

User Interfaces for the Global Virtual Library:
Creative Options for Information Freedom and Economics

by

Lloyd S. Etheredge¹

Several visionary projects are underway to scan and digitize millions of volumes in the collections of leading research libraries. The most notable recent announcement, from Google.com, will include about fifteen million volumes at the Stanford library, the University of Michigan, and selected holdings at Harvard, the New York Public Library, and Oxford University.²

If these steps are to evolve into a global public library - an online library that is available worldwide and free to all users - one critical problem is how to generate revenue to underwrite the operating costs, including royalty payments for copyrighted material.

This brief paper suggests a design for a free and self-financing world public library; and four additional levels of for-profit products and services that can build upon this foundation.

I. The Public Baseline (Free)

¹ Policy Sciences Center, Inc. 127 Wall St., Room 322 Box 208215 New Haven, CT 06520-8251; 301-365-5241 (v), lloyd.etheredge@yale.edu (email). Comments welcome.

² John Markoff and Edward Wyatt, "Google is Adding Major Libraries to Its Database," The New York Times, December 12, 2004. Online. They report costs of about \$10/volume. The business plan of google.com is unclear, but it apparently will sell advertising. The article also discusses the pioneering Internet Archive created by Brewster Kahle and an initiative by the Library of Congress and an international group of libraries in the U. S., Canada, Egypt, China, and the Netherlands to digitize one million volumes and place them online (without advertising.)

Level 1: Adding icons of books & virtual library browsing

The current search methods of the world's online libraries are based on familiar card catalog indexing (e.g., www.loc.gov) and text-based indexing (e.g., google.com and amazon.com's new system to search contents of books). To jump-start the global virtual library and new business opportunities, another step in scanning and an open-architecture software package would add two components: 1.) scanning the spines and covers - so each volume can be represented as an icon (e.g., eventually to be stored along a shelf of books on the user's PC screen). And 2.) the shelves and stacks of the participating libraries will be photographed, so that users can browse by virtual tours of collections. (For many people, wandering and browsing the stacks of libraries adds to the discovery and creative process.)

- A "click" would select a book from the shelves. The book could be opened and browsed
- and "checked out" by moving the icon to the user's desktop for direct access.

- The startup strategy for the global virtual library includes giving free copies of the Level 1 software to the world's public library systems for distribution to their users.

The world's public library systems should be interested partners. Adding free access to a world virtual library vastly expands the benefits that they can offer to the public.³ And their users would have rights to: 1.) unlimited and immediate use of royalty-free volumes and other material; and 2.) access to other books, without charge, on an "available for use" basis - i.e., the number of electronic copies that can be used, simultaneously, by the cardholders of any public library system cannot exceed the number of physical copies that it owns and that

³ The global virtual library could be accessed via the home page of the local public library.

are on its shelves.

If it does not own a physical copy of a volume, and royalties are involved, each public library system will have the option to pay a modest annual subscription fee (to be negotiated) to purchase rights to one “virtual” copy of all books. That is, at least one copy of any book in the world can be available to a public library system’s users, without charge to individual users.

[Aggregate sampling, similar to the system for paying royalties for the music played on radio stations, would permit royalty payments to publishers and authors. The exact payments will require a great deal of negotiating and learning about the changing nature of demand. It seems reasonable, since so little revenue would be involved, to waive all user fees for public library systems in underdeveloped countries.]

Beyond this point, fees can be charged for extra-value services. For example, the limitation of having the icon of a book on one’s desktop, and being able to consult it only if it is not being used by others, can be avoided: users can pay a fixed annual fee for immediate “on demand” access to anything they want to read. [How much would this be worth? Ten dollars a year? Fifty dollars a year?] Billing would be handled by each library system, based

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on current user accounts and IDs.⁴

⁴ If commercial fees threaten to become too high, it would be straightforward for several of the world's largest and most progressive public library systems - California, New York, Singapore, etc. - to form a cooperative to scan many volumes, own the scanned images themselves, negotiate for rights, and receive these revenue streams.

- There may be additional sources of revenues to the entrepreneurs who operate the global virtual library. Users may decide to purchase volumes (via click-through links to amazon.com or other online discount retailers) or by ordering print-on-demand copies of out-of-print books. (These can be manufactured with xerox technology and soft bindings for about \$1/volume; and copies could be supplied in different formats for handicapped users. And there could be additional charges for other binding options.)⁵ Magazines and journals less than a year old could be available online for extra fees, as could fiction bestsellers.

Each of the next four levels of software modules creates new user interfaces with the online resources of the global public library and the Internet.

II. New Options for Add-On Services

Level 2: The Desk/Workstation/Office

The second level of interface will allow the user to keep the icons of volumes on his/her computer screen on a (simulated) office desktop, and along shelves in a virtual office - perhaps up to 500 volumes. The software would provide different 3-D designs of the desktops and offices with nearby bookcases. (A charming example of new 3-D user interfaces has been created by KQED at <http://www.kqed.org/w/jpfastfood/home.html> for Jacques Pepin's cooking show, *Fast Food My Way*.)

The options could begin with a bare-bones, steel desk & bookcase, business office. However, a wide universe of options would appeal to different users. Creative writers might be interested to use the desks and offices (and enjoy the views) of known writers (e.g.,

⁵ Pricing by the Internet Archive Bookmobile project: www.archive.org.

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Hemingway's desktop and view, or Thomas Jefferson's study at Monticello.^{6 7} Or an imagined recreation of Sherlock Holmes's 221-B Baker Street study, for example, for lovers of detective fiction.

It would be possible to create many modern, advanced, and specialized desktops and workstations. Beyond icons of printed volumes, these would include options to use online information in the global virtual library, or on the Internet, without requiring the user to visit different Websites and drill-down through many levels.⁸ (An expensive example is the Bloomberg Terminal (<http://about.bloomberg.com/about/professional/index.html>) for Wall Street analysts, now expanded to include online services for 260,000 users. Another less-advanced example is www.eb.com - the Encyclopedia Britannica's online service that provides expert reviews, and links to, Websites and online resources in every area.) Workstations in any field - e.g., a Biotechnology Researcher's workstation and several shelves of high-use reference material - could increase the productivity and efficiency of their users.

Level 3: The Personal Library

Level 3 add-on software modules would give options for large personal libraries holding thousands of volumes. For example, any user could have a large Library of an English

⁶ For ideas: Jill Krementz, The Writer's Desk (NY: Random House, 1996), Francesca Premoli-Droulens, Writers' Houses (New York: Vendome Press, 2002).

⁷ For a modest subscription fee, some of the virtual offices could be linked to mini-cams showing the actual, current views of the changing seasons from the writer's window. Or of Mt. Fuji, etc.

⁸ For example, a Health Policy analyst's desktop/workstation could have a visual display and a programmed keyboard that could automatically display the schedule of the Kaiser Foundation's Webcasting service of policy conferences (www.kaisernetwork.org). Another key would display current health-related news stories. Another key could display current statistics in different categories.

country house, with a fireplace and high tiers of dark-paneled bookshelves. Or other options, in different styles, drawn from the interior designs and architectures of the world's notable private collections and public libraries.⁹ The many empty shelves could be filled, one volume at a time, by the drag-and-drop method. But checklists of recommended basic holdings, by subject, could be included with the software and used to select basic volumes/icons quickly and begin placing them on the shelves. (For example, there are already expert-selected listings of the best 40,000 volumes in 300+ fields.)^{10 11}

With this Level 3 software, it would be easy for users to assemble collections in many areas of interest. Sections devoted to Shakespeare, to cookbooks, to gardening, to Agatha Christie mysteries, to the study of the Bible or Talmud or Koran, to the history of art, to children's stories.¹² Additional sections could be created for family histories and on-line (digitized) photo albums. Each family member could have personal sections.

At this third level, of serious personal library-building and book-using, other add-on services could be provided. For example, users might be able to select (or design) new

⁹ Guillaume de Laubier, The Most Beautiful Libraries in the World (New York: Harry N. Abrams, 2003). Foreword by James H. Billington.

¹⁰ Geoffrey O'Brien, The Readers Catalog 2nd Edition: An Annotated Listing of the Best 40,000 Books in Print in Over 300 Categories (NY: RC Publications, 1997). See also, for ideas, Judie L. H. Strouf, Literature Lover's Book of Lists: Serious Trivia for the Bibliophile (San Francisco: Jossey-Bass, 1999).

¹¹ Specialists in any field might find it straightforward to create and sell modules and, as video-on-demand becomes available, the capabilities could expand to include multimedia - e.g., Roger Ebert's library of recommended movies (with DVD icons for shelving and on-line links) and reference books. Many organizations could create basic "collections" - e.g., for Bible study or chemical engineering.

¹² See the online Children's Library: <http://www.archive.org/details/texts>

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bindings for their volumes. There could be display areas (e.g., for a Gutenberg Bible), and the picture frames in the original famous libraries could be filled with art or family and other photographs chosen by the user.

- Level 3 software also could permit users or user communities to free themselves from the Library of Congress or Dewey Decimal systems (and the arcane bureaucratic systems used for UN documents, etc.) and invent new classification and meta-coding systems with easy and useful ways to organize global knowledge for different purposes. For example, Choucri coding to identify and shelve together the information on demonstration projects for renewable energy and sustainable development.¹³

Level 4: Specialized Multimedia Knowledge Rooms

The fourth level of add-on software modules will give users a cornucopia of different personal Library/Knowledge rooms, each specialized for a purpose. Beyond icons of printed volumes, each would have innovative resources and multimedia capabilities suited to its purpose. For example:

- A Civil War Room, which could include books and DVDs, and options for busts and Civil War photographs, display cases for uniforms and muskets, and areas for large 3-D displays of battlefields (all selectable, and changeable, by the user.)

- An entire series of Discovery Channel and History Channel rooms, for users of different

¹³ Re Choucri meta-coding: Nazli Choucri, "Knowledge Networking for Global Sustainability: New Models of Cyberpartnering," in Deanna J. Richards, Braden R. Allenby, and W. Dale Compton (Eds.), Information Systems and the Environment (Washington, DC: National Academies Press, 2001), pp. 195-210. Choucri's chapter is available online, without charge, at: http://books.nap.edu/html/infosys_env/choucri.html.

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ages. A Dinosaur Room, with books and posters, and options for large 3-D models. Stocked with suitable books for kids - and, perhaps, also including some adult level/scientific reference books. A Tropical Rainforest Room. An Ancient Egypt Room building upon the range of online resources at www.virtual-egypt.com. Children who love horses could have software resources to create rooms devoted to this interest; or kids who love science fiction; etc.¹⁴

At the adult-level, a cornucopia of further modules could be sold and used with the basic software. For-profit companies and user communities could develop add-in modules and resources for every professional or personal interest and hobby. There could be scientific options: An Environmental Policy Room could include options for planetarium-like displays of global trends and data - or similar options for a citizen or high school student about his/her state, accessing a range of different databases and creating map overlays. A United Nations Millennium Goals War-Room to accelerate progress could have visual display systems for each goal: a map of Africa, for example, could show a red dot for every village that still lacks access to safe drinking water and the software module could link to a central Internet War-Room site, and red areas could become green as the world makes progress.

Some Level 4 knowledge rooms also could have comfortable viewing areas for large-screen Internet television. Leading scientific research organizations (www.videocast.nih.gov,

¹⁴ Software modules could create specialized multimedia rooms to support classroom subjects - for example, each elementary and secondary school subject could have its own age-appropriate Room, with its state-of-the-art instructional aides available to every child worldwide. And the Room's resources might be expandable - a Geometry Room for junior high school students could have a concealed door, and a section of the bookcase could swing open to lead down corridors to a Non-Euclidian Geometry room, and an N-Dimensional Geometry Room, and even side passages to a Prime Number Room, each with contents ranging from basic materials to the most advanced, current, thinking and adult discussions.

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for example) are beginning to provide free global colloquium services to accelerate scientific innovation. And the World Bank has launched one of the first Internet Webcasting “stations” to accelerate research, cooperation, and global knowledge-sharing (<http://info.worldbank.org/etools/bspan/index.asp>). It would be straightforward to select programs from a current issue of *Web TV-Guide*© next to a comfortable armchair and view a state-of-the-art scientific lecture, on demand; or (using a model developed by the New York Academy of Sciences, www.nyas.org) browse an “ebriefing” and select part of lectures or conferences to skim, or view in detail.¹⁵

Level 5: Knowledge Palaces

At the highest level, the software modules could give users advanced ways to organize and use materials in the global public library and on the Internet by creating multi-room “Knowledge Palaces.” The term derives from the Middle Ages. Then, with a scarcity of books, most knowledge had to be stored in personal memory. Keen attention was paid to the art of memory, and one technique was to create “memory palaces.” These palaces were created in the individual’s imagination with myriad rooms, each with a different design and specialized for an area of knowledge.

The vision was humanistic, far beyond today’s libraries, and not limited to simple technophile ideas for data storage and multimedia information processing. The rooms of the palace should be delightful. And, as with the symbolism and allegorical elements of traditional religious painting, knowledge did not need to be represented in verbal or textual or digital form. If the interest were Persian poetry, an entire room might be designed as a Persian garden, and filled with many delights (including books of poetry, occasional

¹⁵ And there could be a notepad next to the armchair, for jotting down brief notes.

nightingales, and locations that were reminders of the poems) and even the poets.¹⁶ Yet another door, at another level, could lead into a room with an entirely different ambience, a “virtual reality/Holodeck suite” customized for remembering, appreciating, and thinking about a different subject or area of life.

Ah, but what specific user interfaces/Knowledge Palace options should be offered to Level 5 software purchasers for the customizable/post-library knowledge systems of the 21st century? It is an open question: What Persian Garden analogs with what types of options for interior design and contents? What architectural options: A Sultan’s palace? A Frank Gehry design?¹⁷ How might the software evolve with technology - when a user is no longer limited to a PC screen and can have a room with large, flat-panel, 3-D wall displays?

Could the Level 5 rooms and spaces of a 21st century Knowledge Palace be designed to do more than store or retrieve knowledge? Could they stimulate creative thought and/or artistic accomplishment?¹⁸ Rather than find knowledge stored “out there,” could (some) rooms be designed to open inner doors and bring alive inner spaces of *this* user, as Zen masters select “skillful means?” . . . Might some of these rooms include people, with expertise or backgrounds different from the user and interested in conversation? Or real-world videoconference technology? Each customizable Knowledge Palace, bringing the world’s evolving online resources to each user, may grow over a lifetime.

¹⁶ Jonathan D. Spence, The Memory Palace of Matteo Ricci (New York: Penguin, 1984). See also Mary Carruthers, The Book of Memory: A Study of Memory in Medieval Culture (NY: Cambridge University Press, 1990).

¹⁷ For one modern architectural option, see the Bibliotheca Alexandrina under the leadership of Ismail Serageldin: <http://www.bibalex.org/English/index.aspx>.

¹⁸ A Music Composers study could offer resources to assist music composers, or simulated string quartets to play a composition.

The future belongs to the bold. The design for the rapid growth of a global online library is: 1.) a startup investment in online resources (already underway); 2.) an investment in digital photographs of spines and covers of volumes, that can be icons in new, 3-D, profitable, value-added, user interfaces; and 3.) partnerships with the world's public library systems. These partnerships, in turn, require that public library systems be able to bring basic access to global online resources to their users and know that, via an open architecture system, they are opening a five-level universe of new, value-added options and products, at competitive prices, to serve their users.

In the long-run, these higher-level options, add-on modules, and user interfaces (expanding and upgrading through generations of Releases, and perhaps including various annual subscription options) are likely to be the high-profit innovations. Information - universal access to all human knowledge that can be electronically stored and communicated - will be free to individuals, but it will be acceptable to charge for creative, add-on products and services. And the revenue streams to the designers and publishers of software modules will be generated on a global scale.¹⁹ (Over time, for every 20 million users who pay \$50/year for any combination of these ideas and services, that's \$1 billion/year of new revenue.) And the profits will belong to those with vision and ability, who have the startup resources, and who execute more quickly than competitors.

¹⁹ Already Apple's I-Tunes music download business is running at \$200 million/year, at about 0.99/song.

APPENDIX - User Interfaces for Papers & Articles

Level 2 software (desktops & offices) can include large 3-D filing cabinets to hold standard, 1/3-cut, manila folders for articles and papers. By default, the folders would be filed in alphabetical order by the last name of the principal author: the 1/3-cut tab for each folder would contain the citation in a standard format selected by the user (e.g., Cannon, J. D. (1984), "Diffusion of Innovations. . ." [etc.]).²⁰ ²¹ The contents of each folder, when "clicked," would appear to be inside the folder; the actual electronic files could reside on the user's computer, or elsewhere in a global virtual library archive or on the Internet.

When an article or paper is added, its folder will automatically appear in correct alphabetical order. And the 1/3 cut tabs for all subsequent folders will be adjusted one position to the right, so that the virtual filing cabinet drawer can be opened and (like physical filing cabinets) its contents can quickly be browsed. An electronic copy of an article or paper always will remain in the folder. Even if a copy is "removed" to another file drawer for convenient access related to a special project, or a copy is xeroxed for reading or loaning, a reference copy will never become lost.

- Higher-level software could add the ability to "click" on any citation in an article or paper, and have a copy of the cited item appear immediately in its folder/icon for reading and/or filing. And it could perform other useful, value-added services - e.g., it could search and monitor the global virtual library for all professional reviews of a new non-fiction book,

²⁰ These tasks could be performed automatically by standard bibliography/citation programs that search online databases (e.g., Endnote).

²¹ The software also could provide alternative types of headings for the folders (e.g., topical headings), color-coding, search capabilities, and several types of cross-indexing.

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to be filed for future reading.