As any librarian can attest, librarianship has always required a wide variety of skills from its professionals. Librarians have always had to cultivate a highly diverse knowledge base to maintain their skills and keep up with the changing requirements of the field. Various discussions have been made about how the librarian’s position is evolving and how librarians must seek new skills to grow with it. Recently, however, technological knowledge and skills have been increasing at a phenomenal rate. In 1996, 66.9% of academic library jobs required some form of computer skills. While many traditional skills continue to form the bulk of library job descriptions, one sees technological jargon, acronyms, software names, and so on appearing in library job advertisements with increasing frequency.

This increase of technological terminology can be a source of confusion for people involved in all parts of librarianship. Administrators seeking new systems personnel may have an impression of what competencies they need but lack the proper technological terminology to describe those skills with precision. Librarians wanting to increase their technological knowledge or to change career paths within librarianship can find that they do not have the ability to decipher the jargon well enough to decide which areas to study. Librarians who are already techno-savvy may not know how best to keep abreast of the field and hone their abilities. Even in library schools and library assistant programs there is a need to determine the most useful technological skills and begin integrating them into the curriculum.

Technological skills in library job advertisements are becoming more difficult to interpret, rather than easier. Some job advertisements list skills which seem fairly self-descriptive. Other job advertisements are so full of technological jargon that the reader is hard pressed to determine the position’s true responsibilities. Job advertisement readers — this author included — may see terms they are unfamiliar with as well as frequently seeing skills listed in ways that confuse them. To help clarify these terms, both for the understanding of job seekers and for the edification of potential job advertisement and job description creators, this article undertakes to define a sampling of recent technological skills sought in the library field. Because this informal examination is not a quantitative analysis, it does not
enumerate the frequency with which various terms occurred; it merely lists
a year’s worth of technological job skills and defines and roughly catego-
rizes them with the intention of making a snapshot of the state of the
market as well as helping job seekers and job creators to understand those
terms.

Methods
The LIBJOBS mailing list was examined for one year, from December 2002
to November 2003. LIBJOBS is an international mailing list for library jobs,
run by the International Federation of Library Associations and Institu-
tions. More information about this mailing list can be found at its home
page: http://www.ifla.org/II/lists/libjobs.htm. Skill lists were copied from
sections describing required and preferred applicant qualifications, and
mined for all technological, computer, and digital-library-oriented skill
descriptions. These skill descriptions were then classified loosely and
defined, with links to official sites.

Classifying these skills turned out to be an unexpectedly difficult task.
The degree of overlap between areas makes it difficult, if not impossible, to
categorize the skills into groups by function. Therefore, they have only
been separated loosely into acro-
nyms and branded or named
technologies. There is still a little
overlap, of course, and efforts have
been made to add references in
these cases. Then definitions were
added to the terms. Definitions
were synthesized from anecdotal
personal knowledge, dictionary
definitions, and Internet sources.3

Furthermore, links to the
official site of the standard, soft-
ware, or technology in question
were added where available. The
intention is to provide the creator
or responsible body’s official view
of the technology in question, and
an attempt was made to use that
official information as a main data
source whenever possible.

A large number of qualitative
skills were also encountered, and
considerable thought was given to
their best classification and defini-
tion. Most job-hunters know that
while it is simple to define HTML,
it is much harder to know for
certain what writers of advertise-
ments mean if they require knowl-
dge of and familiarity with “stan-
dard Internet applications.” Despite
this, many technology advertise-
ments, especially for systems
supervisors, concentrated on these
more descriptive statements.

Therefore they have been synthe-
sized and included at the end of the
article without attempt at defini-
tion or explanation.

Acronyms of Skills Required

ASP – Active Server Pages, a server-side scripting technology that primarily
uses the VBScript or JavaScript languages. Like CGI scripting, it describes
a method for allowing Web pages to interact with a server.

ASP.NET – Microsoft’s Web application development software/environment
for the .NET framework. http://www.asp.net/

CFM – ColdFusion Markup files use CFML, ColdFusion Markup Language.
ColdFusion is a proprietary development environment for making dy-
namic Web pages without needing to know a programming or scripting
language. This allows the author to do many of the same functions as
with server-side scripts.

CGI – Common Gateway Interface, the most common specification used for
executing server-side scripts. Perl is the most common language used for
CGI scripts, but C++ and Visual Basic can also be used. Server-side
scripting is the main method for allowing Web pages to interact with a
server in order to do highly dynamic and responsive tasks, including
drawing from or writing to a database, composing e-mails, and otherwise
responding to online forms and input.

CSS – Cascading Style Sheets are used in conjunction with HTML or other
markup languages to control the style and appearance of Web sites.
http://www.w3.org/Style/CSS

DC – Dublin Core is one of the most commonly used metadata initiatives. It
attempts to be interoperable and broadly functional and adaptable for a
variety of uses and purposes. http://dublincore.org

DHTML – Dynamic HyperText Markup Language is something of a misno-
mer, actually referring more to the process of using HTML, JavaScript,
and CSS together and sometimes with other scripting languages to
create dynamic effects that HTML alone cannot make.

DOI – A Digital Object Identifier is an identifier similar to a barcode for
documents, pictures, and other items of intellectual property in a digital
environment. This may come up in “deep linking” of electronic docu-
ments in the library catalog to items in online databases. http://
www.doi.org
Results
A year’s worth of job advertisements on the LIBJOBS listserv yielded a total of 194 postings, running from November 2002 to December 2003. This represented a total of 206 job openings examined in the data-mining process.

Examination of the skills reveals a very broad range; technological skills are so widely needed in the library field that they can be found in all arenas. Many technological skills were required not only in the ever-increasing number of systems jobs but in public and technical services areas as well.

It is worth noting that skills frequently described as being in one category by the employer would be more accurately classified in another. For example, metadata skills were grouped with Web skills in some advertisements; it was unclear whether they were intentionally being mixed together. This confusion simply reinforces the impression that job description writers and job search committees may need better understanding of the skills for which they are searching.

Over fifty items were identified for definition and explanation. These ranged widely, from highly specific skills (such as programming languages, specific applications, network configurations, and operating systems) to broader topics (such as familiarity with standards and general procedures). Online Public Access Catalogs (OPACs) by specific brand name were excluded, however. Suffice it to say that if OPAC administration knowledge was required for a position, generally preference was given to candidates who knew the in-house system.

Discussion
Though the primary goal of this paper was to provide concise definitions of currently sought-after skills to promote a clearer understanding for job seekers and job description writers alike, it is worth discussing these skills somewhat. In examining the list one can see what skills were in demand during this time period.

Not surprisingly, some of the most commonly required software-specific skills were proficiency in the use and support of Windows terminals and knowledge of Microsoft Office suite applications. Even jobs

Acronyms continued

DTDs – Document Type Declarations are files that have been written to interpret XML and other extensible languages.

EAD – Encoded Archival Description is a metadata format intended for describing archival information and materials. [http://www.loc.gov/ead/](http://www.loc.gov/ead/)


HTML – HyperText Markup Language is the most common method of preparing text for display on the Web. Many advertisements specify proficiency in “handcoding” HTML, which means being able to mark up HTML documents by hand rather than creating them in an HTML editor.

IIS – Internet Information Server is Microsoft’s operating system software for running a Web server.

LAN – Local Area Network.

LDAP – Lightweight Directory Access Protocol is a network protocol for retrieving information from directories.

LOM – Learning Object Metadata is a metadata system for assigning attributes to describe things relevant to educational technology. [http://ltsc.ieee.org/wg12/](http://ltsc.ieee.org/wg12/)

MARC – MMachine-Readable Cataloging is the format for storing library catalog records for use by Online Public Access Catalogs. [http://www.loc.gov/marc/](http://www.loc.gov/marc/)

Marc21 – The current standard of MARC.


NITF – News Industry Text Format is an XML-based system for defining the structure, content, and metadata of news articles. [http://www.nitf.org](http://www.nitf.org)

OAI or OAI-PMH – Open Archives Initiative for Metadata Harvesting Protocol is the format in which OAI-participating institutions should encode their documents. [http://www.openarchives.org/OAI/openarchives_protocol.html](http://www.openarchives.org/OAI/openarchives_protocol.html)
Acronyms continued

OCR software – Optical Character Recognition software is used to convert scanned documents to text.

ONIX – ONline Information eXchange is a standard, XML-based format for storing and transmitting information about books, used by the publishing and bookselling industries. http://www.editeur.org

OpenURL – The Open Uniform Resource Locator standard is for encoding Web-transferable metadata and identifiers for information on the Internet to create URLs that are context-sensitive. http://www.niso.org/committees/committee_ax.html

OSI – 1) Short for ISO/OSI, the International Organization for Standards Open Systems Interconnect, the model which defines the seven layers of types of interrelated interactions in a network, a fundamental concept in networking. 2) Open Source Initiative is an organization which promotes free distribution of software, along with the source code (the uncompiled program, for people to see how it was written).

PHP – PHP Hypertext Preprocessor is a scripting language used mostly for server-side scripting that can be embedded in HTML pages. It is gaining popularity versus other server-side scripting methods. http://www.php.net

PURL – Persistent Uniform Resource Locators point to an intermediate resolution service which associates the PURL with the actual URL. PURLs are a project of OCLC’s research division in collaboration with other groups. http://purl.org

SGML – Standard Generalized Markup Language is an ISO standard for markup languages.

SQL – Structured Query Language is the most common language for making database queries to retrieve information from a database.

TCP/IP – Transmission Control Protocol / Internet Protocol is a set of protocols for computers to communicate over a network. Network administrators have to know how to configure computers’ TCP/IP settings.


VRA Core – Visual Resources Association Core Categories is a metadata system for describing and encoding works of art and images. http://www.vraWeb.org/vracore3.htm

XML – eXtensible Markup Language is a flexible system for creating markup for documents and their associated metadata, geared towards use on the Web. http://www.w3.org/XML/

Brand Names/Technological Terms

Adobe Photoshop – A graphics processor for all purposes http://www.adobe.com/products/photoshop/main.html

Checkpoint – A security and firewall system http://www.checkpoint.com

DSpace – DSpace is a digital library or repository that helps capture, store, index, preserve, and redistribute research documents and output. http://www.dspace.org/

EZProxy – A user authentication system http://www.usefulutilities.com

Fireworks – A graphics processor, particularly for Web graphics http://www.macromedia.com/software/fireworks/

Flash – An online video creation program http://www.macromedia.com/software/flash/

ILLiad – OCLC’s software for sharing interlibrary loan documents with other libraries using ILLiad http://www.oclc.org/illiad/

Java – A programming language for writing programs on and off the Web, not to be confused with and not generally interchangeable with client- or server-side scripting languages. http://java.sun.com

JAVApplets/Javascripting – JAVApplets are programs written in the Java language, and JavaScripts are usually client-side scripts for manipulating HTML and interacting with users.

JavaScript – A scripting language, mostly though not always used for creating quick client-side scripts to make dynamic Web page effects.

Linux servers – An open source operating system for workstations or networks/servers, available in several different distributions or versions.

Macromedia Dreamweaver – A Web-authoring program http://www.macromedia.com/software/dreamweaver/

Microsoft FrontPage – A Web-authoring program http://www.microsoft.com/frontpage

MSOffice – A productivity suite (Word, Excel, PowerPoint, etc.) http://office.microsoft.com

Novell network – A networking operating system http://www.novell.com

Perl – A programming/scripting language, often used for writing server-side scripts via CGI

Shibboleth – A user authentication system http://shibboleth.internet2.edu/

Sun/Solaris – Solaris is the operating system used on Sun Microsystem’s SPARC and x86 servers. http://www.suns.com/software/solaris/

Unix – An operating system. Unix and Linux systems (which are closely related but not the same) together account for the majority of Web server space on the Internet.


are used to control details of the appearance of Web pages in ways markup alone cannot. All of these still depend on the basic tool of Web page authoring, HTML or XHTML which make the page display in the browser-readable format. When writing an employment advertisement, it is preferable to use broad skill descriptions and to indicate that knowledge of certain categories of authoring, such as server-side scripting or hand-coding of dynamic Web pages, are required by applicants.

Original programming and software development skills were rather rare as requirements, outside of specialized areas, including Web and database programming skills. This is probably reflective of the increasing number of computer professionals in libraries to deal with such specific tasks.

Qualitative skill descriptions were very common, and ranged widely. Some were clear, descriptive, and well articulated. Others were either very broad or very vaguely phrased, leaving the reader puzzled as to the exact skills being sought. Even a simple phrase such as “Windows XP,” if unaccompanied by an explanation, might imply anything from basic familiarity with the use of the operating system, to in-depth troubleshooting skills, to XP network administration.

In all areas, computer skills showed considerable mixing. All sorts of technological skills were observed in all subsets of library jobs, within all parts of public services, technical services, administrative positions, and systems positions.

Conclusion and Suggestions for Future Research
Technological skills have become ubiquitous in librarian positions. It is almost pointless to attempt to separate technological from non-technical library jobs; all library jobs have become technologically oriented to the point that they require a level of proficiency with at least some programs. Whether in systems, administrative, technical

### Broad Categories of Skills Required

#### Administrative and Interdisciplinary
- Budgeting
- Contracts and licenses; licensing agreements
- Copyright issues
- Evaluation of electronic resources
- Familiarity with library automation products (especially portal concepts, desk-top computing and Web applications)
- Hardware and software purchasing
- Programming and application development; some programming experience
- Project management experience

#### Digital Libraries / Metadata / Archiving
- Awareness of the issues involved in archiving electronic resources
- Broad knowledge of current practices in digital library development
- Demonstrated knowledge of the principles, practices, and techniques of archival descriptive standards
- Digital rights management
- Familiarity with digitization production processes and standards
- Knowledge of digital imaging management formats
- Relevant digital library issues, trends, and standards, including metadata
- Scanning and imaging

#### Instruction
- Electronic classroom teaching experience
- Trends in instructional technology

#### Technical Support and Networking
- Client/server computing architecture
- Computer skills in a PC/Windows environment
- Integrated library systems
- Knowledge of relational database management systems
- Network technology
- Networking and data communications technology
- PC support
- Understanding of data communications protocols, software and networks

#### Web Authoring
- Accessibility issues
- Demonstrated experience with the design, development, and management of Web sites, including HTML authoring, form creation, editing/site management software
- Demonstrated working knowledge of database-driven Web sites
- Experience with online bibliographic tools, Web database software, Web design
- HTML authoring, form creation, editing/site management software
- Internet and Web-based information tools
- Log analysis, graphic editing tools
- Previous experience in graphic design
- Standard Internet applications
- Technical issues associated with electronic publishing and Internet development
- Thorough knowledge of CSS and the use of templates and library items in Dreamweaver
- Thorough understanding of Web design principles and techniques
- Usability testing
- Web and server administration experience
- Web authoring tools