Building a Global Corporate Library Portal:
Usability Results and Design Implications

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Abstract

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usability tests were conducted on five different corporate library web sites, all within the
same company, but based in three different countries. Usability results addressed the
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INTRODUCTION

Web sites within company intranets have proliferated, with each web site serving specific
organizations, different geographies, and specialized needs. Over the past several years,
large companies have begun to consolidate separate independent web sites into single
portal sites to eliminate redundancies across web sites, to provide a more consistent
framework to meet the global, local, and specialized requirements of employees and
business groups, and to make information easier to find. Building portal sites for
companies with physical sites all around the world is a complex process, requiring an
understanding of the needs, interests, cultural diversity, and linguistic differences of the
various constituent groups.

Usability testing is a commonly used tool, which provides web designers with critical
information about what works and does not work well on web sites from a user
perspective. There is a rich literature describing usability study methodologies, providing
guidelines for how to perform usability tests (Head, 1999, 2000; Nielson, 2000; Spool,
1997). Results from usability tests also provide guidance on specific parts of the process
or web site, such as on page design guidelines (Borges, Morales & Rodriguez, 1997) and
online indexing structures (Hert, Jacob & Dawson, 2000). Academic libraries are using
the results of usability tests to improve the structure of their web sites and to make it
easier for their customers to find the information they need (Dickstein & Mills, 2000;
MIT Libraries, 1999).

Corporations, like Microsoft, are also applying usability testing to improve their
corporate intranets (Kanerva, et al., 1997). In defining typical enterprise information

portal users, Feldman (2000) describes a diverse group of users ranging from R&D researchers to information professionals to support staff to managers who are "driven by enterprise-wide goals and business rules, and they are chronically short of time."

This paper presents the findings from five usability studies that were conducted as part of efforts to build a global library portal site for a large high tech company. Usability tests were performed on five library web sites within the same company in order to determine how to merge the content and navigation frameworks into a single global library portal site. Usability results identified the strengths and weaknesses of each library's web sites, as well as user perceptions and success rates in finding information on the web sites. We plan to compare these findings with usability tests of the new portal when the launch is complete across all five sites in March 2001. The implications for the design of a global corporate library portal are discussed.

RESEARCH QUESTIONS

The purpose of this study was to identify design requirements for building a global portal site that brings together five previously independent library sites in the same company, but located in three different countries. The research questions were:

1. How successful are users on corporate library web sites? What factors influence their success rates?
2. What perceptions do library users have about the usability of corporate library web sites?
3. What do library users value the most about a corporate library's web site?

METHOD

To address these research questions, a series of usability tests were performed at five participating sites in the Hewlett-Packard company in three countries (United States, England, and France). Usability tests were performed on each library's web site, with participants from that location.

Participants

Participants were drawn from the five physical sites that were part of a newly formed global library and information services organization. Two of these sites were located in Europe (i.e., France and England) and three of these sites were located in the United States (i.e., California, Colorado). Following the recommendations from the usability literature, which has found that choosing a representative small group of users (typically around 5) will uncover 80% of the usability problems on a web site, we interviewed from 4-7 people at each location (Head, 2000; Nielsen).

The library staff at each location recruited participants for these studies. Effort was made to choose participants who had differing levels of experience using the library's web site.

Some participants had never used the library's web site before. Most of the participants went through periods when they used the library web site intensively. A few of the participants were regular users.

Environment

Hewlett-Packard currently has over 14 separate library organizations each serving specific organizations and/or geographies. Over the past several years, each library has developed a unique web site to meet the needs of its targeted customer base (see figures 1-5). These library web sites differed in many ways, including color choices, content taxonomies, amount and type of content, navigation frameworks, language, home page text and design, and library logos.

Five of HP's libraries have created a new global library and information services organization, with additional libraries scheduled to join the organization at a later date. The first undertaking of this new organization was to create a unified portal site that would serve as the primary source of external research information for HP employees, offer a consistent and consolidated framework for delivery of web-based library and information services, and eliminate content redundancies.

Instrument

The usability test reported in this study is a benchmarking assessment of each library's existing web site. The benchmarking test was based on the MIT Libraries testing process (MIT Libraries, 1999) and was comprised of three parts:

Pre-test questions: Participants were asked about their previous experience (if any) using the library's web site.

Assigned Search Tasks: Participants were asked to complete 10 assigned tasks on the library web site intended to serve their location. Tasks were chosen to reflect common information needs and to require participants to use many different navigation links on each web site. As much as possible, the same tasks were administered across each location. Some task questions were reworded to accommodate differences in language (e.g., reference assistance vs. inquiry) and some tasks were changed to reflect the unique content offered at each location. Typical tasks included: "Where can you find out whether a book is in your library?" "Where can you find patents on this site?"

Post-test questions: Participants were asked to describe their experience during the usability test with each library's web site, using a 1-5 scale to rate their impressions. They were also asked some open-ended debriefing questions about the most valuable parts of the site, suggestions for improving the site, and what should not be changed about the site.

Procedures

Usability test interviews took place over a seven-month period in 2000. Interviews were conducted with each participant in his own cubicle. By conducting the usability tests in the participant's cubicle, we were able to make a number of observations about the ways participants accessed, displayed, and utilized the library web sites. Each testing session took about 45 to 60 minutes to complete.

A facilitator and an observer came to the participant's cubicle to conduct the usability test. The facilitator conducted the usability test, gave instructions to the participants, and asked the participants questions during the interview. Participants were asked to think aloud while they performed their assigned searches. The observer recorded the start and ending time of the searches and noted what the participant did, including the search words they used, the browsing path they following, the problems they encountered, and the comments they made. Participants were given a maximum of three minutes to find the answer to a task to reflect typical search behavior.

All interviews were conducted in English, even at the French location. The French participants were all fluent in English, as were most of their colleagues. In addition, the French web site used a mixture of French and English.

RESULTS

Experimental notes and observations recorded by the observer were analyzed in terms of success rates, search times, search paths, and comments for each participant. The results from each of the five sites were then compared. Results are presented for success rates, user perceptions, and most valued elements of the library web sites.

1. Success in completing search tasks

Table 1 presents average success of task completion and time to complete tasks by location. Participants were successful in completing the assigned search tasks on the library web sites at each location, with success rates ranging from 7.7 out of 10 tasks at the California 1 site to 8.7 out of 10 tasks at the England site. Search times also varied across sites, with participants at the California 2 site spending the least amount of time searching (an average of 1.1 minutes per task), while participants at the California 1 site spent the most amount of time searching (an average of 1.6 minutes per task). Search time differences may be accounted for, in part, by the amount of content on the web sites, with the California 1 site offering users the most content-intensive web site.

Tasks were easy to find when the navigation link labels were clear to the participants, when the search function retrieved meaningful results, and when there were multiple approaches to finding information. All of the library web-sites were rated highly for the content they provided and the implementation of a navigation bar on the left-hand side of the screen.

Factors that made tasks difficult to locate included:

- *Navigation systems are not integrated* – When more than one navigation system was offered on a home page, participants found it difficult to locate the information they were looking for. For example, on the California 2 site (Figure 2), participants had difficulty finding patent resources because they were listed in one of the links under the Featured Links heading on the home page rather than the left-hand navigation system. The type was small and the link was located low on the page; it did not look like the rest of the navigation links on the page and was not noticed by any of the participants.

Table 1: Mean Success Rates and Time on Search Tasks by Location

Location	No. of Participants	Success (out of 10) M, SD	Time (in min.) per task M, SD
USA – California 1	7	7.7 (.95)	1.62 (.82)
USA – California 2	5	7.8 (.84)	1.05 (.84)
USA – Colorado	5	8.6 (1.52)	1.21 (.64)
Europe – England	4	8.7 (.5)	1.16 (.81)
Europe – France	4	8.0 (.81)	1.21 (.49)

- *Unclear navigation link labels* – Participants had a difficult time completing tasks on each of the library web sites due to unclear labels. Examples of unclear navigation link labels included:
    - "Links List" - "It makes me think it's going to be the same links everybody else has – hp stock, hp now, etc."
    - "Information Jetport" - Participants wanted a more descriptive label, like "links to external sites".
    - "Keeping up to date" - Participants were not sure what would be included under this label.
    - "Search catalog" – One participant felt this label did not indicate that this was a place to find books, thinking instead "A catalog is a magazine."
    - "Library collections" vs. "Search our catalog" – Participants were confused because these two labels appeared to overlap. Participants expected that all information offered by the library would logically be including under something called "Library Collections."

In particular, library terminology and library metaphors applied to navigation link labels were confusing to participants. Examples were found on several library web sites. For example, one web site used the terms "Reference Shelf" and "Travel Shelf", which conjured up images of physical library materials in the minds of the participants, rather than a collection of web links. Another web site used the common library term "Reference tools" as a navigation link label. However, one participant commented: "The labeling is sometimes confusing. 'Reference tools' is a poor one, for example." One of the library web sites

described the category "Subject Area Pointers" as a "collection" of external links, which made one participant think of books and papers rather than internet resources.

- *Buried deep in the content and navigation structure* - Participants had difficulty locating information buried deep in the hierarchy. In looking for electronic journals on the California 1 site (Figure 1), participants had to look under the Information Jetport under Electronic Publications. We observed that the first place participants turned for electronic journals was the online catalog, thinking that since it contained print journals, it would also include electronic journals. "A journal would be a periodical. I thought if I went in the online catalog, I thought I'd find a list." Other participants looked for electronic journals in the Databases section since they would find electronic articles in Databases. They thought that Databases would be a reasonable place to look to get a list of electronic journals.

- *Narrow view of library web-site offerings.* Participants generally had a limited conception of what the library could do and offer them, thinking of the library as providing primarily traditional types of information. Many participants considered the library as a place to find books and magazines (mostly on technical topics), not a place to turn to for:
  - Business/market research – In France, participants indicated they would contact people they knew in marketing groups for market information and suggested that people networking was more effective; they were not aware that they could find market information at the library.
  - Internal HP information – Participants did not think of the library as a source of internal documents and knowledge about the company and questioned why they would be able to find this type of information on the library's web site. One participant commented: "My first reaction would be to go to hp.com for this information." Another participant said: "I think I know the answer, but what does this have to do with the library?"
  - Travel information/currency exchange – Participants at several sites did not know that the library provided links to travel-related information, similar to how libraries have always collected maps, atlases, guidebooks, and other ready reference books in their physical collection. However, participants did not think of the library offering this type of information on a web site: "I wouldn't expect that in the library."
  - External links to technical information – Similarly, participants did not expect to come to the library web site to find external links to technical information, like on mathematics. Participants indicated that they would more likely go to web search engine, like Google, to find this kind of information. Participants also perceived the "Library of web links" function on the Colorado web site to provide a collection of mostly library-oriented links, like to Library of Congress, pointers to other libraries, other search engines rather than provide links to technical and business materials.

User perception of the library's offerings influenced how participants looked for information on the web sites. Many participants indicated they would not have thought to look for the type of information mentioned above on the library web site and, as a result, they were usually unable to complete the assigned task because they were not certain where to look for that information.

2. Perceptions of library web sites

In a post-test interview, participants rated the library web site on a scale of 1 to 5, with 5 being the highest. Participant perceptions of the library web sites were mostly positive, as shown in Table 2. Findings related to each perception are discussed.

Table 2: Perception of Library Web Site Usability by Location

Perception	USA – California 1 (M, SD) n=7	USA – California 2 (M, SD) n=5	USA – Colorado (M, SD) n=5	Europe – England (M, SD) n=4	Europe – France (M, SD) n=4
Ease of finding information	3.4 (.45)	**3.9 (.55)**	3.8 (1.04)	3.2 (.5)	3.1 (.25)
Effectiveness of home page organization	3.3 (.95)	3.7 (.84)	**4.0 (1.0)**	3.2 (.96)	3.9 (.85)
Logic of moving between pages	**4.1 (.93)**	3.8 (.84)	3.8 (.84)	3.2 (1.5)	3.2 (.96)
Accessibility of information	4.0 (.58)	4.1 (.55)	**4.6 (.55)**	3.0 (.82)	4.4 (.75)
Certainty of knowing location in site	3.5 (.76)	**4.0 (.71)**	**4.0 (1.22)**	**4.0 (.82)**	3.9 (.63)
Comfort level in using site	4.3 (.75)	**4.5 (.71)**	4.0 (.71)	3.7 (.96)	3.7 (.96)

Ease of finding information
Participants rated whether they perceived the web site as easy or difficult to find information on. While participants found information for most of the search tasks, as

evidenced by the high success rates, participants suggested ways the site could be improved to make it easier to locate information.

Participants found the navigation structure confusing on the Colorado home page (Figure 3), with two navigations systems in different fonts, sizes, and colors. Participants questioned: "Why are there two lists and why are things in different formats?" Another participant stated: "I find, especially on the first page, it's got two different lists there and I have never understood why and what the difference is." While participants found it confusing to have two navigation systems, participants found it easy to locate information on the web site due to its highly effective search engine. Participants did not find the California 1 (Figure 1) and France (Figure 5) web sites as easy to find information on, mostly because participants had difficulty finding search and navigation tools, including the search button and the site map. Navigation on the California 1 site was further complicated by the amount of content on the web site.

Effectiveness of home page organization
Participants rated whether they perceived the organization of the library home page as not effective or always effective for finding information. Participants liked the ease with which they could find information on the Colorado web site, mostly because there were multiple paths to find information. One participant expressed it this way: "There was always a way to find the information I needed through this site – there's always two paths to find the information and they always give me the answer I need." Another participant said: "If I don't see what I'm looking for on the first page, I find it on the second."

Logic of moving between pages
Participants rated whether moving from page to page seemed confusing or logical. While participants liked the frames on the California 1 web page, participants found the implementation of frames confusing on the French web site (Figure 5). French participants used the navigation links in the main body of the French home page for most of their searching and were not sure why the links were duplicated on the frame. Participants also were confused on the California 2 (Figure 2) site when the left-hand navigation choices changed when they moved from page to page. Participants often did not notice these changes to the navigation choices.

Accessibility of information
Participants rated whether they felt the information on the library web site was buried deep within many pages or was easily accessible in a few clicks. In general, the library web sites received high marks for keeping the number of clicks to a minimum. Participants perceived information on the England web site (Figure 4) was less accessible than the other library web sites, mostly because the site required several clicks to find information about registering for alert services to monitor information. Additionally, participants were disappointed when they finally found the page describing alert service options because they still had to call someone to set up the alert, rather than being able to complete the task online.

Certainty of knowing your location in the web site

Participants rated whether they felt lost or clear on where they were in the library web site. Even though there were several levels in the content structure of the library web sites, participants did not feel lost when searching for information. On some library web sites (e.g., California 1 site), participants were not sure how to get back to the home page since there were not obvious links back to the homepage.

Comfort level in using site

Participants rated their comfort level on the web site, indicating whether they were confused or comfortable when they searched the site. In general, participants felt comfortable using the library web sites, especially when they looked for information they have found before. However, when participants were asked to find something new, they were uncertain of where to look. Participant comments, gathered from several library locations, illustrate this point.

- "It's easy to use what I know is there, I just have problems if my needs change."
- "When you have something as comprehensive as a library web site, you get to know the nooks and crannies and learn to deal with them."
- "Once I find where things are I can get there quickly, otherwise I have a tough time."
- "You have to learn the logic of every web site individually."

3. What Library Users Value Most About Company Library Web Sites

Participants were asked what they valued most about the library web site. The responses are summarized across the five library web sites. In addition to valuing the services provided by the research analysts, one of the most highly valued resources mentioned across all five library locations was the online catalog. Library users viewed the online catalog as critical to their work, allowing them to locate the materials they need in their on-site libraries or to see whether other company libraries owned the desired resource in their collections.

Participants also expected and utilized "search" features on company web sites. Navigation frameworks are not enough and must be supplemented by search functionality. If the search button was not in an obvious location or missing from a web site, participants were frustrated. One participant responded that the most valuable parts of the web site are: "The things that let me search, search the site and search the catalog. If I don't find something right away, I'll fall back to searching for it." Participants at all five of the sites mentioned the importance of this feature.

Library users valued having the ability to conduct as much of their business via the web site as possible, especially having access to full-text journals and databases on their desktops. One participant expressed it this way: "I like to be able to do it at my desk – if I can do a quick search of something and have that running while doing something else, it's convenient." Participants at three sites mentioned this (California 1, England, France). These three sites also specifically mentioned some of their favorite databases, including IEEE/Inspec and the ACM Digital Library. This interest in conducting

business online also included the ability to complete web-based request forms, including research requests. One participant said: "Request forms is perfect – I didn't realize it was even there until I clicked on it."

The two R&D research lab sites valued the patents database, MicroPatents, highly. Other parts of the library web sites that participants valued included: a listing of library services, a market research database, Technical Reports, a collection of web links to external web sites, and a collection of links to Standards.

In addition to mentioning existing aspects of the library web sites they valued, participants also identified several enhancements to the global corporate library portal they would like implemented. For example, participants were interested in a personalized view of library resources, advocating a "My Library" concept (Cohen et al, 2000). Participants also requested adding ways for library customers to submit user reviews and comments on library services.

DISCUSSION

These usability tests have influenced the portal design process, proving to serve as a rallying point for the global corporate library portal project by providing data on customer perspectives across the different library locations. The results have helped the portal design team to make decisions and to rationalize the multiple voices of the participant library organizations.

Throughout the usability testing at each of the five locations, it was clear that most participants were unaware of the breadth of library resources and services at their disposal. Some of value-added services were not well known by library customers and participants were pleasantly surprised to learn about many services. More marketing of these services, on the splash page and other ways, would help people to know that they can find this type of information on the library's site. Participants suggested using the home splash page as a way to communicate current up-to-date information about library services.

The results from the five usability studies have implications for the design of a global corporate library portal site, which takes into account differences in the needs of each location.

Search and Navigation – Participants need to have multiple ways to access information, including a logical and consistent navigation framework, effective search functionality, and site maps. Most people start looking for information by using navigation frameworks, and use search features when they cannot find what they are looking for. However, participants at several locations had difficulty finding the search button on the existing library web sites. Search boxes need to be placed in a prominent location on the screen. Participants preferred search boxes to search buttons.

Labels – One of the challenges in developing a global corporate library site is to find appropriate labels for navigation links that are clear and appropriate across different locations and languages.   The results suggested that several labels were unclear and confusing to participants. Participants expected labels to be descriptive ("external web links") rather than creative ("information jetport"). Library terminology and metaphors should not be applied to web site labels, as participants found this confusing. Labels need to be tested with the user base, as it can be difficult to recognize that the label terminology is overly specific, based on professional jargon, or has a different meaning in different locations. We conducted additional usability tests to help us determine the most appropriate navigation link labels for the global library portal site; the results of these studies will be reported in a forthcoming paper.

"Look and Feel" – The participants in the study expected consistency in the "look and feel" of the library pages, explaining that this is needed "to let you know that you are still on the library page." Another participant observed that the different "look and feel" was confusing: "I don't like the different look, feel, and flavor of the different pages. It makes you forget where you are." While the importance of employing a consistent look and feel across web pages is well understood, it can be difficult to ensure that a web site with many content owners resist the temptation to design their own look for the pages they create and manage. Creating a design template that meets the needs and tastes of several libraries and gives a consistent "look and feel" to a global corporate library web site is necessary for building brand awareness of library services. Participants preferred light backgrounds for web sites. Participants felt that dark backgrounds, like the England web site (Figure 4), "… makes it difficult to read the text."

Screen Space Utilization – Since we observed participants using their own computers, we were able to make several observations about the ways participants displayed information on their monitors. Many participants did not set their display to view the library web site on a full screen, but rather opened the window to a smaller size so they could layer different windows and have multiple tasks going simultaneously. This has implications for where information is placed on the screen. For example, participants using the California 1 web site who kept their window small, missed seeing the search button in the upper right hand side of the screen. This meant that information on the far right of the screen was not visible to people who had their screen displays set up this way. In addition, some participants set their screens to display larger text in order to make the text easier to read. This reduced the amount of visible text on the computer monitor.

Geographic Differences – Several geographic differences in language/terminology, identity, and content were identified in the usability studies that need to be taken into consideration in the design process. Each library location should retain some local control over content, terminology, logos, and marketing to accommodate the needs of their primary users.

- **Language–** Language differences across web sites are problematic for retrieval of and understanding information across web sites. At this time, we are using English for the portal site, with documents and web sites in their native languages. However, as the technology improves to handle cross-language issues in terms of

translations and information access (Bian & Chen, 2000), greater accommodations to a variety of languages will be valuable to the users.

- **Terminology –** In addition to language differences across sites, use of English terminology differed across web sites. For example, Americans refer to "business information" and the English refer to "market information." It is critical to accommodate these terminology differences in the design of a portal site, since a diverse set of users will be accessing the site.
- **Identity –** Each of the library web sites had developed its own identity (as can be seen in Figures 1-5). For example, the Colorado web site (Figure 3) has become closely identified with the dog picture that appears on their pages. One participant said: "I really like the picture of the dog. As soon as I see the dogs I know I'm at the library home page." This local identity for each of the libraries needs to be retained in the portal.
- **Unique content and interests –** Participants at each location had different information needs based on the type of work they were engaged in. Users at each of these sites need to be supported to meet their unique information needs. For example, the European locations were particularly interested in Copyright information and Standards. Patent resources and technical reports were of greater interest at the R&D research lab locations than at the other library locations. For example, at the Colorado site, one participant remarked: "I have no idea. I'm not sure what is meant by the question (regarding technical reports)."

Text Length – Several of the library web site pages were text-intensive, which made it difficult for participants to scan and locate the information they needed quickly and sometimes obscured the information they were looking for. For example, on one library web site, participants had difficulty finding the search button on the "Search Our Catalog" page because there was so much text on the page. Text should be kept terse and clear, especially for corporate library users who need information in a timely manner to make decisions and solve problems. One participant said: "I don't tend to read text heavy pages and descriptions, it takes too much time. I look for links matching phrases in my head."

Depth in Navigation Structure – Corporate library users expect one-click access to commonly used services and are frustrated when these services are buried. Direct access to these commonly used services needs to be supported by the global library portal site. If multiple clicks are required, the user should be lead to valuable and actionable information on the portal. Participants did not like it when they had to click multiple times only to find out they still had to call someone to utilize a service. Participants expect to have the capability to complete tasks online.

Cross-Linking – Participants valued having more than one path to finding the same information on library web sites. For example, participants consistently looked for interlibrary loan information in one of several places: online catalog, request forms, and library services. Under these circumstances, cross-linking ensures that library portal users will find the information they are seeking. However, excess cross-linking can diffuse the meaning of different categories and should be avoided.

Contact Information – Contact information, especially for research analysts, should be prominently displayed on the portal site. Participants at all of the sites repeatedly stated how they valued the research services provided by the library staff. One participant comment summed up the general sentiment: "Keep the people. They are who I use the most. They are the surest way to get information." Participants want to be able to easily locate library staff.

Going Home – Some of the library web sites tested did not make it easy for the participants to get back to the home page. As there was often unique and useful content on the home page, a global portal site needs to clearly offer a way to return to the home page, such as listing "home" as the first or last option in the navigation framework.

Mouse-Overs – Several of the library web sites utilized mouse-over technology, however the mouse-over text appeared far away from the button. Participants either did not notice the mouse-over text since it was disconnected from their action or found it annoying. One participant observed: "My eye is bouncing all over the place." Mouse-over text needs to be displayed next to the button rather than at the top of or else where on the screen.

CONCLUSION

This study aimed to identify design considerations for the creation of a global library portal site that brings together five separate library sites in three different countries from within a single company. The findings provided an understanding of user success rates on five different library web sites and the factors influencing their success, user perceptions of web site usability, and valued elements of web sites. Implications for design of a global library portal site were discussed. In addition to search and navigation, look and feel, labels, and other considerations, it is critical to take into account geographic differences in the library portal design. The usability of the new global library portal will be assessed and compared with the results of the benchmarking studies reported in a follow-on series of usability tests. Further research is needed to determine the generalizability of the design considerations, as identified in this study, for building library portal sites for other organizations.

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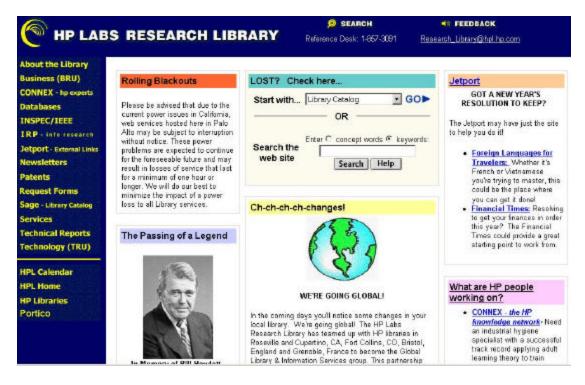
FIGURES

Figure 1: USA – California 1 Library home page

Figure 2: USA – California 2 Library home page

Figure 3: USA - Colorado Library home page

Figure 4: Europe – England Library home page

Figure 5: Europe – France Library home page