World Wide Web Forum this October in Chicago. He expects to have a discussion draft ready this November, then propose 3.0 to the IETF as an Internet Draft specification next spring. The testbed browser will be rewritten as a public-domain WYSIWYG editor for release during 1995.

Web priorities

Some of the proposed changes to HTML are extensions and enhancements that will greatly increase its functionality, such as encryption, transaction services and database gateways. Others involve increasing the variety of SGML tags that HTML supports. For example, HTML 3.0 is likely to have "author" tags, so applications can search the Web for pages created by specific people, and "keyword" tags, for the creation of indexes. Still other proposed changes involve the Web’s look and feel. These include user-defined toolbars, figures with captions, style sheets, arbitrary inline objects, object graphics, tables and text that flows around figures.

Luckily, everything doesn’t have to be built into HTML. Raggett and others are examining ways to modularize HTML so that special-purpose features such as virtual reality extensions and interactive forms are easy to invoke and don’t weigh down HTML applications. A form could consist of external scripts in an arbitrary scripting language. HTML is central -- every home page has to use HTML -- but it is not the only language the Web speaks.

Beyond HTML

Much of the Web’s power and ability to evolve rests on two Internet standards: the HyperText Transport Protocol (HTTP) and the Multipurpose Internet Messaging Extensions (MIME). (Raggett has proposed an IETF working group on HTTP.) HTTP servers negotiate capabilities with client programs before they respond to requests. Such requests may include invoking a different protocol or setting up a parallel session with another server, which offers applications far more flexibility.

For example, at Networld+Interop this month, a company named Ubique premiered a product called Virtual Places, which offers interactive chat with colorful characters -- all inside Sesame, Ubique’s extension to NCSA Mosaic. Ubique, which also developed Active Mail (see Release 1.0, 2-94), developed a Virtual Trade Show for show producer Ziff-Davis to parallel the physical one. Virtual Places runs on an independent server, parallel to the HTTP server. The Virtual Places Protocol uses Mosaic as a backdrop, and lays a different protocol stream on top that supports Habitat-style, real-time chat and interaction (see Release 1.0, 7-93). Cartoon-like
characters can move around on the screen, complete with word balloons. If both systems support shared voice or video, the users can add it.

As other interactive approaches evolve, such as the Virtual Reality Markup Language we described last month, Ubique will be able to take advantage of them. In principle, VPP can run with any client-server data-retrieval system, including relational databases and Lotus Notes. These capabilities fit well with a broad underlying trend to move beyond static Web documents to distributed collaborations.

Adobe wants you to print to the Web

Although many people send PostScript files across the Internet, Adobe's flagship product isn't well suited to interactive Web life. However, some of its descendants are. PostScript, born in the world of typographers and publishers, offers extreme control over presentation, but it's bulky and linear: To see page 15 of a document, the viewing application must generate pages one to 14.

Adobe's Acrobat generates Portable Document Format (PDF) files which offer faithful final-form representation of documents on practically any commonly used OS. Any application that can produce PostScript can create a PDF file. PDF is page-oriented (if the original document was tabloid size, the viewer must scroll and zoom around to read it), but it offers random access through a list of pages and a full index that it builds. In addition, PDF is more compact and has bookmarks, annotations and linking capabilities that aren't in PostScript. PDF won't become a predominant format for reusable information, but may be an easy way to share static content that exists in other forms.

Adobe sees Acrobat coexisting with Mosaic and is committed to extending PDF's functionality. It's possible to enhance PDF by using special tags that different applications ignore. Acrobat 2.0 provides for third-party plug-ins and publicly distributable browsers. That way, Adobe will put Web-compatible link capabilities into a future version of Acrobat. Avalanche is working to add SGML information. Physicists have created a way to publish the existing base of TeX documents to PDF. How all this works will be essential: If users must manually "hang" links on a PDF document, it is unlikely to be popular. If it is transparent and bi-directional, it may do well.

The surprise candidate that might work well on the Web is Adobe's Illustrator file format. Illustrator, which is a special version of Encapsulated PostScript, would actually behave better than PDF in an HTML page. It's scalable and can be positioned anywhere on a page with precision, which makes it a good subordinate citizen. Adobe has yet to define an embeddable PDF.

MIME: a handy rucksack for SGML, Acrobat and OpenDoc

MIME allows Internet applications to handle arbitrary file types or protocols, including executable scripts or applications. One of its early uses
is for attaching rich-format documents to e-mail inside the Simple Mail Transfer Protocol (see Release 1.0, 2-94). Now SGML and Adobe's Acrobat will take advantage of MIME to join the Web; companies are likely to do the same with OpenDoc soon.

Ed Levinson of Accurate Information Systems in Eatontown, NJ, has proposed a pragmatic way for SGML to coexist with the Web. His IETF draft specification shows how MIME can carry SGML documents. It shows how to automatically resolve packaging issues and file references so the receiving party doesn't have to edit all the internal SGML references.

An ocean of documents at hand

Spyglass recently announced that its Enhanced NCSA Mosaic will automatically launch Acrobat Exchange when appropriate to display Portable Document Format files (PDF; see box, previous page). It will also launch an SGML viewer from SoftQuad. With these two additions, Mosaic could access any document that prints to PostScript (if it were processed to PDF and put on the Web), as well as any document now in SGML. If a few of the large SGML document archives make their content available, the number of Web-accessible documents could double overnight.

Spyglass is evaluating whether to include these and other viewers with its Mosaic. The company has recently taken over management and licensing of commercial versions of Mosaic from the National Center for Supercomputing Applications (NCSA), which developed the program. NCSA still offers a public-with-copyright version of the program which is not for resale. NCSA will distribute the SoftQuad browser with its non-commercial Mosaic.

In Release 1.0, 5-94, we described how a combination of OpenDoc and the Internet could marry the best features of the Internet with best features of desktop computing. MIME is an easy way to begin this process. In principle, a Mosaic browser could open an OpenDoc viewer as a MIME type.

A new lease on life for existing markets

The recent Seybold electronic-publishing show saw plenty of product introductions; more are on their way at the Web conference in October (see Resources, page 19). Companies with content already in SGML should be excited about the attention the Web has gotten. They stand to find broad new channels through which to distribute their content. The SGML-oriented software market is also likely to grow because it makes sense for many documents to be brought into full SGML compliance. Other markets may benefit from the interplay between SGML and HTML. Here are a few examples.

• Finally, here's wide-area hypertext that works! Previous attempts to link content in hypertext, electronic-book and personal-information-

7 The World Wide Web doesn't take full advantage of MIME. It only uses top-level typing (similar to the way Windows matches file extensions with applications in WIN.INI), not more powerful features such as multi-part parallel contents. In principle, HTTP could send a page that contains six thumbnail images as one package, instead of requiring seven separate interactions to retrieve them. In fact, MIME could use OpenDoc's Bento.
management systems were constrained within the boundaries of proprietary databases, naming schemes or file systems. The Web offers extensible link space.

- Groupware has likewise lacked a platform that is extensible, malleable and broadly used. Good feature ideas were mired in awkwardly designed products that didn't work with common desktop applications. Component software and the World Wide Web promise to revitalize this market.

- The dynamic document assembly market finally has an infrastructure. Imagine a viewer that can retrieve chunks from several places and flow them together into one document, instead of putting each into a separate window, which is an artificial distinction.

- All of these applications will benefit from smarter automatic "page" layout of the sort that Pages Software and Interleaf have developed over the past few years (see Release 1.0, 7-91). Similarly, OpenDoc parts do some negotiation for display space.

The all-important `<A>`nchor

From the complex, hierarchical-document SGML perspective, HTML's anchor tag `<A>`, which holds the hypertext links, is no more unusual a markup element than those for tables or sidebars. However, the anchor tag is probably HTML's most important contribution to the information revolution. The easy linking of HTML draws attention to the relationships between document chunks. The anchor is not ancillary; it is essential: It is a document's link(s) to the outside.

The anchor may change what we pay attention to in communication. For example, in an e-mail message, what communicates an idea more powerfully: Making sure the inset box is in the right font and in the right place, or linking it to six relevant documents across the world? Putting content in context may be more compelling than making it look pretty. Editors, analysts and colleagues may help put our content in context. Of course, there's a downside: A document with 100 links can be overwhelming.

Virtual structure: The table of contents as a point of view

Anchors may help us deconstruct huge documents into more useful components, without totally losing their structure. With the exception of the Pinnacles DTD, the major DTDs used in the SGML world are highly hierarchical and linear. But those hierarchies are more arbitrary than their creators would let on. It's one thing to agree within an industry to a particular sequence and depth of topics; it's quite another to generate a large document, count the number of nested subheads, then declare that the document "has" six levels, or however many exist.

8 By contrast, HyTime adds links to SGML in such a complex and cumbersome way as to be unusable to novices. As HTML and URLs disappear behind graphical authoring tools, they can get more complex; however, access by ordinary people is likely to remain important for quite a while.

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One person's footnote is another person's thesis statement. What seems important today may seem trivial tomorrow or needs to be updated for all the new things that point to it. With easy, ubiquitous links, one can create virtual structure by creating a table of contents that offers a reader a particular path. The same text objects can be used in many different sequences for many different purposes or updated once for all new references. It's not as easy as writing a new table-of-contents page, since the newly ordered pages may not make any sense, but the underlying idea is powerful. The structure is (part of) the content.

HTML and the Web offer a new mode of expression where documents blend into the document medium and where links are potentially as important as the nodes they connect. It could lead to the deconstruction of many large, structured documents or, more significantly, to a collaborative balance between large, structured documents and ones built from smaller components.

"Creating hypertext is different from creating structured linear text. Once you've done it, you long for it."
-- Tim Berners-Lee, WWW Consortium

Slowly we shift

The changes in the way we view and use information could really complicate content owners' lives. Content owners will have to collect payments and manage documents and links in an increasingly complex environment. Content authors will have to rethink how chunks are composed and flowed into each other. Authors are not likely to know which chunk people have just read, or where they will be two links later.

This may be word-processing vendors' nightmare come true: The urge to share information and link it to other, relevant chunks may dominate other urges and force a transfer of content into highly exchangeable forms, instead of the proprietary formats that each word processor built and now defends. Word processing has hit the wall for new features and hasn't even implemented many features well. Look at how much time people waste jiggering things to set up an outdent -- or failing to do so and using spaces and tabs instead.

As we at Release 1.0 move this newsletter toward multiple forms of electronic distribution, we face the same questions: What tool should we author in? A word processor? A Web document editor? An SGML tool? A page-layout program? The following section presents some of the early options.

SGML affected text the way the first databases affected data. The Web is like a second-generation database: Think of it as the normalization of documents, the way information architects normalized data in the shift from the hierarchical to the relational database.
LIGHTWEIGHT AUTHORING TOOLS AND CONVERTERS

There is already a small but growing market of SGML tools. This section focuses on SGML and other tools that people can use on the World Wide Web.

Despite the sophisticated NextStep system that Berners-Lee created to launch the Web, most people use tools that are still primitive. The need for better tools has not gone unnoticed. At first, people wrote shareware tools, including macros, filters, Perl scripts, Common Lisp programs and HyperCard stacks, to complement the public-domain browsers such as Cello, MacWeb and Mosaic. An XTension created at MIT converts files from the QuarkXPress desktop-publishing program to HTML; researchers at CERN created WebMaker, a FrameMaker-to-HTML converter.

Now SGML, word-processing and Internet software vendors have entered the fray. Some of them collaborated to get to market quickly; some scaled their SGML authoring packages down in the hope that buyers would upgrade. It's possible that the many pieces that are now available may confuse potential buyers. This is more complicated than a decision between Ami Pro, Word, WordPerfect or XyWrite. Nevertheless, this is a hot category: Many new products premiered at the recent Seybold electronic publishing show. Here's a sampling. Some of these companies were described in Release 1.0, 7-91.

Microsoft SGML Author for Word

At the Seybold show this month, Microsoft announced a product that will allow people to use Word to generate SGML documents. The product, Microsoft SGML Author for Word, is for companies that already use SGML, or would like to, and want make SGML available to the large number of people who already use Word. It can also generate valid HTML. Microsoft expects to ship SGML Author, which it created with Avalanche Development, by the end of 1994.

SGML Author consists of an administration tool, a converter and sample applications for various DTDs, including a simple DTD for people who are unfamiliar with SGML. Administrators map existing corporate DTDs to Word styles, which they distribute to end-users. Administrators may need other tools to create the DTDs, such as MicroStar's Near & Far.

Document authors create documents in Word 6.0 with those style guides or specific templates. Then they "Save As..." to SGML format, a new option on their menus. Doing so invokes a post-processor, which validates the use of the SGML tags, corrects SGML errors and annotates the file with its changes. Microsoft expects most people to stay within Word through the entire cycle. People who want to work in native SGML can use SoftQuad Enactor, a specialized version of SoftQuad's Author/Editor integrated to work with and look more like Word 6.0.

Although it's not fully interactive, integrating SGML with Word styles is a minimally disruptive approach to broad corporate use of SGML. By the way, if you've been counting so far, Word users who want to publish on the Web should soon be able to either (a) edit a raw HTML file, (b) print to PostScript and create PDF files, (c) generate SGML using SGML Author that is interpreted as HTML or (d) generate HTML directly using SGML Author. And that's not counting independently created Word macro scripts.

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Drop an Avalanche on your legacy documents

Avalanche Development, a subsidiary of Interleaf, is best known for its SGML parsing program FastTAG, which scans text files, attempts to deduce their structure and leaves behind the appropriate SGML tags. Recently, Avalanche announced SureSTYLE, a companion product to Microsoft SGML Author for Word. Think of SureSTYLE as an SGML grammar checker for SGML Author. SureSTYLE uses Avalanche’s visual recognition technology to make document styles consistent with those created for SGML Author. Microsoft will distribute the base version with SGML Author. The advanced developer’s version, SureSTYLE Pro, is more configurable and includes workgroup features.

Implementing SGML across an enterprise takes considerable expertise. Through its new Author Assistant program, Avalanche will help companies pick product suites, customize them, design templates, create distribution and publishing strategies, train users on-site and do product support.

SoftQuad’s HoTMetaL: Doom for documents

Last June, Toronto-based SoftQuad, an SGML pioneer, shipped HoTMetaL, a product that should quickly make the company visible on the Web. Like SoftQuad Enabler (for Microsoft’s SGML Author), HoTMetaL is a slimmed-down version of SoftQuad’s Author/Editor. HoTMetaL is designed to generate HTML, not SGML. Versions for Sun and Windows are available free on the Internet, Doom-style (see Resources, page 19); a Mac version is on its way. HoTMetaL complements Mosaic: Menu selections in HoTMetaL and the new Enhanced NCSA Mosaic allow users to switch back and forth, so they can preview in Mosaic the files they create in HoTMetaL.

HoTMetaL Pro costs $195 and adds WYSIWYG table editing, spell-checking, multi-page HTML printing, user-defined macros and long or short sets of menus. SoftQuad’s flagship product, Author/Editor, helps people deliver SGML documents; HoTMetaL is designed to let people deliver HTML documents that others can browse with Mosaic and other Web browsers.

EIT’s authoring tools

SoftQuad is not the only company working on authoring tools to complement Mosaic. Enterprise Integration Technologies (EIT), the company behind CommerceNet, is working on a suite of tools for Motif that includes an HTML structure editor, a WYSIWYG HTML document editor, a media browser and a link browser (for a pointer to a description, see Resources, page 19).

EIT’s developers use a Motif widget construction kit called Winterp (the OSF/Motif Widget INTERPreter), which allows EIT to get new features as the widgets are improved. Although Winterp allows for rapid prototyping and is extremely portable between Unix systems, it doesn’t work on other OSs.

Nevertheless, EIT’s developers are creating some extremely useful features. For example, browser "hotlists" are usually a chronological or alphabetical list of the places you’ve decided to revisit. EIT’s designers are making hotlist graphical, so that a user can create a personalized map of the virtual terrain. EIT’s link browser similarly allows users to view portions of the World Wide Web as a directed graph, with version control and check-in. EIT is also working on HTTP server software.
SERVERS AT YOUR SERVICE

As Web usage skyrockets, the need for better servers becomes obvious. The requirements are similar to other client-server systems: fault tolerance, high availability, scalability and wide-area load balancing. In addition, servers can be enhanced with many features, including text-retrieval and document management. This section examines some such products.

Mosaic Communications does a rewrite

Jim Clark, co-founder of Silicon Graphics, knows a business opportunity when he sees one. Last spring, as the Web mushroomed and Mosaic was on everyone’s lips, he whisked away most of the programmers who had created NCSA Mosaic at the University of Illinois Urbana/Champaign. With them, he founded Mosaic Communications (MCom). The development team, led by Marc Andreessen, is about to release its own versions of the Web client and server applications.

Most companies creating browsers for the Web are licensing the original, cleaned-up Mosaic code from Spyglass, the official master licensor for commercial versions. MCom wanted clear rights to and control over the code. The team also knew the shortcomings of what it had done on its first, quick-and-dirty attempt, so it decided to rewrite the client and server software from scratch. The resulting applications, Mosaic NetScape and Mosaic NetSite, offer equivalent functionality to the original Mosaic, with more robust code and some new features.

NetScape is optimized for 14.4 Kbps modem connections, runs faster than the original Mosaic and has a common feature set on Windows, Mac and X Windows. It can display results before the entire file arrives, handle multiple requests in parallel, encrypt files and authenticate servers.

The server software has two Unix-based versions: The NetSite Communications Server ($5000; $1500 for the rest of 1994) adds scalability, script-based setup and security to the current HTTP server software. It also handles multiple concurrent sessions efficiently. The NetSite Commerce Server ($25,000) is for secure commerce. It includes RSA encryption and authentication. The servers are scheduled to be available this October and November, respectively.

EIT offers a Web kit, IDI breaks things up and Individual adds markup

EIT has released some software that can help organizations set up their own Web sites called the Webmaster's starter kit. The kit helps users set up and configure a Web server and includes code to customize home pages, convert mail archives to HTML (a nifty utility called HyperMail), generate server statistics, verify links and more (see Resources, page 19).

Information Dimensions Inc. (IDI), a long-time vendor of large-scale text-retrieval systems, announced at Seybold a product that takes documents in IDI's BasisPlus text-retrieval system and presents them as HTML documents. A follow-on version will interpret SGML documents to HTML.

Individual Inc., which creates and distributes the First! custom-filtered news service, is shipping First! for Mosaic, which adds HTML tags to the
current stream of stories. With the tags, readers can get full-text articles and search for information such as topic, date, company or product names. SGML tags are also available. Companies will likely leverage the markup by using text-retrieval, categorization or other custom programs to automatically link the news stories to documents in their own archives and databases. The First! service is also available via fax and e-mail, and as a Notes database.

**EBT's DynaWeb**

Electronic Book Technologies' flagship product is DynaText, an electronic "book" authoring package for SGML first introduced in 1990. DynaText accepts any valid SGML document and automatically builds an electronic book that can include hyperlinks, tables, equations and graphics. It runs on Windows, Macintosh and Unix and includes an integrated indexer, stylesheet editor and browser. EBT's most recent products are DynaTag, a tool that converts proprietary word-processing documents into DynaText, and DynaBase, a native SGML document-management database implemented atop Object Design's ObjectStore.

This month, EBT expects to field a high-function, high-end product for companies that have many SGML documents and want to make them available on the World Wide Web. The product, called DynaWeb (the DynaText Wide-area Electronic Bookserver), is an Internet document server that interprets SGML documents and makes them look like HTML documents. It accepts queries from Web browsers, searches the SGML database and converts the requested document to HTML on the fly. Its key selling features are that it allows publishers to make their large information repositories available on the Internet, and it automatically segments SGML documents into pieces of appropriate size for Web browsers. DynaWeb will eventually be bundled with the DynaText tool, which costs between $10,000 and $150,000 (ten to an unlimited number of users).

**Notes as a Web server**

The Internet is both a threat to and an opportunity for Notes. On the one hand, many corporations see Gopher, e-mail and the Web as alternative ways to create shared document databases or discussion groups. On the other hand, even cursory inspection of the available Internet tools makes clear that robust and secure document-management systems can really help companies that use the Internet to communicate and publish. Lotus Notes is one such robust system, and it has grown steadily from work-group to enterprise use and now, with AT&T Network Notes, to public networks. An increasing number of Notes users already use the Internet as a transport service: They replicate Notes databases and connect Notes client software to document databases over the Internet.

Now, under a project named InterNotes, Lotus will add features to Notes so it connects more effectively with the Internet in both directions: as a way for Notes users to access the Internet alongside their usual Notes applications and databases, and as a way for Internet citizens to access information stored in Notes databases that companies want to make available over the Internet.

Over time, Notes users will see increased functionality that allows them to browse Internet documents with their existing client software. For the

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Web, Lotus will offer a Mosaic proxy that runs on a Notes server. The Mosaic proxy will dynamically translate Web documents into Notes documents, complete with DocLinks where embedded Web tags are.

To make information available to people across the Internet, Lotus will develop an HTTP module that runs next to Notes servers. To make any documents stored in a Notes database look like proper Web documents, the module will map Web queries to Notes commands, filter or translate documents, if necessary, and transmit the responses. In principle, Notes can be a great repository for information that companies want to make available selectively across the Internet. Notes offers features such as access control, application APIs, third-party software and replication services. Also, workgroups can use the Notes platform to collaborate as they create and maintain Web documents.

The Internet, with pricing policies that often include flat-rate access anywhere around the world and transmission speeds well above a fast modem, is affecting the way organizations distribute information. After all, why replicate a database when the original dataset is available almost instantaneously?

Notes was designed for a pessimistic communications scenario: an environment in which wide-area communications are slow and expensive, with users who are not connected to the network all the time. In contrast, the Internet assumes full-time connections. Recent Internet dialup facilities such as the Serial Line Internet Protocol (SLIP) allow host computers to move about, but don't help distribute or cache information; applications still have to do that. Also, Web protocols are efficient at setting up sessions and transferring information, but they're not well adapted to load balancing when traffic is heavy.

Since it is designed for a worst-case world, Notes has some capabilities that complement the Internet's own. An obvious one is Notes' replication feature, rethought for mixed Internet and offline access. Or imagine Notes client software enhanced with intelligently cached Web pages, so that a user can capture a meaningfully linked set of HTML pages and work with them offline. The Internet and Notes will co-evolve.

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COMING SOON

- Smart communications software.
- Advertising online.
- Software for education.
- Intelligent drawing and authoring tools.
- And much more... (If you know of any good examples of the categories listed above, please let us know.)
RESOURCES & PHONE NUMBERS

Ed Levinson, Accurate Information Systems, (908) 389-5550; <elevinso@accurate.com>
James C. King, Adobe Systems, (415) 962-4944; fax, (415) 962-6063; <jking@adobe.com>
Jed Harris, Component Integration Lab, (408) 974-6549; fax, (408) 974-9710; <jed@cil.org>
Lou Reynolds, Electronic Book Technologies (EBT), (401) 421-9550; fax, (401) 421-9551; <lrr@ebt.com>
Jay Glicksman, Enterprise Integration Technologies (EIT), (415) 616-8000; fax, (415) 617-8019; <jay@eit.com>
Dan Connolly, HaL Computer Systems, (512) 834-9962 x5010; fax, (512) 834-9963; <connolly@hal.com>
Dave Raggett, Hewlett-Packard, 44 (272) 228-046; fax, 44 (272) 228-003; <dsr@hplb.hpl.hp.com>
Bill Young, Information Dimensions, Inc. (IDI), (614) 761-7299; fax, (614) 761-7290
Yosi Amram, Individual, Inc., (617) 354-2230; fax, (617) 354-6210; <yosi@individual.com>
Charles Goldfarb, Information Management Consulting, (408) 867-5553; fax, (408) 867-1805; <gml@almaden.ibm.com>
Haviland Wright, Interleaf, (617) 290-4990 x1714; fax, (617) 290-4981; <haviland@ileaf.com>
Paul Haverstock, Lotus, (617) 693-4264; fax, (617) 693-5541; <paul_haverstock@crd.lotus.com>
Chris Locke, MecklerWeb, (193) 226-6967; fax, (203) 454-5840; <clocke@panix.com>
John Vail, Microsoft, (206) 936-7407; fax, (206) 936-7329; <johnva@microsoft.com>
Jim Clark, Marc Andreessen, Mosaic Communications, (415) 254-1900; fax, (414) 254-2601; <jm@mcom.com>, <marca@mcom.com>
Eric Naggum, Naggum Software, 47 2295-0313; <erik@naggum.no>
Bruce Webster, Pages, (619) 492-9050 x212; fax, (619) 492-9124; <bwebster@pages.com>
Dan Pattyn, Sematech, (512) 356-3868; fax, (512) 356-3575; <dan.pattyn@sematech.com>
Mary Fletcher Laplante, SGML Open, (412) 264-4258; fax, (412) 264-6598; <laplante@sgmlopen.com>
Yuri Rubinsky, SoftQuad, (416) 239-4801; fax, (416) 239-7105; <yuri@sq.com>
Tim Krauskopf, Spyglass, (217) 355-6000; fax, (217) 355-8925; <timk@spyglass.com>
Udi Shapiro, Ubique, (415) 896-2434; fax, (415) 541-7775; <udi@ubique.com>
Tim Berners-Lee, WWW Consortium, (617) 253-9670; fax, (617) 258-8682; <timbl@w3.org>
For further reading:

Visit the Text Encoding Initiative at http://etext.virginia.edu/TEI.html

HTML-WG (working group) is a mailing list focused on getting HTML 2.0 finished. Send message body "help" to majordomo@oclc.org; it will reply with a list of lists it hosts, as well as subscription instructions.

For help with Web development questions, hit the World Wide Web Virtual Library, at http://www.charm.net/web/W11b.html

Dan Connolly’s HTML Design Notebook points to many other resources, including official definitions of current and proposed HTML specifications. It’s at http://www.hal.com/%7Econnolly/drafts/html-design.html

Get SoftQuad’s HoTMetaL via ftp from several sites, including ftp.ncsa.uiuc.edu:/Mosaic/contrib/SoftQuad

The remote HTML validation service Connolly has made available is at http://www.hal.com/users/connolly/html-test/service/validation-form.html


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October 2-5

October 3-5

October 3-7

October 4-6
International Software Industry Trade Show - Washington, DC. Co-located with Software Development '94 (see above).

October 4-5

October 4-6

October 5-7

October 5-8

October 6-8

October 8-9

October 10-12

October 11-13
Intelligent multimedia information retrieval systems & management - New York City. Sponsors: Centre De Hautes Etudes Internationales D'Informatique Documentaire France and Center for Advanced Study of Information Systems USA. Contact: J.M. Brentano, 33 (1) 42 85 04 75; fax, 33 (1) 48 78 49 61; in US Peter Brodnitz, phone/fax (212) 741-1421.

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Global Mobile - Paris. Sponsor: Tellabs. Call Denys Gilhooly, 33 (1) 49 52 33 00; fax, 33 (1) 49 52 07 56.

October 17-18

October 17-19

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October 22-26 @CSCW '94 - Chapel Hill, NC. Sponsor: ACM. With Jerry Michalski. Call Kevin Jeffay, (919) 962-1938; fax, (919) 962-1799.


October 24 Fall membership meeting, Massachusetts Software Council - Newton, MA. Sponsor: Massachusetts Software Council. Fax (617) 437-9686.

October 24-28 INTEROP 94 - Paris. The mother of all networking conferences. Sponsor: Interop Europe. Contact: Carinne Propper, 33 (1) 4639-5656; fax, (33) 1 4639-5699.


October 31-Nov 1 Assets '94 - Marina del Rey. Sponsors: ACM and GIGCAP. Contact: Ephraim Glinert, Dept of Computer Science, RPI, Troy, NY 12180 or glinert@cs.rpi.edu.


November 4-6 @BusinessNet - New York City. Sponsored by CMP Publications and New Media Associates. Covers online activity, from advertising to virtual communities. With panel moderated by Jerry Michalski. Call Irene McCarty, (516) 733-6740; fax, (516) 733-6753.


November 7-8 @BusinessNet - New York City. Sponsored by CMF Publications and New Media Associates. Covers online activity, from advertising to virtual communities. With panel moderated by Jerry Michalski. Call Irene McCarty, (516) 733-6740; fax, (516) 733-6753.


November 10 @Advertising Day - New York City. Sponsor: Center for Communication. With "commercial netiquette" panel moderated by Jerry Michalski. Call Laura Blum, (212) 836-3050; fax, (212) 836-2773.


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November 14-18 *Comdex - Las Vegas. The biggest US show of all. Sponsored by the Interface Group. Call Peter Young, (617) 449-6600; fax, (617) 449-6953.


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January 17-19 @SoftExpo95 - San Jose. Sponsored by Software Publisher Magazine. With Jerry Michalski. Call David Webster, (303) 745-5711; fax, (303) 745-5712.


February 5-8 *Demo 95 - Palm Springs. Stewart and David's picks. Sponsored by InfoWorld Editorial Products. Call Therese Solimeno, (415) 312-0545; fax, (415) 312-0547.

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May 7-11 CHI '95: Mosaic of Creativity - Denver. Sponsored by ACM. Call Rosemary Wick Stevens, (415) 328-3600.


* Events Esther plans to attend.
@ Events Jerry plans to attend.

Lack of a symbol is no indication of lack of merit.

Please let us know about other events we should include. -- Christina Koukkos

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Daphne Kis
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