NYU 21st Century Library Project: Designing a Research Library of the Future for New York University

Report of a Study of Faculty and Graduate Student Needs for Research and Teaching

Conducted by New York University Libraries with the assistance of Katzenbach Partners LLC (KPL)

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I. EXECUTIVE SUMMARY

In the fall of 2005, New York University's Division of Libraries initiated a study to determine how the Elmer Holmes Bobst Library could improve its physical spaces and services to best address the current needs of scholars, as well as to create an environment that could be adapted to the needs of the future of scholarly research. In order to make systematic and targeted considerations of renovations, the Bobst 21st Century Planning Committee was launched. This work built upon the highly successful 2004 renovation of Bobst's lower two levels, which were designed with a focus on undergraduates. The 21st Century Project focuses on future renovation of the upper floors of the library and seeks to understand the needs of faculty members and graduate students in the context of the many recent changes in access to research resources.

The goals of the 21st Century Library Project were to understand and interpret trends in scholarship and research processes in a way that would enable the design of 21st century spaces and services that can facilitate efficient, productive scholarship and inspire scholars by providing a sense of participation in an active intellectual community. The scope of the project also included developing ways to enable the library staff to expand their definition of their own roles, and to embrace changing notions of the traditional library. In short, the 21st Century Library Project laid the groundwork for changing NYU's conception of existing and future services for faculty and graduates students available through the library, and its conception of the role the library plays in the scholarly community of the University.

To achieve the goals of the 21st Century Library Project, Dean of Libraries Carol Mandel and the planning committee worked with New York-based management consulting firm Katzenbach Partners LLC (KPL) to assess the needs of faculty and graduate students. KPL conducted interviews and focus groups with librarians, faculty, and graduate students in a range of academic disciplines. Faculty were selected for the interviews by the deans for their schools as exemplars of first-rate research scholars. The project team spoke with approximately 65 members of the NYU community.

Interviews with faculty members and focus groups with graduate students provided the major source of data for the study, and a number of core issues surfaced that scholars face as they engage in their research activities and repertoires. There is a great interest in the question of space for research, especially physical space and ways that the library can serve as a dynamic environment that contributes to intellectual and community life. Ideas about the evolving resources, tools, modes of access and forms of assistance offered by the library were also important. Challenges regarding interdisciplinary and collaborative research and its effects on the kinds of resources used and needed were discussed at length. And the changing nature of scholarly work (including research methods, resources, and publishing) was of great interest to many participants.

A literature review by NYU librarians in collaboration with KPL also informed the study. The literature review committee expanded the review beyond the library literature into other disciplines, including the social sciences, business and technology. The review identified trends about how researchers work across the spectrum of digital and physical resources; changes and innovations in virtual and real spaces; new teaching strategies and learner expectations; best practices in libraries and the private sector; and new technologies and trends that could either impact or have application for the research library.

In analyzing the data from interviews and focus groups in light of the context provided by the literature review, three main themes emerged: 1) unfettered, seamless, and comprehensive access to library collections and other research materials; 2) the importance of physical and virtual spaces for both contemplation and research; and 3) the role of the library as a gateway to the world's resources.

In the new world of scholarly research, there are many ways to support and enable the diverse work of scholars. At NYU, the changing story of scholarly work can be supported by improving spaces for work; enabling collaboration and connections across disparate disciplines; making the discovery process more powerful; expanding beyond traditional conceptions of the library; and creating more spaces and mechanisms for intellectual creativity and inspiration.

II. PROJECT OVERVIEW

A. Context

In 2004, the NYU Libraries opened the Brine Library Commons, a major renovation of two floors of the main library designed as an undergraduate library environment. Based on extensive input from undergraduates and the considerable literature and demonstration available about student learning space, the renovation was highly successful. As the Libraries looked ahead toward renovation to serve faculty and graduate student researchers, it became apparent that there was no similar body of work characterizing the library needs of post-graduate researchers in the 21st century. As a result, and with the collaboration of the Provost's Office and the deans of arts and sciences, the Libraries undertook a study to understand how it could evolve its physical space and services to better address the current and future needs of NYU researchers.

The NYU Libraries system is highly centralized, with services and collections for almost all disciplines and professional schools based in the main library facility, the Elmer Holmes Bobst Library, on Washington Square. Thus it was important to understand needs across a wide range of disciplines. Designed in the late 1960s by Philip Johnson and Richard Forster, Bobst Library has a distinctive physical impact. With a twelve- story atrium at its center and hard surface, symmetrical design, the building provokes strong responses from its users, some of whom view it as elegant and handsome, and many

others who find it cold and intimidating. These strong reactions influenced and stimulated interviewees' thinking about library spaces.

B. Process

The deans of Social Sciences, Sciences and Humanities for the Faculty of Arts and Sciences and the Dean of the Steinhardt School for Culture, Education, and Human Development identified 32 faculty members from a variety of disciplines who were considered outstanding researchers in their fields, exemplars of faculty for whom the NYU Libraries should be designed. Faculty members were interviewed individually. Interviews and focus groups were also conducted with 14 graduate students from many of the same disciplines, and with a selection of faculty and graduate students who were users of the Libraries' special collections. In addition, the study team interviewed faculty from the Interactive Technology Program (ITP) of the Tisch School of the Arts whose work relates closely to the central questions of the study.

The disciplines represented in the study included: anthropology, applied psychology, art and art professions, biology, business, computer science, culture and communication, East Asian studies, economics, education, English, fine arts, history, interactive telecommunications, journalism, linguistics, Middle East/Islamic studies, music, music technology, neural science, nursing, physics, politics, psychology, religious studies, sociology, and Spanish.

The Libraries engaged the New York-based management consulting firm, Katzenbach Partners LLC (KPL, http://www.katzenbach.com) to conduct the study. Founded in 1988, the firm seeks "to help enterprises achieve peak performance by offering distinctive capabilities that integrate strategic problem solving with insight into people and organization." KPL worked with the Libraries not only to gather and analyze data but also to help the Libraries respond strategically and effectively to the results. KPL and the Libraries formed a team of consultants, librarians, academic administrators and faculty members to work through an iterative planning process as it gathered, interpreted and responded to the results of the data gathering. The team included: Caroline Adler of Katzenbach Partners LLC; Jacob Alspector of Alspector Architecture LLC; Roddy Austin, Director of Libraries ITS and Classroom Media Services; Justin Blau, Professor, Biology Department; Lucinda Covert-Vail, Director of Libraries Public Services; Faye Ginsburg, Professor in departments of Anthropology and Culture, Media and Film; Dawn Lawson, East Asian Studies Librarian; Carol Mandel, Dean of the Division of Libraries; Marilyn McMillan, Associate Provost and Chief Information Technology Officer; Thomas McNulty, Fine Arts Librarian; Clifford Siskin, Professor, English Department; Michael Stoller, Director of Libraries Collections and Research Services; and Jane Tylus, Vice Provost for Academic Affairs.

The KPL team:

1. interviewed and conducted focus groups with 65 members of the NYU community;

2. worked with a team of librarians on a literature review to assess evolving research styles and standards, changing teaching expectations, patterns of spaces, tools for thinking and practices from retail and other commercial domains as well as libraries;
3. worked with core and extended teams to discuss functions of the library, the objectives of future recommendations for changes and actual recommendations for space and services;
4. presented recommendations and tools for thinking to enable library leaders to continue developing the thinking and ideas introduced during the project's phases.

C. Interviews and Focus Groups

Interviews with faculty members and focus groups with graduate students provided the major source of data for the study. Faculty members and graduate students were identified with the assistance of University deans in order to capture the needs of especially engaged and active scholars.

As flexible, iterative conversations, the interviews and focus groups were designed to allow the interviewers to learn as much as possible about the research practices, methods, and needs of those who participated in the study. Two main areas of questions were developed with the assistance of a limited number of pre-interview tests with faculty members. The first area of questions addressed the use of library resources and services for research purposes, while the second concentrated on teaching needs (questions about teaching were addressed mostly to faculty). Special attention was paid to how interview subjects defined library space, whether physical or virtual. When needed, interviewers probed participants to elaborate on their specific disciplines, research interests, and positions (faculty or graduate student) and the impact on their research processes. ("Areas to Probe" can be found in Appendix 1.) Each interview lasted approximately one hour, and focus groups were approximately one and a half hours in length. The questions asked included the following:

Use of library resources and services as a researcher

1. In order to have more detailed context for the questions we want to ask you, we'd like you to describe a bit about your focus and about the focus and vision for your research.

2. Are there certain times throughout the day you do things related to your research, and visit certain places?

3. Tell me more about the kinds of information sources you like to use and why you find the process for using them is smooth and straightforward.

4. At what points in the research process – developing a hypothesis, structuring your research, gathering insights, designing a synthesis, and ultimately publishing – do you use the library?

5. As you go through the research process, are there tools you find particularly useful?

6. With the way you communicate your research to the outside world evolving with changes to technology (e.g., data is being shared online in new ways), what are the implications for your work as a researcher?

7. How much is your experience with the library the same or different from that of your graduate students, the researchers of the future?

Use of library resources and services as a teacher

1. In addition to your time as a researcher, we would also like to get a sense of how the library plays a role in your teaching. Can you describe to us the kinds of classes you teach and your preparation routine?

2. Are there certain times throughout the day you do things related to your teaching (e.g., class preparation, teaching), and visit certain places?

3. What kinds of media and what kinds of materials are useful to you during the process of preparing your classes and while you are actually teaching?

4. As you go through the teaching process, are there tools you find particularly useful?

D. Literature Review

With the objective of moving beyond conventional sources and ideas of what was relevant to the development of research libraries in an academic setting, a broad literature review was undertaken by librarians and KPL staff. Four main areas were covered: Evolution of Research Strategies, Changing Teaching Expectations, Latest Practices in Libraries and Patterns of Space, and Changing Tools for Thinking.

E. Calendar and Objectives

The general trajectory of the project included three phases and took place over the 2005-2006 academic year. Interviews with professors, graduate students, librarians, and special collections users were used throughout all three phases.

Phase 1: Laying out parameters and capturing insights (Fall Semester, 2005)
Phase 1 consisted of discussions in which project members framed and brainstormed initial ideas about the roles and functions of the library. The project team focused on the functions of research libraries, the existence of analog institutions and services outside of academia, and on common elements of success generally. During Phase 1, the team and KPL initiated data compilation from early interviews, external research, and a literature review. The team began to identify emerging trends among disciplines and levels of

scholars, as well as patterns in changes made by research libraries beyond NYU. Further, it became possible to determine which scholarly processes were shared across disciplines, thus shaping future areas of focus for the project. Lastly, the team attempted to match external trends of research libraries to the expressed needs of faculty, graduate students, and University administrators.

Phase 2: Synthesis, brainstorming, deepening, and testing insights (Intersession, 2006)
During Phase 2, the project team streamlined the tasks outlined in Phase 1 by testing "areas of focus" to create a guiding framework for the analysis of data and ideas. As part of this effort, the team distinguished between library users and external trends/leadership aspirations as distinct sources of input that shape the objectives for changes to the library's spaces and services. It presented special areas of focus to be prioritized by core and extended project teams, and compiled feedback to create a range of possible future directions for the library. Phase 2 also involved formulating objectives for ideas and recommendations in which the team determined a core set of objectives for changes to the library's space and services.

Phase 3: Finalize recommendations and proposed next steps (Spring Semester, 2006)
In the final phase of the project, two main tasks were completed: ideas and creative approaches were shared and discussed, and formal recommendations were reviewed. For the former, interviews and external research were used to inform creative recommendations for rethinking the use and design of library spaces and services. All recommendations were presented by KPL in a visually creative and provocative book of "*Ideas and Inspirations*." Initially created as a "tool for thinking" about recommendations and future directions, the *Ideas and Inspirations* book was ultimately adopted as a reporting device for the project. KPL also provided details for governance and ongoing needs for oversight and consideration to successfully implement proposed recommendations.

III. SUMMARY OF RESULTS: SIXTY-FIVE CONVERSATIONS

The comments from faculty and graduate students are as far-ranging as they are idiosyncratic and provocative. But a number of core issues emerged that scholars face as they engage in their research activities and repertoires. There is a predominant interest in the question of space for research, especially physical space and ways that the library can serve as a **stimulating environment** that contributes to intellectual and community life. Ideas about the **evolving resources**, tools, modes of access and forms of assistance offered by the library were also forthcoming. Challenges regarding **interdisciplinary and collaborative research** and its effects on the kinds of resources used and needed were discussed at length. And the **changing nature of scholarly work** (including research methods, resources, and publishing) was of great interest to many participants.

Some major findings, discussed in detail below, were:

- Different and often conflicting descriptions of "ideal work space," ranging from total isolation to social spaces, often depending on the research tasks at hand
- General recognition of the importance of the behavioral aspects of a user's experience with the library
- Growing desire for the library to serve as a "connector of people"
- Differing visions across disciplines on the role of serendipity in research and in the library
- Different expectations for the role of the library and the librarian in terms of assistance and expertise
- Developments in technology allow for new approaches to research, enabling scholars to make connections that would previously have been difficult
- Differing views – across, rather than between, disciplines and positions (faculty or graduate student) – on the role of the library's collection (physical materials and electronic resources)
- Dependence on virtual tools, across all disciplines
- Increased reliance on multi-media resources
- Increased reliance on primary sources as teaching materials, especially for undergraduate instruction
- Expectation of seamless and efficient access to physical and electronic collections and tools
- Lack of awareness of some existing library services
- Changing definition of disciplines and growing dependence on collaboration and "interdisciplinary" work
- Discontent with current publishing processes across disciplines and use of alternatives for posting and retrieval

A. Library as a Stimulating Environment

Discussions about the materials held within the library often become conversations about the library's physical environment. One humanities professor said: "Bobst could aspire to have one of the world's greatest social and intellectual spaces." A common thread is a desire to have a place to study and work that is comfortable, aesthetically pleasing, and welcoming. The ubiquity of the personal computer, and the need for physical spaces that accommodate laptops, Internet access, and other technological devices used by individuals, is also a dominant need. Further, despite the increased reliance on electronic resources, faculty and graduate students remain keenly invested in the idea of space as a productive dimension of their research.

Ideas discussed in this section include views of ideal research spaces, the general role of space in scholarship, and needs for effective interdisciplinary and collaborative research spaces.

1. Differing views of ideal research spaces

People's images of the ideal research space are sometimes modeled on other libraries and community spaces in which they have worked productively and enjoyably: "When I want to do real work, I go to Firestone Library at Princeton" (humanities professor). A predominant image of the ideal library is intimately tied to a traditional view of what libraries have often been: alternately cozy and serious, perhaps with wood paneling, green glassed lamps and quiet corridors. A professor in the social sciences said, "I really like sitting back in the big, comfortable chair… to read." A scholar in the humanities commented, "I'd like a quiet, airy space where I can spread out my work," and a social sciences graduate student stated, "I need windows and space."

The need for a variety of spaces that serve multiple, and at times competing, needs is expressed by a user of special collections within Bobst: "People do use the special collections collaboratively, but it is annoying if you are trying to work alone. It would be valuable to have different kinds of work spaces for those working in groups and those working alone."

2. Role of space in scholarship

Discussions about physical space were often about the role different kinds of spaces play in scholarship generally. For one professor, the library should model the kinds of activities that take place within its walls: "The library is a social phenomenon – I would like to see behavior modeled for me. I like to see people behave in a certain way and then I will feel that I can behave that way." Another commented: "The library should be about humans, and Bobst doesn't give you the sense of human interfaces. A library should provide the human interface to a mode and style of research." A social sciences professor remarked, "I often feel that the symbolic meaning of the space displaces the purpose of the building as a gathering and contemplative place." And a humanities professor asks, "How can the library create spaces that galvanize excitement about research?"

3. Graduate student spaces

The need for spaces specifically designated for graduate student research came up repeatedly in focus groups. A social sciences graduate student remarked, "Graduate students have a separate library at University of Michigan. It would add a lot to the graduate student experience to have a space reserved just for us." One Steinhardt graduate student said, "I often try to study in one of the reading rooms, but it's hard when undergraduates next to you are flirting." A social sciences graduate student says, "I prefer to work at home, but that's mainly because I don't have an actual space at NYU." In sociology, each cohort has a reading room with individual carrels for all of the doctoral students. "I like being wireless, multi-tasking, listening to music, and taking breaks." Another comment, "I like having my privacy, but some implied pressure from the people around you makes you want to work harder." While many travel with their laptops and desire Internet access, another graduate student says: "When I have a serious paper to write, I go to Bobst, turn off my phone, and keep my laptop disconnected from the internet. The isolation helps me work better."

4. Solitary contemplation or serendipitous interaction?

Faculty and graduate students' thoughts on the ideal research space differ greatly: some want solitary contemplative spaces, others need a place to work collaboratively; some prefer quiet spaces free of distraction (electronic or human), while others like the hum of those working around them. The challenge of building spaces that fulfill the variety of personal preferences was captured by a graduate student in social sciences: "Over time, scholars develop idiosyncrasies and rituals and it is hard to create spaces conducive to individual preferences in the library." Among the many who expressed the desire for private, quiet workspace, a social sciences professor commented, "The only real time I can avoid distractions is when I work in my office from 8pm-2am. I need a space that is comfortable, and doesn't have distractions like email or the Internet." Another faculty member in the social sciences agreed, "I want a place where I can go and hide from everyone looking for me."

At the same time, many expressed the desire to work among others, and to have the library serve as a public gathering space and a connector of people with shared interests: "When I'm sick of my office I go to a nearby coffee shop" (humanities professor). Another comments, "In coffee shops, I am surrounded by strangers – I enjoy the socialization of an activity that is normally very private" (humanities professor). And another adds: "The library is a place for meeting others – the interactions in the library are different from those in a café because you are meeting over the scholarly work you are doing" (humanities professor). A professor from social sciences comments, "It can be very stimulating to feel like you are part of a community of scholars."

5. Interdisciplinary connections

Many agreed that the library should develop more spaces for collaborative work, and work areas for scholars interested in similar subjects regardless of their respective disciplines. A social sciences professor commented: "Themed reading rooms that group related fields would allow me to interact with colleagues who might be interested in what I'm researching and vice versa." A humanities professor said: "Experiences that brought me in closer contact with others who are doing similar work would be useful. The University could spend more time trying to create more experiences in common."

While there is no doubt that scholars need and desire spaces that facilitate interdisciplinary research and encourage informal interactions with other researchers, the question did arise in interviews of whose responsibility it is to create such spaces. Some believe that the need for interdisciplinary space lies within the purview of the library, while others think that academic departments and other campus entities are also well suited, or perhaps better suited, to provide the infrastructure needed for inter- and extra-disciplinary scholarship and interests.

6. Collaborative research needs

On research spaces specifically designed for collaborative research, a graduate student in the Steinhardt School says: "Recently I had to work on a group project with two other students – we really enjoyed working in Bobst's group study rooms on the lower levels." Some faculty faulted the library for not providing enough space designed specifically for

group work, an ITP (Interactive Telecommunications Program) professor commented: "The library system so far undervalues the user and the community of users. It's important that there be a flow of messages across the community – so far the individual can access information…but libraries don't do enough for groups." Another professor opined: "The library should move out of the current model that optimizes storage to one that makes sense for group work."

B. Evolving Resources, Tools, Modes of Access

The advent of new technologies, tools, and digital resources is changing how scholars conduct their work, keep current in their field or fields of study, and think about research generally. Moreover, technology allows scholars to make intellectual and personal connections that previously would have been difficult, which in turn compels many to change their expectations for their own research and that of their students and colleagues. It is common knowledge that the practices of scholarly research have changed dramatically in the last decades, even since the end of the last century, and yet librarians and scholars still care deeply about the more traditional roles of the library: collection development, research space, assistance, preservation and access.

What is still up for grabs, then, is the shape academic libraries and research institutions should take given the ubiquitous dependence on electronic media, the need for efficient and timely delivery of resources, and scholars' desire for having what they need, when they need it, where they need it. How, in short, can libraries provide the depth and breadth of resources, tools, and modes of access in the 21st century?

Themes discussed below include the role of physical resources, the broad impact of technology on the research process, the role of serendipity in research, views on services and tools currently offered by the library, and the need for increased awareness of these tools and services.

1. Differing views on the library's physical resources

The ways that scholars use physical spaces and resources (books, collections, assistance, etc.) vary by discipline and by role in the university (faculty or graduate student). One social sciences professor remarks, "Economists just don't read books," and a science professor comments, "Books aren't really necessary in the sciences – papers are much more important." On the other hand, a user of special collections says, "There's something about touching the paper of a letter that immerses you in what you are studying." Commenting on the changes to research resources through technology, an administrator says, "I remember a long time ago when I would go to the library and use an actual book, pencil, and piece of paper to record ideas," implying that such activities have been supplanted by new behaviors. At the same time, professors from the humanities and social sciences especially value traditional library resources, commenting that they "regularly check out books from Bobst." Broadly, researchers expect seamless access to physical resources facilitated by digital search tools. A graduate student in education says: "fifty percent of my library use involves the virtual tools like data

searches and downloading services, and the other fifty percent of my library use involves physical materials like historical documents that don't circulate. I generally don't linger in the library – I access the information I need and then leave."

2. Universal dependence on virtual tools, across disciplines

Scholars are both dependent on and comfortable with the burgeoning array of digital tools provided by the library, so much so that for some, the library is synonymous with virtual resources. An administrator says, "When I think of Bobst, I think of the little icon on my desktop that brings me to the Libraries website." A professor in social sciences considers herself to be a "virtual subscriber to Bobst." The effects of ubiquitous use of online services are multiple: for some library users, the provider of the resources (the library), becomes somewhat incidental or invisible. One professor in the sciences comments, "At first I thought I didn't use the library at all—until I realized that in fact I use it every day to access online journals." For others, the processes of discovery (identifying sources for research, searching activities, and the like) are accomplished online, transforming the library building into a place of "disclosure" – the retrieval of materials already identified – rather than "discovery": "I almost always know what I want before I go to the library – I usually do the research online and just go to Bobst to pick up the books" (graduate student in economics). A humanities professor comments, "I am extremely comfortable accessing resources online."

Scholars use an array of sources to accomplish a single task. The use of online tools for teaching and research is not limited to those provided by the library: "When planning an undergraduate course, I'll use Wikipedia to check dates and facts" (humanities professor). Another humanities professor says, "I find going to the library to be a real hassle – it's so much easier to just order stuff on Amazon." The mixing and matching of electronic tools regardless of provenance is a significant shift in the research behaviors of scholars, and is likely spurred by the multiplicity of resources available. Some scholars see the library as playing a key role in making new tools available.

3. Increased expectation to access physical collections and tools for thinking in new ways

Generally, developments in technology facilitate and encourage interdisciplinary research. A humanities professor says, "It is no longer enough to spend time studying one particular text deeply – with current resources, it's much easier to follow trends and 'leads' across a wide variety of texts. The possibility that one could examine a reference across many different texts has led to the expectation that people will do it."

The expectation that scholars will expand the purview of their research because of the availability of technology and resources leads them to expect new things from library services, tools, materials, and forms of organization as well. A humanities professor comments, "As departments change, there no longer will be a way of thinking that can be easily associated with a set of books. There needs to be a new procedure for determining what stays in the stacks and what doesn't."

Even more pronounced is many scholars' sense that they are missing key resources as a result of the vast array of options, avenues, and tools available to them. A social sciences professor reports, "I get so overwhelmed by the information that's out there – I could never be comprehensive enough to read everything on a given topic. I'm much more inclined to just use the one or two books in my office as representative of others." A graduate student in the humanities says, "There's a gap between technological innovation and what's available online, and my knowledge and skills in accessing it. I'm constantly worried that I'm missing something." Even when scholars are confident in their ability to access all the materials they need, they can still get overwhelmed and be unable to keep up effectively: "The issue of 'information overload' is huge today in my field. I hear from 99 out of 100 people, when asked whether they saw a particular article, that they saw it but didn't get a chance to read it" (Sciences professor).

4. Different visions across disciplines for the role of serendipity in research and in the library

Stacks browsing, a traditional staple of the discovery process in research, is one of the most beloved and discussed activities. The introduction of electronic resources and tools into libraries has made the question of serendipitous finding even more crucial. One ITP professor comments, "Serendipity is a critical reason why libraries should never lose their books. Besides that, the only other reason is the smell of old books." A humanities professor concurs: "It's a wonderful thing when professors' eyes are caught by the spines of books." A graduate student comments: "I really want to keep the wonderful stacks so you can find books by proximity. Even if all of the library's collections were online, it's always better to scan the books in person." Some researchers also value browsing in special collections: "When walking through special collections, it is always nice to have the opportunity to walk through exhibition space to provoke new thinking." Another user of special collections comments: "When you actively look at the spines of books, it gets you thinking in very creative and innovative ways. When special collections are locked, you can't have that same experience."

Though researchers value digital tools, some do not believe that they can take the place of traditional forms of browsing: "There are obvious benefits to a digital library, but it is hard to replicate the serendipity of standing in front of a physical bookshelf, looking to see what catches your eye" (science professor). A social sciences professor comments, "I do a few searches on BobCat just to know the physical area in Bobst where I should browse. I don't know if that browsing experience could ever be replicated electronically." A graduate student in the sciences asks, "How can we replicate online the experience of browsing a bookshelf?" Even the invention of a perfect online browsing tool, according to some, would not be satisfactory. Criticisms of electronic discovery tools range from their incomplete results to formulas for ranking materials. One social sciences scholar comments: "Electronic search interfaces will never mimic serendipity – they produce only the most popular results of searches."

At the same time, it is less necessary, and even less practical, for some researchers to physically browse the stacks of the library due to the multiple tools available for discovery and researchers' busy schedules. A professor in the social sciences says,

"When I was an undergraduate, I would go to the library and browse to find books serendipitously. With Google, I no longer need that – it's much better to use Google than browse the collection." A social sciences professor reports: "I rely heavily on online journals, and access them through the Libraries' website, but I don't usually go to the library itself." Another social sciences faculty member comments, "I don't usually take advantage of the browsing function of the library because I'm usually in a big rush when I actually make it there." Some researchers believe that electronic tools such as Google provide more serendipity than actual physical browsing (sciences professor): "There's a greater chance for serendipity with Google than at the library – how can we Google-ize Bobst?" A social sciences graduate student is satisfied with online tools available for discovery: "I can experience the 'serendipity factor' just as much online as I can from picking up books on the shelf I didn't know would be there."

5. From serendipity to book delivery

The many discussions of serendipity and browsing allowed interviewees to move beyond any nostalgic memory of behaviors since supplanted by busy schedules and electronic alternatives, and into areas of need that are not fully satisfied by current services and tools. Many researchers have specific ideas about the services they would like to see provided by the Libraries. A graduate student in the social sciences thinks "it would be great to have books delivered – and to not have to go all the way back to Bobst to return them." And a professor in the sciences comments, "It would be great to be able to 'package' sets of books based on different topics – I'd love to see a list of quantum physics books that a computer scientist thought were valuable." An ITP (Interactive Telecommunications Program) researcher wonders about new ways of evaluating and vetting sources that draw on the knowledge and expertise of those who use them: "To what extent have library resources…been made artificially scarce… requiring special skills to access them? We don't get to the landscape of opinions about the books. What is authoritative, some library classification or ratings by peers?"

6. Some dissatisfaction with user's experience of current tools and services offered by the library

The rapid growth of online resources can create some anxiety and frustration for scholars, who struggle to keep current with their fields. It also leads to increased expectations that the library should provide clear and comprehensive access to all that is available. These expectations challenge libraries to improve their services, tools, spaces, and resources. "When I walk into the library, I don't know where to turn for assistance. The entrance is just too overwhelming," comments a social sciences faculty member. A humanities professor remarks, "As scholars increasingly depend on a broader range of resources, the library should focus on determining the accuracy and depth of databases and tools." Another researcher comments: "I always get the sense I am losing something when doing a BobCat search" (social sciences graduate student).

The concern that researchers are not finding all that's available to them is pertinent to users of special collections as well: "There's an anxiety about the amount of materials that have not yet been categorized online. Users don't know what's there so they are less likely to take advantage of the collection." Gaps in the physical and electronic collections

also frustrate researchers at times, compelling them to look elsewhere for research support. A humanities professor says, “If the library had every single book I needed, I’d use it more – but since it doesn’t, I’ve stopped thinking about it as a primary resource for information.”

7. Lack of awareness around services the library already offers

Researchers’ desire for more and different services, tools, and spaces at the library is coupled with some lack of awareness of what the library regularly provides, revealing a need for better marketing and advertising of services, and clearer targets for improvement. A humanities graduate student says: “There was a recent gift of a large library of Caribbean literature. I found out about it by accident and it makes me wonder what else I’m missing.” A professor from the social sciences reports, “I didn’t realize there was a tool offered by the library to help me keep a bibliography while I do my research.” A humanities graduate student comments, “I didn’t realize there was a librarian for the business collection – I have struggled to find the right resources and would welcome help in the area.”

A humanities professor comments, “It would be nice to have a more regular mechanism for professors to communicate with librarians,” even though the regular duties of departmental liaisons and subject librarians include communicating with faculty. A number of other methods of speaking with librarians exist, including email, instant messaging, and phone. A social sciences faculty member says, “I would like librarians to introduce themselves formally to classes of students.” Librarians regularly visit classes and offer workshops for the University community.

C. Interdisciplinary and Collaborative Research

The increasingly common practices of interdisciplinary and collaborative research across the University present special challenges to how researchers conduct, and expect to conduct, their work.

Ideas discussed below include changing definitions of disciplines, and the growing popularity and need for collaborative and interdisciplinary research.

1. Changing definition of disciplines

The phenomenon of interdisciplinary and collaborative research presents special challenges to the library, as well as opportunities for rethinking how best to organize and make accessible a variety of resources and tools. Examples of the interdisciplinary research of NYU scholars include the following:

> “My work is very interdisciplinary – it spans engineering, visual neurobiology, perceptional psychology, and applied math….” (Sciences professor)

> "My research is very multi-disciplinary and far-reaching. I have had to stretch and learn about finance and banking, areas in which I had very little experience and expertise." (Humanities graduate student)

> "If you work in an interdisciplinary field like Middle Eastern studies, where each field has a different set of required methods and materials, it's hard to navigate between them." (Humanities professor)

> "I am trained in philosophy and my work is extremely multi-disciplinary. I primarily study how information issues like intellectual capital, privacy, and the accessibility of knowledge affect society today. I am currently running a series through the law school." (Humanities professor)

> "My topic draws on many different areas of study – Caribbean history, financial and economic history, banking and finance, and the history of slavery – I rely heavily on primary sources for my information." (Humanities graduate student)

As a result of the range of subjects and questions pursued, the library must adapt to new ways of thinking as well. A scientist says, "With increasing opportunities to work across disciplines, the way resources are organized in a library will need to be drastically changed (e.g., it would be useful if a search for a book led to a serendipitous discovery of a related book, but in a different discipline)." A humanities professor goes further, suggesting that innovative forms of organizing resources in the library can influence the University's understanding of how to best support cutting edge scholarship: "The library, traditionally oriented to the structure of departments in the University, will need to change to support an increasingly interdisciplinary world. The library can help define the way the new University is organized."

2. Growing dependence on collaboration and interdisciplinary work

Collaborative research, taking place across the University and involving a range of scholars – graduate students working with faculty, campus research groups, and colleagues around the country and the world – can leave researchers struggling to find the best ways to have informal meetings, conduct research effectively, share ideas and resources, and present work publicly. Travel and event logistics, as well as maintaining substantive discussion around busy schedules and across distance, all challenge researchers and the research infrastructure available to them. Examples of collaborative research relationships include:

> "Most of my collaboration with colleagues and fellow scholars revolves around planning events, not actual research" (humanities professor).

> "Collaboration to me means walking down the hall and chatting with colleagues" (social sciences professor)

"I spend about half of my time collaborating with others, especially in virtual spaces – some of my colleagues are in England and California, making it difficult to meet face-to-face" (social sciences professor).

"I frequently collaborate with other researchers on my floor because we are so physically near each other" (sciences professor).

"I collaborate with others and that is the norm for my discipline. It is becoming more and more unusual for faculty to work on their own" (social sciences professor).

Some of the strongest professional relationships I have are with people I met while working at special collections – without the special collections space to bring us together, we may have never collaborated" (special collections user).

D. Changing Landscape of Scholarship

Scholars have broad and imaginative ideas about how libraries and librarians can best support research in the humanities, social sciences, and sciences. Many of these ideas are influenced by commercial endeavors outside of academia. Some ideas, though, come from an appreciation of the roles librarians have traditionally played while facilitating the scholarly process. The library's rapid adoption of technology, and its substantial role in developing innovative research strategies and technologies is also a factor in scholars' ideas of the role of the library in scholarship.

Subjects discussed in this section include: expectations of the library and librarians, current publishing processes and alternatives, and the use of multi-media resources and the role of the library.

1. Different expectations for the role of the library and the librarian

One scientist sees the future role of librarians as "aggregators, playing a Yahoo-esque role in creating large, universally accessible, hierarchically ordered lists of links; or as administrators and facilitators of scholarly journals and conferences." A humanities professor says, "Libraries can now provide both research and work space more easily (as space needed for physical materials is reduced). Findability of books is in some ways easier as well."

The many roles played by librarians – as teachers, subject specialists, curators, and technologists – contribute to researchers' high expectations of librarians, and to the difficulty of identifying the core priorities that best serve the most people. A humanities faculty member comments, "The effort that used to go into categorizing and shelving books should go into helping people learn how to use the new tools." A user of special collections says, "I've seen people sitting at the front desk who have helped curate exhibits – because they know the entirety of the collections, they are able to help scholars understand what they are studying in new ways." Some have very positive experiences

when they seek assistance and research support: “I love working with my department’s librarian!” (Humanities graduate student)

Nevertheless, the often proprietary nature and specificity of much research can hamper researchers' expectations of the role librarians might play in research assistance: “I am skeptical that a librarian would actually be able to select a set of books that would be more useful to me than one selected by another computer scientist.” (Sciences professor) Additionally, some researchers experience inconsistent results when seeking assistance: a humanities graduate student says, “I have tried getting assistance from librarians while doing my research – but I haven’t found their services very helpful. I often feel the suggestions of librarians are too broad;” and a Steinhardt graduate student reports, “I was taught to use the services of librarians, but they each have different personalities so I’ve had varying experiences.”

2. Discontent with current publishing processes across disciplines (slightly higher in the sciences) and use of alternatives for posting and retrieval

When it comes to disseminating the results of research, scholars can feel frustrated by aspects of academic publishing – long lead times between submission and publication, limited venues, high subscription fees, and copyright regulations – compelling scholars to pursue, or at least wish for, alternative forms of dissemination (pre-print services, online journals, new standards for peer review, and more). A professor in the social sciences says, “Publishing in my discipline is very slow – it has taken about eight years for me to get a paper published, starting from the day I began writing. I have started using online tools to post articles and find other colleague’s articles…I use repec.org to get feedback on early versions of my papers.” A scientist comments, “I feel long-term resentment toward publishers – academics are the most lucrative arm of publishing. Physicists are…starting to establish new, free, online journals.” A graduate student in the sciences says, “An open publishing process, where papers are successful or not based on voluntary peer feedback, would better support my needs.” Even administrators weigh in: “It’s much easier to create new online journals given the dependence of scholars on the Internet. All you need to do is convince your community to serve as peer reviewers.”

3. Increased reliance on primary and multi-media sources

Archival and multi-media sources play an important role in research and teaching for faculty and graduate students. Some archival sources are digital, while others reside in more traditional archives and special collections at NYU and elsewhere. The heavy use of primary and multi-media sources requires scholars to know how to find the right materials – which is often difficult due to the fact that some archives do not publish full catalogs of holdings, and because digital archives do not appear in many search engines – and use these materials effectively. NYU’s special focus on the arts only adds to the need for improved ways to access multimedia sources: A humanities professor says, “I would really like to have even more of the Avery Fisher [media center] collection digitized and accessible via the web."

Use of special collections is also on the rise. A user of the Fales collection says, “I love the thrill of discovering something valuable.” A humanities professor comments, “I would love to be able to express to undergraduates the excitement of discovering things in [the] Tamiment [Library].” A curator in special collections reports, “There are a few classes now that take place in the archive, where students are required to use the materials to draw conclusions and develop ideas.” “Special collections are increasingly being used as a teaching tool – professors are using them as quasi textbooks,” adds another curator. A graduate student concurs: “I use the archive to give undergraduates access to primary sources.” An administrator comments, “PhD students do behavioral research through lab experiments and questionnaire-based studies, and some use archives of behaviors on the Internet.”

IV. LITERATURE REVIEW

A literature review performed by NYU librarians in collaboration with KPL also informed the study. The literature review committee deliberately chose to extend the review beyond the library literature and into other disciplines, including the social sciences, business and technology. The review identified trends about how researchers work across the spectrum of digital and physical resources; changes and innovations in virtual and real spaces; new teaching strategies and learner expectations; best practices in libraries and the commercial sector; and new technologies and trends that could either impact or be applied to the research library.

Four themes emerged from the literature review:

1. Evolution of research strategies
2. Changing teaching expectations
3. Latest practices in libraries and patterns of space
4. Changing tools for thinking

Within each theme, the literature review identified a range of topics, issues, trends, research, best practices and new technologies that complemented the results of the interviews. The four themes and their respective findings are summarized below.

A. Evolution of Research Strategies

In a world of ubiquitous computing and ambient findability, users need a “total” research experience regardless of location. Libraries need to support scholars as they create digital research – from development through making their research accessible. Libraries do not function independently from the goals, mission, and structure of the University. As the institution redefines its core priorities, the library may need to reorganize to mirror and support these changes.

Themes discussed in this section include: perceptions of authority and expertise, the needs of interdisciplinary scholarship, networking and social communication, the future of Google and other non-library enterprises, and developments in hardware and technology.

1. Changing perceptions of authority and expertise

New questions surround libraries' credibility regarding building effective physical and electronic collections and providing adequate staff. Some of these questions may have to do with a rising movement of "cost-effort credibility," i.e., people tend to value information differently based on the ease of access to the information and whether a subscription/fee was necessary. Fee-based material is considered to have more value than information from free sources. Additionally, there is a general feeling that social bookmarking, recommendations, user reviews, and general critical mass add credibility to information. At the same time, there is growing trust in personal preferences.

2. Research into trends in increasing "interdisciplinary-ness"

As scholars populate the Internet with high-quality resources for accessing information, they are customizing and bringing clarity to the part of the "digital blur" they know best. Libraries can create meta-indexical resources to provide the necessary connective structures for context-rich access to research materials and improve researchers' ability to navigate and work in an increasingly complicated scholarly communication landscape. Librarians can also create tools to aid in the analysis of large textual datasets, e.g., indexing, annotating, text analysis/comparison. In other words, ambient findability is a "world in which we can find anyone or anything from anywhere and anytime."

As interdisciplinary programs help universities increase their definition and distinctiveness, new areas of specialization are also emerging. Scholars are creating new networks of research materials and collegial support in the digital realm as they search for information, collect research materials, and consult with other scholars. Scholar-created resources will require research libraries to take on added responsibilities in at least three areas: 1) technical support for scholars; 2) collection of scholar-bundled materials; and 3) metaindexing of resources. There is also a need for more systematic ways to identify potential collaborators and help scholars communicate across departments, schools, and initiatives. Libraries have the opportunity to create databases that facilitate the finding of collaborators and scholars who share interests.

There are many ways that scholars are working interdisciplinarily. For example, they can mix working with both digital and analog media. Many interdisciplinary scholars and scientists probe outside their core research area for information that is intellectually distant or from unknown sources. This kind of serendipitous discovery is usually done through exploration of bibliographic databases and more general Internet searching. There are difficulties adapting to the vocabularies and cultures of a scholars' non-affiliate disciplines and the problem of "acculturation" in non-affiliate disciplines. Where scholars were once required to know about the relevant preceding work on their research topic, they may now be expected to identify patterns or themes in a body of texts with which they have little background. Internet access is highly valued by researchers across

disciplines, and a variety of resources are heavily used, primarily for four research activities: confirmation searching, discovery searching, collecting, and consultation. For many humanities scholars, key primary and secondary materials are central sources of evidence, and research is conducted through interaction with these materials. Humanities scholars prize their own personal collections of research materials as well as the library collections at the institutions where they work. Personal collections are a necessity for humanists since rereading is a significant part of their interpretive work. Any number of texts may require periodic or systematic reading, and some may be read for years or decades.

3. Nature of search tools

The research processes of life scientists often involve tools that are the simplest but with the highest expected utility. Many researchers are generally satisfied with search tools that require little cognitive effort in search and retrieval functions (PubMed, Google). Researchers seek new resources to supplement those already in use only when necessary, and rely heavily on tools introduced to them in graduate school. Many also seek the "artifact" and generally prefer the PDF form, rather than HTML, printing articles to create a "local information ecology" for the research project, lab, etc. Individuals in all disciplines are using personal bookmarking for individual retrieval of favorite websites.

4. Sociology of connected societies

The Internet presents tools for continual engagement, especially when real physical contact is not possible (e.g., post-midnight). People who are well integrated into their physical communities report finding a sense of community online as well, through "digital bonding." The digital world also offers "belonging" to those who don't belong. Youth are very engaged in digital communities as opposed to civic "in-person" communities, while older people are engaged in both kinds of communities. Will the situation for youths change as they age or is this an emerging trend that can be applied for future scholarly practices? At the same time, web interactions are not "anchored" by gender, age, or race – they are more free-floating. People are extending their webs of personal relationships to include cyberspace.

Cyberspace, or the cybercity, uses terminology (e.g., plaza, home) that offers both spatial codes and markers for appropriate social behavior. Blogs, as part of the cybercity, can be mined to identify emerging interests and communities of practice that are useful to researchers, especially those whose interests are specific and outside of traditional disciplinary concerns. The long tail – the phenomenon by which a critical mass of objects makes it possible for the least popular, used, or known to be discovered and used – is privileged online. If independent cyber communities begin to thrive, traditional collective social capital may be diminished.

5. Future plans of Google, the Internet Archive, and Wikipedia

As the web increasingly becomes both an interface and an infrastructure, there will be more desktop applications moving to it and more aggregation of information, data, and content. Users will want to locate, use, reuse, fix, and remix loose collections of applications, content, and data available on the web. And users will contribute value and

content to these tools – co-creation will become common. In short, users will expect to *do things* on the web, in addition to just visiting websites. Wikiversity and Wikibooks are open source textbooks and examples of digital resources that benefit from the value added by users. These objects are continually transformed through use, and as such have content that is neither fixed nor stable.

Google, Amazon, and others are already creating an analog to the reference interview, employing user profiles to identify information needs and thereby facilitate access and participation. But there is a paradox in user behavior – even as search and retrieval systems become increasingly sophisticated, users still prefer Google.

6. Developments in hardware

As mobility rises for users, hardware is getting smaller and smaller. Users increasingly require flexible space. Digital environments should be created that replicate the way print scholars use traditional tools and texts (e.g., side-by-side screens to compare versions). There are more "digital lockers" being used, allowing users to store and retrieve favorites and works or ideas in progress. Generally, environments are experiencing "ubiquitous computing" with the development of networked, embedded, and wearable technologies, and smart objects. What are the implications for the library?

RFID (Radio Frequency Identification Devices) tags and cell phones represent a trend of receiving information from "attentive objects." Technology is blurring the work-life perception of the world and corresponding boundaries between professional and personal. It becomes important to integrate real-time communication and collaboration tools from the web with those of the physical library. Interactive floors at some public libraries, for example, create a new attraction in the physical library by creating a place where people may playfully meet and interact with digital materials. Visitors may post and reply to questions displayed on the floor and then interact with the contents. Other integrated virtual library spaces could include blogs, wikis, web conferencing, webcasting, and podcasting. Tools created to support scholarly communication should represent the varying and vital ways researchers gather and use information, not reestablish some minimal number of successful disciplinary constructions.

Examples of mobile social software apps can be found at:
http://www.elasticspace.com/2004/06/mobile-social-software.

In the realm of social bookmarking where users make public the digital resources they find most valuable, users are making computing visible. People, then, are being transformed into UFOs (ubiquitous finding objects) and "attentive objects" that convey information, thereby turning every moment into a learning opportunity. Attentive objects can distill information into "gems of knowledge" and information can be sent back to storage devices (e.g., cell phones).

B. Changing Teaching Expectations

For most students, teaching supported by technology seems commonplace. They feel comfortable using new tools in the classroom and communicating with fellow students. Successes in distance learning can provide important insight for librarians as they increasingly support scholars working outside the library. Additionally, corporate training methods may serve as a useful indicator of new trends and tools in learning and academic research settings.

Themes discussed in this section include technology, teaching, and the virtual classroom.

1. Technology and teaching

Like teenagers, undergraduates live with abundant technology and networks. Course management systems (CMS) have had positive affects on students – these experiences translate into positive feelings about the role of technology in learning. Participants in technology simulations learn the most when they are constantly mentally active and make discoveries for themselves. Simulations also suggest that successful learning also takes place through collaborative environments and that knowledge is situation specific and context dependent. Students look to technology for convenience and to easily connect with others. Students are comfortable with a core set of technologies and less comfortable with more specialized applications, viewing technology in the classroom as supplemental to their course experience, not as transformational. Technology permeates all aspects of student life, but its use as a tool has become paramount – it facilitates student communications and academic feedback.

2. Best practices of the virtual classroom

Even if courses have face-to-face components, many are "blended" with some online aspects. Good instructional design is key to successful "virtual instruction," and teaching in an online environment requires more preparation time for both teachers and students. Developing partnerships with outside experts and other faculty is important. Current educational technology is flexible and should be combined in an "integrated mix" to create successful distance learning. Both interactivity and communication are central, as online learning is a social process. Support services (including technical support) must be available; self-pacing for students is important; and instructor feedback is still a necessary component, especially around performance and evaluation.

E-learning and corporate training strategies are increasingly being used in universities and governments. Major factors to consider in e-learning include cost considerations, reaching large-scale groups, and reassessing people's relationships with learning and information. Successful educational experiences largely depend on matching a course's educational values to the educational values of the students.

C. Latest Practices in Libraries and Patterns of Space

With libraries serving as more than book repositories, the use of space expands to support collaboration and social interaction as well as "technology-enabled" study spaces not available elsewhere on campus. Users' expectations for the space and services of a library are heavily influenced by commercial ventures, both physical locations and online tools and services. The library needs to anticipate these expectations and experiment with ways of addressing them. The experimentation by many retailers and other commercial ventures is developing new ways to merge the best of the offline and online worlds into a unified service. Learning from some of these experiments could radically improve the usability of the library.

Subjects discussed below include: usable spaces and tools, commercial practices in non-commercial settings, technology in museums, culture and consumers, and space in service organizations.

1. Usable spaces and tools

Usable spaces are key—these can include gathering spaces, collaborative spaces, information points, cafes, computer centers, etc. The library should plan for more group study rooms than they think is necessary as collaborative learning has become more popular, and even required in some fields. Library users prefer using tables equipped with outlets and Internet connections. Tables may need to be resized to make best use of space—in general fewer people occupy a table than there are chairs at the table. Tools that can have an impact on how space is used include handheld devices (phones, i-Pods, etc.). Secure study rooms (both single and group) are also popular.

2. Commercial best practices in non-commercial settings

It is important to maintain a streamlined supply chain where there is a single source for electronic operations (the California Digital Library is a good example). Commercial best practices suggest the value of having a coffee shop in the library, more learning space with video screens, additional meeting spaces for groups (book clubs, knitting groups, etc.), programming such as book signings and speakers, and space(s) for movie screenings. The library could also implement "Everyday Accessible Scholarship" (like "Everyday Low Prices") as a way to ensure they are constantly thinking about what their users want, as well as look at their 'bottom line' to prioritize opportunities. IT solutions may offer money-saving options to common problems. Commercial websites can provide new ideas and marketing strategies for library organizations.

3. Understand technology driving trends in museums

There is an ongoing debate as to whether museum websites should provide general information about the museum, or actually provide a virtual museum. As a result, museums are increasingly using websites that change automatically depending on user preferences and content-based filtering (using input from users) and collaborative filtering (using information from other users with similar interests). New websites that

can actually create virtual museum environments and tours (Virtual Reality Modeling Language – VRML) are gaining popularity, and new Bluetooth-based PDA software is improving user experiences in museums.

4. How culture is empowering consumers

The Internet is a starting point for information and it informs users before they actually make decisions. Likewise, retailers are researching requests of consumers and using that information to prompt their responses. At the same time, buyers are prompting market processes and defining communication content, a phenomenon that actually provides sellers (the information providers) with data about who is interested in buying what content (e.g., confetti.co.uk – knows who's getting married before they walk into the shop).

5. Patterns in new uses of space and best practices in service organizations

Stop & Shop, a chain grocery store, is now offering a wireless touch screen computer attached to a shopping cart called a "Shopping Buddy." There are also increasing numbers of projectors, mirrors, and software that can turn any retail store into a virtual, interactive touch screen. More "personal shopping assistants" are being used to harness RFID tags and global positioning system technology to alert customers to promotions and personalized discounts as they walk through the aisles. Expert kiosks connect live to a video enabled screen. Electronic advertising displays help customers find their way around stores and provide detailed information through videos and animation; information terminals provide comprehensive information covering various aspects of store levels; and staff have PDAs for constant contact with customers. The Norwegian School of Management's (Sandvika, Norway) new building is like an open town where students can look up, down, and sideways to see activity, with spaces that contain terraces, galleries, nooks, and quiet areas. These are examples of how technology and physical layout and design are changing the way people find what they are looking for.

D. Changing Tools for Thinking

Libraries need to take the opportunity to support users as they become increasingly engaged in social classification applications and communities. By moving beyond traditional classification retrieval mechanisms to mine the rich data libraries themselves have created, libraries can allow users to gather, remix, and create new scholarship. Libraries should support the integration of various "sources/databases" and take advantage of new tools for visual representation and concept clustering to assist with scholarly research. Developments in web technology (Web 2.0) now allow for increasingly powerful and flexible tools. Libraries are already experimenting with ways to put these improvements in technology to use, and should continue with these efforts of innovation.

Subjects discussed below include online social tools and practices, intellectual property, unified search interfaces, and Web 2.0 innovations.

1. Social classification, folksonomy, and tagging

Social bookmarking is on the rise, allowing individuals to create personal bookmarks, use classification systems based on keywords and tags, share their work, bring visibility to the collections of others, and browse the bookmark space of others. Social classification systems reflect the values of a community of users and represent a shift away from formal taxonomies. These new tools simplify the distribution of reference lists, bibliographies, papers, etc., but raise the question of how best to integrate the new tools with existing classification systems.

As users create personal playlists and image collections, they also informally create bibliographies, share information, and find information. By reusing text from other users and presentation materials, the tool, Shared Text Input, makes note-taking dramatically easier, especially on small devices. CScope is an application based on collaborative filtering of shared notes.

It is expected that mobile blogging and photoblogging use will expand, especially through commercial applications (e.g., Nokia's Lifeblog and ShoZu that allows people to send their mobile photos to their own Flickr site). Some potentially interesting projects/sites include: Yellow Arrow http://yellowarrow.net/index2.php where users can post yellow arrows in places, include information, and have that information accessible to others who see the yellow arrows; H20 playlist http://h2obeta.law.harvard.edu/69447, a shared list of readings and other content about a topic of intellectual interest; Dogear (enterprise-wide bookmarking system at IBM), Odeo http://www.odeo.com, where users can share and record audio directly from the website, PennTags, http://tags.library.upenn.edu/ (user initiated "tagging" of catalog records); and community building/information sharing tools developed by FXPAL. (Shared Text Input allows networked users to share notes and text across laptops and PDAs such as PocketPCs and Palms).

2. Intellectual property and mass digitization

Questions of intellectual property rights and copyright infringement are increasingly on the minds of librarians and scholars alike. Various organizations have filed separate lawsuits against the Google Print Library Project. Unexpected collaboration and partnerships between companies and groups are emerging in response to the copyright debate, and so are Google competitors. For example, Yahoo and Open Content Alliance announced a project to scan works in the public domain. Microsoft will also join OCA but will make books available in its own book search engine. Through outreach and education, libraries have an opportunity to help scholars understand the ramifications of these issues, as well as the scholars' own intellectual property and publishing rights.

3. Science of self-governing networks

Characteristics of self-governing networks include knowledge-based learning organizations, shared learning and collaboration, and organizational structures that are flexible, non-hierarchical, and network-based. This means that workers have links to multiple communities that transcend traditional organizational boundaries. The self-

governing structure is based on a model of natural leadership by emergence, self-correction, and new ways of motivating a global network of knowledge workers.

4. Mining, tracking, and "re-publishing" personal resources

The intent of the now defunct Media Lab Europe was to explore human relationships and how they are mediated by technology. The focus was on "shared experiences" via technology. They used the RAW tool, a digital still camera and digital stereo audio recorder that captured one minute of sound before and after a picture is taken. The tunA project allowed users to share their music locally through handheld devices. Mobile social software applications are another example of this trend. Important websites include: http://www.elasticspace.com/ and http://www.elasticspace.com/2004/06/mobile-social-software.

5. Technical efforts to build unified search interfaces

Many users expect search retrieval mechanisms to be "Google-like," but there are other innovations that use "relevancy rankings" for results and "concept clustering" to organize search results into topical clusters. "Endeca," an online catalog tool indexes and reformats data from the NCSU catalog, making it more useful and readily available to patrons. Visual tools are also being used for the concept clusters. For examples see http://library.stanford.edu/about_sulair/special_projects/stanford_grokker.html and http://www.kartoo.com/.

Additionally, library portals are no longer single technologies, but combinations of several systems, standards, and protocols that provide a single user entry to a variety of library services and content. Features include metasearching and result set management. Deep web content is information in databases, multimedia files, and non-HTML file types such as Word. Some web search tools specifically target deep web content. A mashup (Web Application Hybrid) is a website or web application that seamlessly combines content from more than one source into an integrated experience (http://en.wikipedia.org/w/index.php?title=Mashup_%28web_application_hybrid%29&oldid=44321456).

Partnerships forming between sources of scholarly content and commercial providers of access/retrieval include Google Scholar, Google Print, OpenWorldCat, and A9 (Amazon). OpenSearch is a set of simple formats for the sharing of search results. Any website that has a search feature can make its results available in OpenSearch™ format (http://opensearch.a9.com). Other tools can then read those results.

6. Web 2.0 (and by analogy, Library 2.0)

Web 2.0 permits the building of virtual applications, allowing data to be manipulated by users. Architecturally flexible, modular applications can be inserted into various sites to facilitate communication and community, and enable remix and greater use of more obscure and unknown sources. Libraries have the opportunity to push their content, services, and expertise out to places that are designed according to Web 2.0 principles. They can also be path-breakers by integrating Web 2.0 features into content meant for scholarly use.

V. ANALYSIS: FUNCTION OF THE RESEARCH LIBRARY

In analyzing the comments from interview and focus groups with faculty and graduate students across New York University, and in taking into account the comprehensive literature review, it is possible to identify trends from the world beyond NYU that inform the key functions of the research library. Part 1 of this section analyzes the comments heard in interview and focus groups in terms of how project participants define and imagine the role of research library, and in terms of the impact of key trends taking place beyond the library. Part 2 presents highlights from the KPL-created *Ideas and Inspirations Book*, a tool for thinking creatively about the future design and scope of the research library.

A. The Role of the Research Library in Scholarship: Themes from Interviews and Key Trends Beyond the Library

Though diverse in substance and theme, interviews with faculty and focus groups with graduate students provided rich data for the 21st Century Library Project. In analyzing these data, three main themes emerged: 1) unfettered, seamless, and comprehensive access to library collections and other research materials, regardless of provenance or media (books, articles, archival materials, film, video, audio, etc.); 2) the importance of physical and virtual spaces for both contemplation and research—spaces that are intuitive, efficient, convenient, and in proximity to all resources necessary for the diverse tasks of scholarly work; and 3) the role of the library as a gateway and connector to the world's resources.

At the same time, the conversations with faculty and graduate students were not strictly limited to issues related to the library. Further, the literature review undertaken by the 21st Century Library project team and KPL provided context and depth to many of the ideas expressed by faculty and graduate students. Key trends taking place in the realms of technology innovation and consumer culture have a great if often invisible impact on the expectations, comfort levels, and perceptions of library users.

In this section, themes of access, space, and the library as gateway are discussed in light of the broad range of possibilities and questions that surround the role of the library in scholarship taking place inside and outside the library's physical and virtual confines.

1. Access to information

Library collections and the work of the university

Interviewees value convenience, specialized collections, and access without restrictions, despite highly personalized and often idiosyncratic research needs and interests. Users expect to be able to find any book, article, or multi-media resource and are discouraged

when they cannot do so easily. Scholars, particularly in the sciences, depend particularly heavily on access to works-in-progress and informal interactions with colleagues (conference proceedings and grey and white literature). Users at and beyond NYU expect instant gratification, so much so that when financial resources are available, users, especially faculty, prefer to buy the books they need. Further, increased numbers of public and private partnerships committed to the digitization of "all the world's knowledge" (e.g., Google Books and Google Scholar) thereby making it more and more possible for users to expect, if not obtain, full electronic access to anything they want to read, view, or download. Some researchers active in discussions about copyright law attempt to publish in open-access journals so their work will be more widely accessible.

Expert and thoughtful cataloging of collections for disciplinary and interdisciplinary research

The challenge of finding everything needed for a project is exacerbated by the wide occurrence of interdisciplinary research, a phenomenon that compels researchers to search beyond their home disciplines where journal titles, authors, and even search terms may be unfamiliar. Physical books are insufficient to support changing expectations of users, as evidenced by the frequent use of free access to online journals. Major analogous libraries beyond NYU are in the process of making major portions of their collections available online, and common use of Barnes & Noble and Amazon.com change perceptions and expectations of how collections are accessed and organized.

Assistance with navigating research resources

Many users do not take advantage of the library's full array of services for a multitude of reasons (e.g., convenience, or lack of awareness). Individual users are generally adept at searching for materials but would benefit from additional expertise. The need for assistance is often immediate—precisely at the moment a challenge or obstacle arises, and not before. The changing role of librarians requires them to serve as mediators of information overload, and to provide assistance no matter where a researcher needs help or when he/she needs it.

Diverse collections of the old and new; long-term preservation

The frequent use of Amazon.com and similar services has made users dependent on the ease of ordering books and having them delivered directly to an office. At the same time, there is less interest in the physical medium of the book than the content in it. Interviewees' preference for electronic resources – from tables of contents to individual chapters – supports this fact. Libraries across the country are increasingly interested in storing books at offsite locations where materials are housed and preserved. Only a minority of libraries undergoing major physical renovations aim to increase capacity for books and other physical media. A more common occurrence has libraries considering ways to increase virtual use and space, and taking head-on the challenges of long-term preservation of digital media.

Supporting serendipity in the discovery process

Some users perceive "serendipity" as the remaining virtue of the physical library as compared to online tools. Others view multi-dimensional serendipity, a product of online

sources, as much more powerful than the traditional "uni-dimensional" experience. Rapid advances in search technology allow for better results, and for deeper connections made between materials. Better records of individual preferences enable personalized service and search functions, creating opportunities for libraries to provide new forms of evaluating and returning search results. Efforts are underway to make better sense of content during searches (e.g., searching patterns and images themselves, rather than associated text).

Promoting information literacy
Many professors express concern that the research methods of students are undermined by new kinds of technology that threaten academic rigor (e.g., students develop a heightened reliance on convenience). With libraries and librarians changing, they wonder, who (in the place of librarians) will become the authenticators or arbiters of information? The nationwide rash of plagiarism and online "plagiarism watches" confirm this concern, while changing definitions and methods for establishing reliability and credibility of sources occur as a result of sites like Wikipedia (sites that are increasingly popular, though not always effective, scholarly sources).

2. Physical and virtual space for contemplation and research

The 'Library as Place' for gathering knowledge and for contemplation
Interviewees repeatedly mentioned the nearly universal trend of doing "real" work outside of the library. The real work, they say, tends to take place in private spaces (e.g., home office), public spaces with built-in anonymity (e.g., coffee shop), or *other* libraries altogether. For many users, using NYU to *gather* rather than *produce* knowledge is currently inconvenient for the "daily rhythm," but generally still desirable. Users, especially graduate students, indicated that they are looking for physical spaces that NYU doesn't provide enough of (e.g., private offices on campus, more social spaces, more spaces for informal and formal collaborations, more comfortable furniture/carrels, and spaces that are better suited to quiet contemplation).

As physical libraries and collections are becoming less integral parts of a scholar's daily life, many libraries around the world are rethinking their use of public space. With availability of new tools, pervasive computing environments, and the ubiquitous use of personal laptops equipped with wireless Internet access, many librarians seek to redefine what knowledge gathering, production, and scholarly contemplation look like in the 21st century.

Supporting the creation and dissemination of scholarly work
Users report enjoying free and immediate access to the journals needed for producing their work. Many scholars are interested in exploring avenues for publishing papers and interacting with peers outside of the traditional journals, and outside of physical spaces. Libraries across the country are considering if and how the library plays a role in supporting informal journals, the peer review process, and the scholarly publishing of faculty and graduate students. The trend within libraries to build a repository of institutional knowledge that is accessible and cross-referenceable is part of how libraries are cultivating their roles as stewards of "knowledge management for the University."

Supporting collaboration and sharing

Collaboration is admittedly valuable to the scholarly work of interviewees, but the library does not yet play a vital role in the processes of collaboration. Users know the library provides "meeting space," but desire more effective virtual collaborations (e.g., sites that allow real-time communication and writing, version sharing and control, and even collections of relevant sources and tools). Physical meeting places, though, are still needed, and some interviewees would be more inclined to take advantage of library spaces designed for collaboration if they supported social interaction alongside scholarly work (e.g., coffee shop in the midst of an archive). How, then, should the library support collaboration beyond providing access to online journals and websites where collaboration already takes place? How do libraries best provide outlets/space for personal and private reflection, and for collaborative interactions? The Internet is the model for energizing social interactions and enabling connectivity among scholars separated by geography, discipline, and language.

3. The library as "gateway"

Discovery and serendipity

The rise of search engines and digitized content redefine the way users engage with material. Both phenomena feed a growing expectation of immediate access and visibility of deep connections within texts. At the same time, decreasing the distinction between the virtual and physical realms (e.g., more virtual workspace technologies reducing dependence on physical collaboration space) makes it possible for the library to serve as a gateway to resources wherever they may reside. The heavy dependence of scholars on electronic academic journals, coupled with a steady nostalgia for the serendipity of "browsing" physical collections, leads to discussions of ways that new technologies can enhance serendipity. More broadly, there is also a shifting focus away from what publishers can supply to what customers demand, in all media.

Independence and idiosyncrasy

In their daily lives, library users are independent and accustomed to helping themselves – from booking travel, to buying stocks, to looking up medical information – and this affects how they want to interact with the library and its resources. There is also a spreading trend to request service from a distance (e.g., virtual consultation of library resources and librarians). The growing popularity of folksonomies and user-based tagging in the non-scholarly realm, and the increasing presence of free, blog-like electronic academic journals, all inform what users may come to expect from libraries and research institutions.

Library transparency and seamlessness

User perceptions of libraries and librarians as resources and "book locators," or as thought partners and collaborators, are changing, and there is a blurring distinction between what the library provides access to, and what users can access without the library. This means that the library has the opportunity to make more transparent its place in electronic scholarship, and, at the same time, to provide more seamless access to the full array of its resources.

Growing interconnectivity of social phenomena, academic scholarship, and technological innovation
An explosion of interdisciplinary scholarship building on existing areas of research requires new partnerships between corporations and institutions that innovate and may produce major sociological and technical shifts (e.g., Google Books, and Google Scholar). The emerging need for new patterns and roles associated with information chains, as well as rapid advances in technology, requires a flexible approach to planning for an explosion of information. Internal "centers of information" are increasingly necessary as libraries offer new functions to users.

B. Ideas and Inspiration Book

To capture the essence of findings from the interviews, focus groups, and literature review, KPL created the *Ideas and Inspiration Book*, a provocative "pie in the sky" thought-piece and illustration of how the Libraries could visually imagine changes to physical spaces, virtual spaces, services, and tools. In the spirit of Mahatma Gandhi, "You must be the change you wish to see in the world."

Bobst Library's presence and environment influences scholars' sense of the importance of their work—be it in the atrium, special collections, stacks, carrels, or reading rooms. Many scholars speak nostalgically about the libraries they have frequented at other institutions, or mention the New York Public Library as an ideal vision of what a library should feel like. Nonetheless, a library does not need to be built in the beaux-arts style to be inspiring. There are many ways to stimulate moments of creativity and innovation: take advantage of the atrium to display art, create meeting and social spaces, present the work of the University, or even represent the flow of information into and out of the library. The library can create spaces for inspiration, serendipity, immediacy, access, exchange of ideas, and interactivity.

The *Ideas and Inspiration Book* focuses on: Spaces for Inspiration, Spaces for Work, Collaboration and Crossing Disciplines, Findability, and Changing Perceptions. The book communicates graphically, with visual impact. This is a narrative overview of its messages.

1. Spaces for inspiration

Bobst Library's large atrium can be the center and heart of the library, much as Grand Central Station's vast lobby creates the feeling of movement, activity, and direction. By mounting images and creative signposts, the library can provide guidance, navigation assistance, and focal points for the space, while also drawing patrons deeper into the library. Displays, artworks, and other visual cues can anchor the atrium, but also transform it into an inspiring gateway into the library's collections and reading rooms.

The library can attempt to make visible the invisible: the processes of finding, understanding, and representing the rich resources of research. Electronic displays of flow charts that map the array of subjects held within the library's collections can produce a sense of liveliness and depth. Screens that feature real-time calculated and animated representations can show the life of the library at every instant, displaying data of what has been most recently checked out or searched online. The items displayed may be books, DVDs, CDs, videotapes, keywords, call numbers, or Dewey classifications. An installation at the Seattle Public Library uses the circulation of data taken from the daily activity of the library to create an exchange center of media and information. Culturally, the representation of what happens in the library can be an indicator of what the community of users considers interesting at any specific time. By visualizing the statistical information of titles and categories, the library presents a living picture of what the community is thinking and doing.

2. Spaces for work

The library should create personal workspaces, comfort, commonalities, variations on atmosphere, and ubiquitous networks (me=me+my computer). Throughout the library, there are varying styles of behavior and expectations among scholars that necessitate different working environments. By providing a variety of public working spaces, the library can attract a range of scholars who reflect the diversity of interests and working styles. Adaptable spaces with adjustable furniture, lighting, and size could also be ideal spaces for inspiration.

Just as flexible reading rooms provide public spaces that accommodate a range of working styles and preferences, individual study carrels and work areas – spaces that are traditionally isolated – can be adapted for scholars who prefer working in solitude. Different kinds of workspace – including traditional and modern spaces and décor – enable scholars with different sensibilities to feel satisfied with the array of options. Researchers can come with their laptops and notebooks, and transform library spaces into personal spaces. With books within reach, the ability to open or shut doors or other flexible partitions, the presence or absence of other scholars, spaces can be defined by the activities taking place within them.

A graduate reading room may satisfy the many graduate students who want a special space for their exclusive use. This space would not only provide opportunities to be around others serious about their research, but also enable collaborative experiences and give graduate students respite from the undergraduates who are their students.

Ample natural light, attractive and comfortable furniture, and other aesthetic additions can also make the library a desirable and effective place to read, think, and work.

3. Collaboration and crossing disciplines

The library should facilitate access to colleagues and interdisciplinarity, and create places to interact formally and informally. The library should be a tool and a connector that emphasizes the common activities and interests of researchers, regardless of disciplinary boundaries. By creating varied reading rooms with multiple but related resources

displayed and available, researchers can make connections beyond their original purviews. “Thought centers,” spaces for meetings, study, or exhibitions, can be used to convene scholars around interdisciplinary topics, and would aim to help scholars draw new connections. Rooms could also be used to host speakers and special events and to exhibit the work of professors and graduate students (or the kinds of resources they use). Configurable furniture would ensure flexibility.

4. Findability

Discovery, perhaps the traditional and sustaining lifeblood of research libraries, is a core activity of scholars. The library should create ways to facilitate increased personal control, personalization, convenience, fluidity, efficiency, and transparency to create a more powerful discovery process. Exhibits of special collections make sources visible and alluring. Likewise, technology produces new ways of finding, organizing, and sharing information and ideas. By experimenting with categorization – according to frequency of use, disciplines crossed, or even book jacket color – the library can produce a type of ‘faceted navigation’ that provides users with different dimensions by which to access information. Online environments populated by notes and phrases from researchers, or by tags, allow researchers to see the ad hoc but often meaningful ways a source can be used. These online environments then become collections of information generated by the new authorities—the researchers themselves.

Further, while stacks of physical books, films, and recordings are important, online resources are far more portable. What if library users had a service that helped them to keep all the materials they needed in one place? What does a personal online library look like?

A personal library management tool in which scholars can search and collect citations, PDFs, full text links, images, video clips and more would be a valuable addition to everyday research repertoires. It would allow researchers to access the materials they need in one central place, make notes and marginalia, and manipulate content. Further, all the holdings are portable – available anywhere an Internet connection exists – and even shareable.

To address needs of multi-media resources for research and teaching, the library can create new and innovative ways to integrate the variety of services and materials available into the interdisciplinary crossroads of researchers. By filming conferences, concerts, and lectures taking place on campus, the library can then offer the recordings for research purposes. Increased digitization efforts can also help to support audio-visual research needs across campus; portions of collections designed especially for teaching can contribute to the use of “smart classrooms” that combine audio/visual technologies in interactive learning environments.

5. Changing perceptions

The Libraries of NYU can expand services beyond traditional conceptions of ‘the library’ and thus serve as a center of intellectual life. Outreach, marketing, and partnerships with New York City institutions and beyond are key to changing scholars’ perceptions of the

tools and services offered by the Libraries, as well as of its role in the intellectual production of the University and the city. By continuing to build relationships between librarians, faculty, graduate students, and other stakeholders in the University community, the Libraries can enhance its role in intellectual and cultural life at NYU.

Specific ideas of how to cultivate relationships between scholars and librarians include creating an online "Library Matchmaker" in which researchers can type in their research interests, department affiliations, and other information in order to receive a match with the appropriate subject specialist. Likewise, library collections within the library can carry posters with information about the librarians who manage the different subject areas.

To enhance the Libraries' role in the culture and heritage of the University and New York City, special collections can be displayed online in new ways. It is understood that special collections need to be preserved and protected, but they also need to be available for use. Technology provides new ways to immerse oneself in the subtle details that give its users a sense of being in the presence of history. The convenience of seeing archival materials online, complete with detailed finding aids and contextual information, makes online collections attractive and useful. Providing online access to the archives also makes it more practical to use primary resources for teaching, and to introduce students to the methods of archival resources. Finally, by displaying these collections online in robust ways, researchers within and beyond the University can explore the rich collections, experience the thrill of discovery, and use the materials without damaging fragile artifacts.

VI. FUTURE OBJECTIVES, RECOMMENDATIONS, AND TOOLS FOR IMPLEMENTATION

In the new world of scholarly research, there are many ways to support and enable the kinds of work scholars are doing. At NYU, the changing story of scholarly work can be supported by improving spaces for work; enabling collaboration and connections across disparate disciplines; making the discovery process more powerful; expanding beyond traditional conceptions of the library; and creating more spaces and mechanisms for intellectual creativity and inspiration.

This section discusses the objectives of changes to Bobst Library and to library services at NYU, recommendations, and tools for successful implementation.

A. Objectives

The objectives of the 21st Century Library Project are to:

Provide a stimulating, adaptable environment that facilitates the creative work of scholars

- The library is a center for exploring and supporting the changing ways scholars discover, use, and create knowledge.
- The library provides a gateway to digital content, with tools for thinking that enable scholars to navigate and make use of the explosion of information available online.
- The library invents new ways to make its different types of collections (non-print media, books, journals, archives) accessible, navigable, and meaningful.
- The library fosters a dialogue about how continuing innovation in services, collection-building, and space can enable the work of individual scholars and the scholarly community.
- The library enables collaborative and experimental uses of the collection.

Enable both formal and informal collaboration

- The library creates valued places for multi-disciplinary groups within the University to meet and work together, including experimental spaces.
- The library builds exhibits, spaces, and collections in a way that inspires scholars and fosters interaction among them.
- The library connects people who share research interests, while establishing and supporting networks with the institutions around the world that offer the most to NYU faculty and students.

Be a vibrant enabler of individual and community intellectual life

- The library identifies opportunities – and plays an active role – in the forums we have for publishing and presenting research, and finds ways to support and encourage knowledge sharing between scholars and across institutions.
- The librarians are known as a source of thought partnership for the University community, working face-to-face and virtually.
- The library enriches the University community's sense of place by facilitating access to all that New York City has to offer.

B. Recommendations

Specific recommendations presented below are only the beginning of ways for the NYU Libraries to support the changing needs of scholars. The recommendations are designed to be points of departure from traditional ways of thinking. They are not meant to be an exhaustive list of recommendations. Ideas are considered according to the objectives of the 21st Century Library project, relevance, risk, potential for impact, and expense.

Main recommendations, discussed below, include:

1. Improving and expanding spaces for work
2. Enabling collaboration and connections across disparate disciplines
3. Making the discovery process more powerful

4. Expanding beyond traditional conceptions of the library
5. Creating more spaces and mechanisms for inspiration

1. Improving and expanding spaces for work

Inherent to creating an inspirational environment is ensuring that the library is not merely a space for accessing information, but also one that encourages lingering among patrons in order to read, reflect, and write. The quality of space was typically considered from two perspectives: comfort and flexibility. Each person had a slightly different description of the ideal workspace, ranging from a desire for total quiet and privacy to a need for the buzz of a social space. The library could serve these disparate needs by establishing 'zones,' each one representing a different style and specific type of expected behavior. Additionally, scholars speak of many practical requests: more computers, kiosks in the stacks, the ability to secure belongings.

Changes to spaces for work primarily focus on serving the varying needs of scholars. Recommended changes include improving and expanding spaces for work; co-locating special collections; creating varied reading rooms; purchasing flexible furniture; creating a Graduate Student Reading Room; creating adaptable spaces and more personal work spaces; exposing more natural light, adding more comfortable furniture, and more printers and computers.

2. Enabling collaboration and connections across disparate disciplines

Beyond general changes to the space of the library, there is a need for change in the traditionally understood role of the library. Scholars, searching for moments of serendipity to move their work forward, need sources of inspiration. Often, that inspiration comes from conversations, either casual or formal, that help scholars make connections across topics and disciplines they wouldn't otherwise have been able to make. The library could enable this collaboration in a number of ways—by simply providing opportunities for scholars to strike up informal conversations, by providing more meeting spaces explicitly designed for group discussions taking place beyond the classroom, or by making informal connections between scholars doing related work.

Parallel to a desire for serendipity through collaboration is the phenomenon of "de-discipline-ness"—the erosion of formal boundaries between disciplines. This emerging trend may eventually lead to an academic world whose "centers of gravity" are quite different from those of today. Scholars are increasingly finding they need to immerse themselves in completely new disciplines, having followed the threads of their research into unfamiliar territory. Changes to the library's physical spaces and services should anticipate the significance of this phenomenon's revolutionary effects on academia.

Additionally, the library could support the growing need for connectedness among scholars by facilitating ongoing dialogues about the materials used in research. Using new technologies, the library could record marginalia and make it accessible, publish bibliographies in which a given book appears, or provide links to other scholars who are

working in related areas. These additions would provide depth and perspective unavailable through traditional research methods, and build on the growing trend of social networking in existing online ventures.

Recommended changes include: more group study rooms; improved ways to capture the marginalia of research (notes, ideas in progress, suggestions) through means both technological (online environments that are personalizable and flexible) and non-technological (suggestion/comment cards); creating online personal libraries with saved citations and full text; and "what's new sections" with recommendations and news from the library, wish lists, and favorites.

3. Making the discovery process more powerful

While helping scholars make connections with each other may be a new role for the library, connecting them with just the right book has a well-established heritage. Scholars' reliance on findability and the navigation of library resources remains central to their overall experience, and a vital part of their scholarly work. Libraries have often been leaders in technology, taking advantage of new developments to provide users with deeper insights into the content of their collections. New technologies allow for even more powerful tools to search and access collections. As the library expands into new areas, a renewed focus on tools for findability and navigation should garner increased investments.

Ideas for ways to continue to expand and enhance this function of the library range from the practical to the speculative, from the mundane to the experimental. A common theme throughout all of the interviews and focus groups was the ascendancy of Google. Perceptions of the influence of Google ranged from extremely positive to guardedly negative, but one thing is consistent: Google has radically changed users' expectations of the way online tools should work. It has also changed the perception of what it means to make serendipitous connections between materials. The ability to stand in front of a bookshelf and let your eyes wander remains important to scholars, but they also value the unplanned, online, and often random connections that Google can help them to make.

Not all of the suggestions from faculty and graduate students revolved around improved online search mechanisms. NYU scholars have also been thinking about ways to allow for the best of both the physical and online worlds—connecting the richness of the physical experience with the immediacy and flexibility of categorization and access that online tools can provide.

To improve the discovery process and make it more powerful, it is recommended that the library transform options for browsing and serendipitous finding, experiment in categorization, display special collections with increased transparency, and generally develop ways to make searching easier and more powerful.

4. Expanding beyond traditional conceptions of the library

In interviews and focus groups, scholars often made requests or suggestions for services the library already provides. Scholars struggle to make a connection between the library

and the library services they use every day, like access to online journals. There is a need to institute internal and external mechanisms that allow scholars to realize all that the library has to offer. This can be accomplished in the form of outreach to the University community through continued building and strengthening of librarians' relationships with scholars and departments, continued improvement of the library's physical spaces, enhanced access to collections and special collections, and an increased role of the library as a builder of scholarly communities.

To effectively expand beyond traditional conceptions of libraries, the Library could create "Bobst Syndicated" by placing tools and resources in the flow of the research process and beyond a localized online library website; open more content through digitization; promote and provide media in teaching; and facilitate and spearhead New York City partnerships.

5. Creating more spaces and mechanisms for inspiration

The Bobst Library atrium – a central organizing space of the building, and the first space users experience when entering the library – has emerged as the symbol of the library. While the atrium is not the only source of inspiration for scholars, it is the heart of the building and can set the tone for changes to the surrounding spaces.

In creating more spaces and mechanisms for inspiration through social interaction (cafes and themed reading rooms; through art (exhibits and displays); and by highlighting research groups and projects on campus; the library can play an enhanced role in connecting library users with each other and each others' work.

C. Tools for Change

The participation of KPL in the 21st Century Library Project had many advantages, chief among them the firm's expertise in providing tools and methods to assist with deep organizational change. KPL and the Project Team worked to chart a vision of how best to undertake and implement recommendations in a research library setting.

Five main components of the "toolkit" are discussed below. They include:

1. The 21st century library future advisory group
2. Models of success
3. Lifecycle of an experiment and tools for a learning organization
4. Potential implication of implementation
5. Phased iterative implementation of recommendations

1. Taking advantage of expertise: The 21st Century Library Future Advisory Group

The purpose of the 21st Century Library Future Advisory Group is to serve as a creative engine for the library, to advise and guide experiments, to push the thinking surrounding

each project in all its dimensions, and to ensure that long-term visions are always represented.

Key among the potential participants are faculty members whose fields keep them in touch with trends and ideas that can help the Libraries look forward. Other members would include librarians, graduate students, and relevant outsiders (e.g., funders).

The primary responsibilities of the group would include:

- maintaining the vision of the Libraries' future,
- setting the right level of creative thinking,
- measuring progress in terms of learning and results,
- defining and decision-making around experiments,
- organizing sponsorship,
- working with other teams to implement recommendations and gather information.

2. Models of success: the experimental mind-frame adapted to a non-profit

As the Libraries begins its effort to become a center of experimentation, it can use the best practices from Vijay Govindarajan and Chris Trimble's *10 Rules for Strategic Innovators*. Though Govindarajan and Trimble's suggestions focus on for-profit institutions, they are adaptable and can serve as important guiding principles for academic institutions. Key suggestions include:

Focus on basic principles, not details
In planning the renovation of Bobst Library's physical spaces and other tools and services, the Libraries can focus on high-level goals and objectives, not the details that tend to be wrong in early phases of experimentation. Resolving the "unknowns" that could "make or break" the 21st Century Library Project is imperative.

Focus on theory, not numbers
The Libraries should not hesitate to make broad "theories or hypotheses" that seem like "gambles," but it should test theories systematically.

Predict trends
By focusing on the prediction of trends rather than trying to "aggregate results for long periods of time," the Libraries can see clear results in a matter of months. Effective predictions combine effects of experiments, allowing the Libraries to "guess the timing and magnitude of the changes anticipated."

Mind your history
Plan experiments using "as much detailed history as possible" rather than "looking strictly ahead," and look for trends in the history of the organization, especially "predicted trends and actual outcomes" that can provide clues for current and future experiments – "these disparities drive the learning process."

Reiterate plans frequently
"Thorough reviews of experiments must occur often" to ensure constant review of what has been learned and to tweak experiments. Successful experimenters are not the organizations that "start first or start with the best strategy [but] they may well be the ones that learn the quickest."

Identify performance measures
Identify new sources of performance measures based on the specific experiments under consideration and avoid relying too heavily on traditional forms of metrics like foot traffic and book circulation, but do not avoid them altogether.

Hold innovation leaders accountable for learning, not results
"Reassure leaders that experiments" are based on theories and hypotheses and the leader is responsible for capturing what's been learned and integrate it into the experiment—not whether the experiment succeeds or fails. It is also important to communicate ongoing high levels of accountability, in addition to the fact that effective evaluation is based on "how quickly leaders learn—they will go out of their way to demonstrate the quality of their thought process."

3. Life-cycle of an experiment and tools for a learning organization

In identifying future projects that respond to findings from the 21st Century Library Project, the KPL team and the project Advisory Group outlined a possible trajectory for communicating with stakeholders that the Libraries could follow. These steps include selecting and launching experiments, establishing uniqueness of experiments compared to ongoing services and spaces, questions for possible course corrections, and classifying experiments.

Selecting and launching experiments
In selecting and launching experiments, it is important to consider the plausibility and value of each one. It is also necessary to put in place a team whose responsibility it is to oversee, evaluate, and capture what is learned from the experiments' processes and outcomes. Understanding the experiments' role in relation to the core objective and goals of the project is also important.

Establish the uniqueness of an experiment compared to ongoing services and spaces
In communicating the value, innovation, and uniqueness of existing services and spaces, it is recommended that the Library notify stakeholders of "permanent fixtures": the core objectives of the Library and the elements of services and spaces that can be depended on as enduring. It is also important to communicate the reasons why some experiments are experiments—attempts at change that may not remain intact if they do not fulfill designated needs. By establishing clear governing principles, it is possible to maintain oversight of changes in scale – either up or down – and to capture and apply what is learned in ongoing or new experiments.

Questions for course corrections

Throughout experiments it is important to engage in a number of checks: an "objectives check," asking if the objectives of changes to the Library are being achieved through the experiment; a "usability-check" that allows the project team to assess whether the change to services or spaces improves the experiences of library users; a "dilution-check" that asks if the change to services or spaces is true to the spirit of experimentation; an "evolution-check" in which the team keeps track of any recent improvements in technology that might suggest different directions for the proposed changes; and, finally, a "reality-check" where the team assesses the feasibility of scaling an experiment up to a new level.

Classifications for experiments

As experiments progress, it becomes possible to consider a "scale-up" if the experiment has survived the appropriate checks and appears to be a permanent asset to the organization. When results and lessons are still vague, but it appears that the current course is potentially successful, it is important to keep learning and assessing the situations. At times, an experiment is worthwhile, even if there is no good basis for a decision at the present time. And even experiments no longer worth investment still yield valuable information. It is especially useful to capture what has been learned in these cases.

4. Potential implications of implementation

Pictures of true success versus settling

In recognizing the possibilities and implications of both "true success" and "settling," library leaders will have the means to view decisions through filters that increase possibilities of success and suitably limit chances of "settling."

What "True Success" Might Mean	What "Settling" Might Mean
• Building satisfied users across disciplines and levels who cherish the library as an invaluable part of their academic and professional experience • Constructing a library strong enough to be a meaningful factor in faculty and student decisions to choose NYU • Establishing NYU Libraries as a thought leader recognized by associations and peers important in identifying and shaping trends in libraries • Creating a recognized model of an adaptable "Organization that Learns" so NYU Libraries continues to grow and change over the years • Earning a reputation as an innovator in	• Unable to change people's conceptions of the role of the library • Allowing failed experiments to discourage future creative thinking and risk taking • Building inflexible and static spaces and services that are unable to adapt with new technologies and needs of users • Discontinuing the dialogue between the library and its constituencies, assuming their current needs will not change in the near future • Allowing experimentation and innovation to distract from the common core competencies of research libraries • Continuing to rely on the same success

unknown territory, but also strong in the core competencies of research libraries in general • Having a strong group of leaders and librarians who are forward looking and eager to experiment with changes to the library	metrics (e.g., foot traffic, circulation) to measure value of innovative experiments • Struggling to shift the mindset of librarians as they adapt to their new roles and responsibilities

5. Phased implementation of recommendations

Recommendations for the 21st Century Library Project may be appropriate for three distinct phases: near term (0-2 years), middle term (2-5 years), and long term (5-10 years). Phasing allows the Library to embark on change in the spirit of experimentation and innovation, while at the same time assessing near- and long-term changes that require substantial planning and evaluation.

6. Immediate next steps

Build a learning organization

Begin planning for deeper organizational change that allows for the library to be constantly experimenting, learning, and pushing thinking beyond traditional boundaries. Establish formal and informal mechanisms to broaden the conceptions of roles for library staff, and their understanding of what the traditional library can offer. Identify leaders in the organization and encourage them to share best practices and influence those around them. By selecting a few simple low risk but high profile experiments that can be started right away and demonstrate for library staff the process of selecting, managing, and capturing learning from specific experiments, the Libraries will demonstrate its commitment to change. Throughout experiments, it is important to understand and test the funding landscape for a learning organization.

Expand a network of stakeholders

Begin to assemble (or retain existing) formal and informal groups of stakeholders, and reach out to experts and advisers in the broader NYU community (e.g., invite professors to a bi-weekly lunch to discuss key issues facing the Libraries). Also initiate a partnership with ITP to design a program to continue gathering learning.

Re-brand the library

Demonstrate early commitment to change by implementing recommendations identified as “Quick Fix Changes.” Define and implement an external outreach effort that more effectively communicates existing services of the library and the new focus on building a learning organization. Roll out an internal communications campaign that engages librarians and staff to enable a smooth transition to a “learning organization” mindset.

VII. CONCLUSION

Not long ago, scholars depended on the physical space of the library as a major source for their research needs. With the rise of digital content and the Internet, that single, physical source has been transformed into a complex network of options, with varying levels of accessibility, authoritativeness, and depth. This transformation has had powerful effects; it has not simply made research more convenient, it also has changed the nature of scholarly work.

Researchers across all disciplines, *including the humanities*, are no longer tied to the physical space of the library. (Except for archives and special collections.) They function in a world of e-resources, virtual tools and free choice of where to work physically. The commercial sector and the Web shape their expectations for access and process. Community, collaboration, stimulation and communication are core elements of their research environment and they seek ways to gain and enhance these elements. Across disciplines, there are widely differing expectations of the roles of the library and the librarian and openness to new roles for the library as "connector" to people, to resources and to tools.

In light of these radical changes to scholarly work, it is easy to overlook a principle component of scholarship that has not changed: the desire among scholars to feel that they are a part of an intellectually stimulating and energizing community. Yet in this world of ubiquitous Internet access and convenience-enhancing tools, research can increasingly be done in isolation. The role of the library is now, more than ever, to create an environment that inspires creativity and innovation in scholars across levels and disciplines, and to reinforce their sense of participation in lofty and meaningful enterprises.

While the exact future of scholarship remains unknown, changing technology is undoubtedly inciting a pronounced transformation. Communities of scholars are the principle patrons of the library, and changes to its spaces, tools, and services should remain adaptable given the uncertainty of the evolution of scholarship. Nonetheless, from what we know now, libraries should aspire to grow to be the symbol of a stimulating, adaptable environment that facilitates the creative work of scholars, enables both formal and informal collaboration, and is a vibrant center of intellectual life.

APPENDIX

Appendix I: Interview questions and probes

1. In order to have more detailed context for the questions we want to ask you, we'd like you to describe a bit about your focus and about the focus and vision for your research.
   Areas to Probe
   - What kinds of questions are you concerned with?
   - How would you describe what it means for you to be successful given your own standards for your own work (e.g., if your work gets published, positive reviews)?
2. Are there certain times throughout the day you do things related to your research, and visit certain places?
   Areas to Probe
   - What is it about certain kinds of places that makes it easier and more productive to work with others? What about on your own?
   - Given the choice to find a resource in the library or elsewhere (e.g., in your home, office), when would you choose to use the library and why?
   - What is a situation in which you found the space of the library to directly affect the work you were able to do, or the objectives you wished to achieve?
3. Tell me more about the kinds of information sources you like to use and why you find the process for using them is smooth and straightforward.
   Areas to Probe
   - Are there specific attributes of those sources that make them easy and straightforward to use?
   - Can you contrast these easy-to-use sources with others that you find more difficult and frustrating to use?
   - Where are these resources – both those you find easy to use and those that are more frustrating – physically or virtually housed?
   - What kinds of media do you typically look for in an information source (e.g., online, film)?
   - Do you believe the sources you use today will be different in any way 5 to 10 years from now?
4. At what points in the research process – developing a hypothesis, structuring your research, gathering insights, designing a synthesis, and ultimately publishing – do you use the library?
5. As you go through the research process, are there tools you find particularly useful?
   Areas to Probe
   - Are there kinds of software or other physical kinds of tools that are important to you?
   - As you sift through data, gather your research, and design your synthesis, what are the natural steps or tools (e.g., an online program, physical space) you use that could be supported by the library?

- What tools, in a world of infinite possibilities, would the library be able to provide for you?
- Do you believe the tools you use today will be different in any way 5 to 10 years from now?

6. With the way you communicate your research to the outside world evolving with changes to technology (e.g., data is being shared online in new ways), what are the implications for your work as a researcher?

   Areas to Probe

   - Are there new ways for communicating your work to the outside world (e.g., new features on online journals)?

7. How much is your experience with the library the same or different from that of your graduate students, the researchers of the future?

Use of library resources and services as a teacher

1. In addition to your time as a researcher, we would also like to get a sense of how the library plays a role in your teaching. Can you describe to us the kinds of classes you teach and your preparation routine?

   Areas to Probe

   - What kinds of questions are you concerned with?
   - How would you describe what it means for you to be successful given your own standards for your own work (e.g., strong reviews from students, teaching awards)?
   - Are there current and emerging trends in the way you, or your colleagues, teach – including your assignments – that we should think about?

2. Are there certain times throughout the day you do things related to your teaching (e.g., class preparation, teaching), and visit certain places?

   Areas to Probe

   - What is it about certain kinds of places that makes it easier and more productive to work with others? What about on your own?
   - Given the choice to find a resource in the library or elsewhere (e.g., in your home, office), when would you choose to use the library and why?
   - What is a situation in which you found the space of the library to directly affect the work you were able to do, or the objectives you wished to achieve?

3. What kinds of media and what kinds of materials are useful to you during the process of preparing your classes and while you are actually teaching?

   Areas to Probe

   - How do you prefer to access these materials – through an online source, a reference librarian, or somewhere other than the library?
   - If you could have access to other media for your teaching, what would you request?
   - Do you believe the types of media you use today will be different in any way 5 to 10 years from now?

4. As you go through the teaching process, are there tools you find particularly useful?

Areas to Probe

- Are there kinds of software or other physical kinds of tools that are important to you?
- What tools, in a world of infinite possibilities, would the library be able to provide for you specifically for teaching?
- Are there new technology tools for teaching that are changing the way you teach?
- Could a technology tool change the way you think?
- Do you believe the tools you use today for your teaching will be different in any way 5 to 10 years from now?
- Do you tend to use technology resources more frequently for your teaching than you use the library?

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