UC Berkeley Library, may I introduce you to the Lawrence Berkeley National Laboratory?

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Feb 18, 2010

SLIDE 1
Good morning. As the liaison to the Lawrence Berkeley National Laboratory, I would like to introduce the Lab to UC Berkeley Librarians.

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In this presentation, we will discuss how the Lawrence Berkeley National Laboratory is a unique scientific environment that offers opportunities for engagement and exploration by UC Berkeley Librarians.

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I will try to explain this position by addressing four key points.

First, the lab is a special environment because of its unique history and purpose. Secondly, it conducts important and interesting research. Thirdly, there are links between the lab, the University, and the Library - which offers opportunities UC Berkeley librarians. Finally, we will discuss how librarians can participate in these opportunities.

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Before I begin, let me define the Lawrence Berkeley National Laboratory. It is a world-class facility, and the lab is the oldest of ten national laboratories sponsored by the US Department of Energy, Office of Science. It conducts scientific research and development that may not be well suited to a university or private sector setting because of the scope, infrastructure requirements, or multidisciplinary nature of the scientific problem.

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The Lawrence Berkeley National Lab is a unique environment with a special history. Its evolution across more than 75 years is a story about striving for scientific excellence, collaborating across a wide range of scientific disciplines, and delivering science-based solutions to problems of national significance and priority. Let me tell you the story of the Berkeley Lab.

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It all began in the summer of 1928. Ernest Orlando Lawrence was on faculty at Yale University when the UC Berkeley Physics Department wooed him to come West.

After arriving at Berkeley, he invented a unique particle accelerator. This machine could whirl charged particles around and around in order to boost their energies so that when they were directed at a target they could smash open atomic nuclei. This machine was called a cyclotron, and it led to a new era in nuclear, radiation, and subatomic particle science.

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By 1931, Lawrence created his Radiation Laboratory on the Berkeley campus. He recruited colleagues from physics, chemistry, engineering, biology, and medicine – and they worked together as a team, what was termed “team science.”

This interdisciplinary research was groundbreaking because scientists at that time typically worked within their own specialized field – rarely collaborating with other departments or engineers. This team approach fit in with the era of Big Science, whereby interdisciplinary cooperation on large-scale projects could tackle complex scientific problems – challenges that couldn't be easily resolved by single scientific discipline.

This collaboration was fruitful. With radiation researchers working alongside biomedical researchers, radiation therapy was developed for treating a leukemia patient. This was the early stages of nuclear medicine, biophysics and imaging research.

By the end of the decade, Lawrence would win the Nobel Prize in physics (1939).

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In the 1940's, the Radiation Laboratory was building machines that were too big, and potentially too dangerous to be housed on the UC Berkeley campus. So the lab moved up into the Berkeley Hills and built the 184-inch cyclotron.

During World War II, the Laboratory responded to national defense needs. The scientists conducted research that led to some key technology developments during the war including the atomic bomb, the proximity fuse, and radar.

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After the war, the lab maintained strong government and military ties. The Radiation Lab joined the new system of national laboratories under the Atomic Energy Commission, which is now the Department of Energy.

Additionally the laboratory broadened its base of research to include organic and physical chemistry detector programs. The 1950's saw the development of new more powerful accelerators like the Bevatron and the Heavy Ion Linear Accelerator. In 1959, upon the death of its founder, the Radiation Lab was renamed the Ernest O. Lawrence Berkeley Laboratory

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In the sixties, the Lab saw more expansion and growth – thus solidifying an attitude of interdisciplinary work in diverse research areas. There were advances in physics and nuclear chemistry and medicine as well materials sciences, physical biosciences, earth sciences, and environmental studies.

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The 1970s was a challenging period for energy resources beginning with the 1973 oil embargo. The lab responded to this challenge with new research programs that explored national energy supply and end use.

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By 1980, the Berkeley lab expanded its expertise in more areas including the life sciences and genomics. Also in the 1980s, the Department of Energy selected the Berkeley Lab to be the site for the new National Center for Electron Microscopy (NCEM) and the Advanced Light Source (ALS), which is one of the world's brightest sources of x-ray and ultraviolet light.

These facilities are “national user facilities”. They are built to provide researchers from academic, private sector and other national laboratories with specialized scientific infrastructure they would not otherwise have access to. These facilities serve scientists from around the world.

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In the 1990s, the Department of Energy continued expanding programs for genome sciences and sequencing at the Berkeley Lab. Computation sciences became increasingly important. The Department of Energy’s National Energy Research Scientific Computing (NERSC) Center moved to the Berkeley Lab in 1996, bringing with it one of the nation’s most powerful unclassified high-performance computers.

This signaled the importance of high-performance computing – along with experimentation and theory – for scientific advancement.

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In the beginning of the new century, alternative energy sources and environmental sciences and technology became increasingly important. So did nanoscale materials and technology. In 2006, the Molecular Foundry was built, which is a national user facility for nanoscience research activities.

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The evolution of the Lab has been marked by excellence. Many milestones have been made in its over 79 year history.

Table of 75 years of excellence:
http://www.lbl.gov/Publications/75th/files/03-75-milestones.html

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They include:

- Human Genome Project begins – Berkeley Lab named one of two DOE centers for mapping and sequencing human genome.
- TCP/IP flow control algorithms – algorithms developed at Berkeley Lab substantially reduced network traffic congestion and are widely credited with saving the Internet from an otherwise inevitable congestion collapse
- Many chemical elements were discovered including Lawrencium and Berkelium.
- Photosynthesis path of carbon identified – Melvin Calvin won the 1961 Nobel Prize in Chemistry

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Scientists at the lab have received international recognition with eleven Nobel prizes having been won. And one of them has won a million dollars on the Fox television game show Are You Smarter Than a 5th Grader?

SLIDE 18
Over the years we see how the Berkeley Lab has gone from a wooden building on the UC Berkeley campus to a national laboratory. It conducts interdisciplinary research to bring science-based solutions to challenges of national significance and priority in areas such as human health, technology, energy, and the environment. All of this with its continual drive for scientific excellence.

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Today, the research at the Lab continues to address diverse national and global challenges that require innovative scientific solutions.

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There are prominent challenges in energy, environment, human health, modern materials, scientific advancement, and matter and energy in the universe. The Berkeley lab has responded with 20 year science and technology goals that will:

- Develop new energy technologies and environmental solutions
- Discover the composition of matter and energy in the Universe
- Understand and engineer living systems through quantitative biology
- Create designer materials through nanoscience
- Advance X-ray and ultrafast science
- Enable scientific discovery through advanced computing

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These are difficult scientific goals but the lab is poised to meet them. First of all, the Lab has longstanding experience with collaboration. Additionally, the lab has strong divisions and facilities that span a wide range of subjects from earth and environmental science to particle physics and nuclear science, and from quantitative biology to energy science and technology.

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There is an organizational infrastructure for meeting large scale research as well. Specifically, there are 14 scientific divisions that work together – as detailed in this organizational chart. There are 6 strategic directions that help the divisions to focus their research. These strategic directions include:

- Soft X-Ray Science for Discovery
- Climate Change and Environmental Sciences
- Matter and Force in the Universe
- Energy Efficiency and Sustainable Energy
- Computational Science and Networking
- Biological Sciences for Energy Research

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The lab also has six national user facilities. They provide state-of-the-art and specialized research technologies, infrastructure and instrumentation – often times not available elsewhere. The facilities provide resources for ultra-bright light sources, electron microscopes, high-speed data networks, supercomputers, research on new materials and nanotechnologies, and genome sequencing.
They can be used by academic, private sector and other national laboratories. In doing so, they enable collaboration that extends to the worldwide science community.

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Research has diversified over time. This was 1970.

SLIDE 25
And this is 2005.

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Carbon Cycle 2.0 is a recent initiative that reflects the collaboration, multiple strengths, and innovative research of the Berkeley Lab.

This initiative is motivated by Earth's carbon cycle, which is overburdened. More carbon is emitted into the atmosphere than natural processes are able to remove - an imbalance with negative consequences. Carbon Cycle 2.0 will hopefully provide the science needed to restore this balance by delivering creative scientific solutions toward a carbon-neutral energy future. (paraphrased from: http://www.lbl.gov/Conferences/cc2/#)

To help you understand the science being conducted at the Berkeley Lab, there is a video glossary, where scientists explain the research topics they are working on. (http://videoglossary.lbl.gov/)

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Overall, the lab has multidisciplinary research strengths, has a history of collaboration, and excellent scientific facilities. This puts LBNL in a position to conduct innovative research that may have a great global impact.

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As an organization, LBNL has strong links to UC and UC Berkeley. There are close collaborations among these groups and a common thread in its history, resources, management, and operations. In addition to being neighbors in its physical context, there is overlap with the management and human resources at UC. Furthermore, the LBNL Research Services are collaborating with the UC Berkeley Library, which is relevant since many of the subject expertise at the Library matches the research being conducted at the Lab. Examining these points will show how there are opportunities for librarians to engage with LBNL.

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Here is the physical link. The Berkeley Lab's main site is situated on a 202 acre parcel of UC Regents' land in the Berkeley/Oakland hills. According to 2006 numbers, there are 107 buildings and 53 trailers and it is growing.

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The Laboratory extends outside of these perimeters to include offsite facilities in Berkeley, Oakland, Livermore, Walnut Creek, and Washington DC. These leased spaces are used for administrative and research functions such as facilities for high performance computing in Oakland, biosciences research in Berkeley, and genomics research in Walnut Creek.

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Secondly, there is an administrative connection between the Lab and the University.

The Lawrence Berkeley National Laboratory is sponsored by the US Department of Energy and largely funded by this organization. However, the Berkeley Lab is managed by the University of California (UC) for the Office of Science at the Department of Energy.

As a result of this organizational structure, LBNL personnel are employees of the University of California, not the Department of Energy. A special contract defines the relationship and interactions between the University of California and DOE. There is a Regulations and Procedures Manual (RPM) that outlines the DOE directives and the policies and regulations by UC and the Lab. The RPM also has details of the Laboratory's master contract with the DOE.
http://www.lbl.gov/Workplace/RPM/index.html

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As a tangent, this graph shows how the budget is divided among different research programs. It is important to note that funding for LBNL research also comes from other funding agencies like the National Institutes of Health.

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Furthermore, the budget is projected to increase over time.

About $264 million has been allocated to the Lab since March 2009 through the American Recovery and Reinvestment Act for research in computing, energy, health and other sciences. At least 192 jobs have been created or retained as of Dec. 31, 2009 due to the influx of stimulus funding.

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There are close ties between Lab personnel and UC Berkeley faculty, staff, and students. Many Berkeley Lab employees hold joint appointment at UC Berkeley and LBNL.

There are 470 faculty associated with Berkeley Lab, over 250 of whom hold both UC faculty and Laboratory appointments. The joint research projects advances university education and provides students with unique research opportunities to prepare for cutting-edge fields.

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According to July 2008 numbers, there were a total of 7360 individuals at the lab. This breaks down to 3683 employees and 3677 guests. Here is a graph that shows the breakdown. Of the employees, 29.5% had a joint affiliation with UC Berkeley and other campuses. So as you can see, many Berkeley Lab personnel are UC Berkeley faculty and students.

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This human resource connection rises to the administrative levels. This is Professor Paul Alivisatos. He is the new Director of the Laboratory and he is also Professor of Chemistry and Materials Science, and the Larry and Diane Bock Professor of Nanotechnology, here at UC Berkeley.

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LBNL scientists without joint appointments have borrowing privileges of print resources via a special institutional affiliation – they are able to obtain a borrowing card from Library Privileges Desk.

LBNL personnel with a joint UC Berkeley appointment have full access and borrowing privileges to digital and print resources as well as access to Library public services.

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As you may know, there is an agreement between UC Berkeley Library and the Laboratory. According to the agreement, the Library provides access to digital resources to LBNL lab members, and LBNL will provide funding to support the addition of Lab scientists to existing contracts and provide a pool of funding for digital acquisitions and personnel to manage this transition. Print resources and related services are excluded from this agreement.

Currently, the Berkeley Library and California Digital Library have begun systematically contacting publishers with whom we have licenses to request the addition of LBL scientists to our licenses.

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Another connection is that the subject expertise of the Library matches much of the research that is being conducted at the Lab.

To understand what kinds of research that the Lab conducts, I did a content analysis of the LBNL website. I went through the web pages of scientific divisions, strategic directions, national user facilities, and planning documents to identify research topics.

I entered these topics into an access database and then grouped them into categories. Afterwards, I matched the research subjects to libraries at Berkeley – particularly the Sciences Libraries and the Environmental Design Library.

In this analysis, I identified 6 research themes, with 35 research disciplines beneath, and their subsequent subject areas (486).
This research is conducted in over 70 research centers and user facilities.
A caveat: this database and analysis are not exhaustive.

This database allows me to answer several questions:

- What research is being conducted on the topic of X?
- Who conducts research on X?
- What LBL research groups are relevant to Library X?
- What research topics are relevant to Library X?

I have some sample reports available for review, and I can generate a report to suit your interests.
Reports are available at: http://jeffloo.com/berkeley/2010/01/14/ucb-library-lbnl-subjects/

Looking at these reports, you can see a lot of overlap between LBNL research and the subject expertise of our libraries.

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Here is a concept map outlining the research areas at the Berkeley Lab.

SLIDE 41
In summary, because of these connections between UC Berkeley and the Berkeley Lab, there are opportunities for libraries to engage with the Lab.

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With the connections between the Berkeley Lab and the Library, we are fortunate that are opportunities for UC librarians to engage with the Laboratory.

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Before I go into details about these programs, I just want to answer, why would I want to invest the time to engage with the Lab?

- Firstly, awareness and participation in LBNL activities provides an understanding of cutting edge research that may assist with collection development and developing new public services
- Secondly, it is an opportunity to interact and serve UC Berkeley faculty, staff and students who have a joint appointment there and may not have many opportunities to visit the libraries on campus – so this is a different venue for interacting with library patrons

- Thirdly, LBNL has a unique flavor and mode of operation. Witnessing this contrast to UC Berkeley may spark new ideas for information services.
- Finally, the campus is situated on a hill that provides beautiful vistas 1300 feet above sea level.

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I can provide you a tour of the facilities and the vistas they afford. My interest is in the landscape and architecture of the facilities.

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I want to show you the natural beauty: near panoramic vistas, the deer, the wild turkey, and the rustic landscape

Then there is the architecture, which has been described as "purpose-built and industrial in nature giving the site a no-nonsense character of simple, unpretentious buildings". Here are some interesting facts: The ALS building was designed by the by the architect Arthur Brown who also worked on San Francisco's City Hall and Coit Tower. The Molecular Foundry has received the highest standards as a green building with the LEED Gold Certification.

On this tour, it would be a great opportunity for me to chat with Berkeley Librarians and gather new ideas on how the Berkeley Lab collaboration and the liaison role can evolve to or serve both UC Berkeley and the Lab well.

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There are lectures, seminars, and outreach events up on the hill.

Community outreach is an important value to the Berkeley Lab and a strategic initiative to the success of the Berkeley Lab. Recently the Berkeley Lab Goes Hollywood by providing public events exploring public perceptions of science forming and shifting under the influence of mass entertainment.

The Friends of the Berkeley Lab helps advertise some of these community events. There is a Berkeley Lab Twitter feed and Facebook account for keeping up with these events.
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If you don't have time to come up the hill, I would be happy to meet you in your office and just chat about the Lab and what I've learned.

If you want to, you could provide library instruction or provide seminars at the Berkeley Lab on information and library science and scholarly communications issues. Again this may offer you contact with UC Berkeley personnel who have joint appointment at the Lab and may not come to your campus library often.

If you have an idea about something you want to do with Lab, just get in touch with me and I will try to facilitate it at the Lab.

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While there are different ways of engaging and interacting with the lab, you don't need to make a heavy investment.

I would be happy to just give you a tour of the Berkeley Lab - an amazing environment in terms of its research and its facilities.

Hopefully it will just be fun and a positive learning experience for both of us. I would be happy to listen to your impressions and ideas.

SLIDE 50
Haiku summary

Berkeley Lab – leading
research to change the world.
Come up and learn more!

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Content of this presentation based on the following (with excerpts and paraphrasing):

- Lawrence Berkeley National Laboratory. 2006. Long Range Development Plan. [http://www.lbl.gov/LRDP/] Accessed Feb 10, 2010.
- Lawrence Berkeley National Laboratory. 2010. Website. [http://www.lbl.gov/] Accessed Feb 10, 2010.