

The 21st Century Library

**SPACES FOR EFFECTIVE
LEARNING AND RESEARCH**

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Contents

Summary _____	3
Project description _____	7
A 21st century humanities library _____	10
A 21st century science library _____	17
A 21st century social science library _____	22
Themes across disciplines _____	25
Library design review _____	27
Lessons learned for Oxford from visits _____	57
Outcomes and ongoing benefits _____	61
Conclusions _____	63
Bibliography _____	64
Appendix _____	69

Summary

The 21st Century Library project was designed to investigate current and future research habits within libraries and related learning spaces, and the resources available within those spaces, at the University of Oxford. It aimed to determine the tools, services, spaces and research environments necessary for researchers to work most effectively by consulting with members of the University at all levels regarding their scholarly and teaching needs and how these can be met or supported through library services. It therefore considered how architects, designers, library users and librarians envisage future academic library spaces and the availability of research resources.

The project started in February 2013 with a comprehensive design review of libraries and learning spaces that had been constructed or renovated in the previous ten years. The review was international in scope and included buildings and spaces designed by less prominent as well as high profile architects. The review resulted in a list of features considered by readers, library staff and architects to be important in the functioning of the 21st century library (see Appendix).

The project continued by examining current and future study and research habits, and consequent library and learning spaces. This work was conducted in three phases: humanities scholars; science, technology, engineering and medicine (STEM) scholars; and social science scholars. The analysis brought together the international context, via a review of the literature, with the local context, illuminated by focus groups and interviews with academics, postgraduate and undergraduate students, and with library staff.

Informed by the design review, Richard Ovenden, Bodley's Librarian, whilst overseas on other Libraries business, visited recently designed libraries noted

for their innovation. In addition, Richard was accompanied by Dame Vivien Duffield on three special trips: to Berlin in November 2015 to visit the Philologische Bibliothek at Freie Universität and the Jacob und Wilhelm Grimm Zentrum at Humboldt Universität; Lausanne in February 2016 to visit the Rolex Learning Centre at École polytechnique fédérale de Lausanne; and to Amsterdam in September 2016 to visit the Public Library and the Library of the Frei Universitet.

All scholars at Oxford use different spaces at different times, depending on their needs and moods. In general, the needs are the same for all but the characteristics of the space which addresses these needs depends on the individual. All scholars want an ambience that promotes focus, no distractions, and 'tucked away' spaces. Above all, spaces must be comfortable. Students like to work alongside their peers, but individually in companionable silence rather than as a group.

A concept that came through strongly from the research was the need for 'mental demarcation' when working. Scholars choose to go to a library to enter a 'bubble' without distractions, and wish to be able to take a break without leaving the 'bubble'. Therefore, leisure and relaxation space outside Reading Rooms but within the confines of the library is highly desired.

Humanities scholars will use electronic resources alongside physical resources – both those provided in the library and those they bring with them to the space. They will continue to use special collections and will increasingly use non-text primary sources. Humanities researchers will continue to work alongside specialist staff in locating and interpreting sources, and increasingly will require support in using specialist technology for recording, analysis and communication of research. There is also a desire among postgraduates and senior scholars for spaces to meet with colleagues to exchange ideas, both on

a shared research topic / resource of interest, but also more widely with colleagues from different disciplines.

Science and Medicine scholars will move to working solely with electronic resources, alongside electronic methods of recording, analyzing and communicating research. However there will still be a need for a convenient, comfortable, appropriate, silent study space that provides the environment, technology, and staff to support students in their study.

Social Science scholars will move towards primarily electronic resources, as reading software improves to accommodate preferred ways of reading, and will continue to use electronic methods of recording, analyzing and communicating research.

Visits made to recent library buildings highlighted the importance of key attributes of the best modern libraries. They should be flexible to adapt to changing patterns of use, and be easily adaptable. The best buildings provide a variety of spaces for study - ranging from seminar rooms to quiet study reading rooms - and have both small and larger spaces incorporated into the design. The best libraries provide good quality catering so that researchers are able to remain within the envelope of the library while obtaining sustenance. The best modern libraries blend the provision of print and digital collections in reading rooms and other areas, mirroring the blending of spaces for different kinds of library use and interaction with collections.

Above all the modern library should be seen as an intellectual hub, with collections at the core but which provides an environment for a range of services, activities, and study environments, which are shaped (or 'curated') by the library in a deliberately considered fashion. Many new library facilities include these components, but there is an opportunity in Oxford to bring the best of them together to create an entirely innovative new library for the 21st century.

The results of the research have been disseminated to stakeholders via a one-day symposium in June 2016. They have also been communicated to Libraries staff in Oxford via a lecture. The results have been communicated within the library community via journal articles and conference papers (specifically at UXLibsII and Library Assessment Conference).

Specific results and recommendations will be incorporated into planning for the Humanities Library on the Radcliffe Observatory Quarter site and the refurbishment of the Radcliffe Science Library.

Project description

Aim of the project

The objective of this investigatory project was to discover the current and future research habits of members of Oxford University, specifically in relation to library and related learning spaces and the resources available within those spaces. It aimed to consult with members of the University at all levels regarding their scholarly and teaching needs and how these can be met or supported through library services. To this end, it also investigated how architects, designers, library users and librarians envisage future academic library spaces and the availability of research resources. The project examined the resources and tools currently used by researchers; the kinds of information resources likely to be used in the future; and how and where these resources are used now, and likely to be used by future researchers. The results of this investigatory project have provided a picture of the ideal tools, services, spaces and research environments necessary for researchers to work most effectively.

Work packages

The 21st Century Library project was originally conceived to inform a medium-term re-evaluation of the requirements for a library on the Radcliffe Observatory Quarter (ROQ). In 2005, the University of Oxford issued its planning document for a new Humanities Building in Oxford. Incorporating a library, this building was planned for the site previously occupied by the Radcliffe Infirmary, now known as the ROQ, on the Woodstock Road. Following receipt of planning permission in 2009, the development was placed on hold. The project remained, however, a strategic priority for the University and by 2013 a need to restart the planning for this project became apparent. Between 2009 and 2013 a number of changes to the Bodleian Libraries, as

well as developments in the broader research and learning environment, meant that the original planning assumptions could no longer be relied upon and a re-examination of the ROQ building's parameters was necessary. In March 2013 Oxford University issued notice of a strategic review of capital projects to be held in autumn 2013. In order to adequately respond to this review, part of the 21st Century Library project had to be greatly accelerated. Following this capital projects review, the ROQ Humanities building was allocated to the second 5-year phase, and detailed planning was progressed through a pre-feasibility study, which was undertaken during the course of 2016. The 21st Century Library project has been able to inform and contribute to the pre-feasibility study.

At the same time, the Bodleian Libraries received a legacy to be used to improve the Radcliffe Science Library. The 21st Century Library project was therefore extended to cover Science, Technology, Engineering & Medicine (STEM) and Social Science subjects in order to feed into this exciting project.

This multi-strand, multi-phase research project finally had four components:

1. A 21st century humanities library
 - Consultations with the University community and structured analysis of their views.
 - A review of existing feedback pertaining to space issues.
 - A review of existing published research relating to research spaces of the future.
2. A 21st century science library
 - Consultations with the University community and structured analysis of their views.
 - A review of existing feedback pertaining to space issues.
 - User Experience (UX) analysis of the Radcliffe Science Library.

- A review of existing published research relating to research spaces of the future.
- 3. A 21st century social science library
 - Consultations with the University community and structured analysis of their views.
 - A review of existing feedback pertaining to space issues.
 - A review of existing published research relating to research spaces of the future.
- 4. Design Review: Libraries and their Learning Spaces
 - A review of recently designed or recently renovated academic library buildings, many of them designed by leading architects.
 - A survey of physical and virtual features within these buildings, significant in the design of effective learning and research spaces.
 - Site visits to libraries that might serve as models for future Oxford research and study library spaces.

Some of these components were designed to run concurrently, others consecutively.

Libraries are the laboratories of the humanities.



A 21st century humanities library

The first phase of the project focused on humanities and began with a series of six focus groups and six one-on-one semi-structured interviews with eleven academics (research and teaching faculty, early career researchers, tutors), 17 postgraduate students and 16 undergraduate students.

The information gathered was complemented by a review of the existing feedback from readers pertaining to space issues, primarily gathered via the University-wide library survey run during autumn 2012 (LibQUAL+). The feedback was synthesised to extract the underlying issues and was amalgamated with the data from the consultation.

Finally, the researcher undertook a review of the published research relating to research spaces of the future for Humanities scholars. The purpose of this exercise was to try to predict the research and learning needs of future members of the University. The literature was synthesised to identify common themes, and illustrative examples were captured. The bibliography is presented at the end of this report.

At the end of the project, five students took part in a week-long diary study to gain some insight into the impact the planned Humanities library on the (ROQ) might have on students' 'journeys' within the city for their study/research.

Libraries are 'the laboratories of the humanities' and as such play a crucial role in the lives of humanities students and researchers. This is not solely because they provide access to archives, manuscripts and printed resources, but because they provide an environment conducive to reading, writing and

“I would like to be able to share my photographs easily with students. I have found this thing called Flickr, but I am not sure how to go about it. The librarians are always so helpful I want to ask *them*”

thinking, and the supporting facilities and resources to enable scholars to interpret and analyse sources.

Humanities scholars use a wide range of resources in libraries. One of the key reasons for visiting libraries is well known - to use special collections of rare books, manuscripts and archives. Another is specific to the Oxford environment – as a Legal Deposit library, books held in the Bodleian Library may only be read in one of the on-site reading rooms. Additional copies may be available to borrow from the faculties’ libraries, but this is not the case for all books. In the future, an increasing number of both primary and secondary sources will be available online and so will not require a researcher to visit a particular library to use them. The use of digitised collections has already enabled scholars to use the time that was previously spent searching through print copies on more focused research. However, such digitised collections will not remove the need for researchers to interact with the tangible artifact: some will do so because the nature of their research requires it; other will do so out of preference and habit.

In the future, in addition to all the existing resources and digitised proxies of analogue items, humanities scholars will also be working with non-text primary sources (video, audio), born-digital primary sources, and big data corpuses. The use of scanners and digital cameras has already speeded up the process of taking notes and copying pages, and the need for scholars to use digital images has also consequently increased. Such usage will become more pervasive, sophisticated, and will also encourage a ‘data’ perspective on humanities research - where artefactual information becomes utilized as data through the process of digitization. As consequence, new tools and technologies will improve data analysis practices. Finally, technology will broaden the avenues for dissemination of humanities research. The scholarly

“Space to read.
Space to write.
Space to think.”

monograph will remain a central channel for dissemination; however, this does not necessarily mean a printed monograph. In the same way that hardback and paperback versions of the same fiction title can co-exist in the marketplace, so physical and electronic versions of the scholarly monograph will co-exist in the scholarly cannon. The physical monograph will always have cultural value, but electronic publishing will enable additions such as sound, video, and moving visualisations to be incorporated. Other avenues of dissemination, such as blogs, websites, social media, and digital-only publications will be increasingly used, particularly to engage with the public. Images will routinely be posted on services such as Flickr, conference presentations will be mounted on YouTube (for example), and discussions will occur via multimedia platforms. It is likely that the use of such technologies will become ubiquitous in the humanities because they improve the day-to-day research practices within the accepted ('traditional') research methods. In contrast, applying new research methods will become more widespread, but will remain in the minority over the medium- to long-term.

Although humanities researchers will continue to work as individual, independent scholars, the importance of research teams and groups is already a feature of humanities research and will grow in importance. Technology is already aiding such approaches and collaborations, through the use of wikis and Skype, and this will be an area where super-fast internet connectivity and the use of mobile devices will enable new ways of collaboration to take place.

These changes to the work practices of humanities scholars due to technology will not downgrade the importance of physical libraries in the research process. This study has found that humanities students and researchers already interact with resources that they could use anywhere (lending books; ebooks; ejournals; photocopies of printed articles) within a library. This is for three reasons. Firstly, because humanities scholars also view the library space itself

“[The Upper Reading Room] is what standing on the shoulders of giants feels like”

as a valuable resource for the provision of “space to read; space to write; space to think”. Secondly, because students and researchers need and value the expertise of specialist library staff. Finally, because communities of researchers interested in the same topic / students studying the same courses tend to coalesce around a library. These are discussed in more detail in the following paragraphs.

In the interviews and focus groups, students and researchers in the humanities described working in libraries as a way of achieving ‘mental demarcation’ from other areas of their life – whether that was teaching and administration, or friends and family. All participants commented that they particularly liked the wide range of different libraries available to them in Oxford. These different libraries have different characteristics, facilities, location, and clientele. This enables humanities scholars to choose where to study depending on their need and mood. Sometimes an individual wants to work in a tucked away space - “I like to hide in the Library so my students and colleagues don’t know where I am.” Sometimes they want to work (silently) alongside their peers - to feel part of a community or to spur them on to finish a piece of work. Sometimes they want an ambiance that promotes focus (for some this may be an inspiring historical building with a lovely view, for others a featureless ‘dull’ environment). Sometimes they want to work in an environment with no distractions (for some this is absolute silence; for others the ‘white noise’ of background hum). A single library cannot provide all these environments for everyone, but it does not need to because each individual library sits within the Oxford library ecosystem. If a scholar does not like a particular library they can, and do, use another library. The most dissatisfaction comes from being ‘forced’ to use a reading room they dislike, because that is the immovable location of a particular book.

“Mental demarcation”

Scholars use catalogues and finding aids to help them navigate the information landscape, and although these aids are increasingly electronic they will continue to include archivists, curators and specialist library staff. Participants in the interviews and focus groups commented on the trust and respect they have for specialist staff. In addition, students currently learn the skills of humanities research through guided interaction with the same sources used by established researchers. Such teaching may be by a researcher, archivist/curator/librarian, or a combination of the two. In order to take advantage of future technological developments students (and established researchers) will need to develop an additional set of research skills to layer on top of those that are necessary for a purely print environment. Where such technologies are not widely available, then it is appropriate to expect a 21st century humanities library to provide the spaces for students to hone these new skills, with the aid of technologies, equipment, staff support, and the opportunity to engage and collaborate with one another.

“I like to hide in the Library so my students and colleagues don't know where I am.”

One of the benefits for researchers needing to use specialist libraries and archives in order to get access to specific primary sources is that such resources are, by their nature, rare. Therefore, all scholars interested in that source will need to use the same library. This means that over a period of time spent in that library (usually over the summer period when researchers have no teaching commitments) a scholar will ‘bump into’ other scholars in the same subject, some of whom may have been unknown to them. High quality digital proxies may remove the need to physically travel to a particular location to access special collections, but the need to connect both to the archivist and to other scholars working on the same resource will remain. Therefore, 21st century humanities libraries will need to provide ways to re-establish this scholarly network. Interview and focus group participants highlighted that it was connections made with researchers outside their area that were the most

advantageous – usually achieved via serendipity. Therefore, the 21st century library should aim to provide inter-disciplinary interaction spaces.

The perfect new humanities library would provide peace and quiet, and desks large enough for working simultaneously with multiple resources – it is not unusual to see a scholar using a primary text, a secondary or reference text, a tablet and a laptop at the same time. There is no desire for facilities to support formal group work, but there is a desire for small ‘breakout rooms’ to be available adjacent to the reading room where a researcher could discuss a source with a colleague or students. Informal seating areas would be welcomed by those who wish to read entire books.



The perfect library would provide a conducive study environment with comfortable and ergonomic furniture, good temperature control, excellent light (preferably natural), good ventilation, pleasant lavatories, and easy access to drinking water. To enable scholars to stay in the library for the whole day, as well as to facilitate a feeling of community, there should be a social meeting area outside the reading rooms, but within the library. This area would have coffee and snacks available and a common room vibe so readers could discuss work with others, either in the same discipline or outside it. Those interviewed offered the Oxford Social Science Library and the Cambridge University Library Tearoom as good examples of this.

The perfect library would provide a suite of specialised technological resources, from the simple to the cutting edge, as well as help with using these technologies from library staff, who they already respect and trust. Simple technologies include: tripods and good lighting so digital cameras can be used



Immersive
visualisation in CSI
Cyber (CBS)

to record primary sources; personal scanners to record less fragile resources; and bookstands. Cutting edge technologies may include: graphics editing software; image manipulation software; 3D printers; and visualisation tools. Future scholars may even want to use holographic technology to help them integrate and organise sources and research notes. These spaces will require appropriate estates infrastructure to support them (such as enabling multi-gigabit delivery of data, appropriate cabling routes, associated machine rooms and air conditioning) as well as flexibility to cope with the rapid development of technology.

There is little desire for 24/7 opening; undergraduate and taught postgraduate students do want somewhere to work at the times they want to work, but for most this is fulfilled by College libraries open 24/7. Where resources are not available elsewhere in Oxford, or are confined to a specific physical library, postgraduate students in particular want weekend and vacation opening hours in that library to be the same as those during term-time weekdays in the larger libraries.

A 21st century science library

The second phase of the project focused on science, technology, engineering and medicine (STEM) libraries, and started with a survey of Radcliffe Science Library users and non-users during May 2014. This survey was sent via email to departmental administrators for onward circulation and received 359 responses (229 undergraduates; 21 taught postgraduates; 68 research postgraduates and 41 academic staff).

“If the person working next to me is in my seminar group and working hard, it encourages me to keep going when I get distracted.”

Five pseudo-focus groups were held with academic staff from STEM departments via the researcher attending departmental/faculty meetings of Zoology, Computer Science, Organic Chemistry, Inorganic Chemistry, and Physical Chemistry. In addition, the focus-group questions were published in the Department of Anatomy, Physiology & Genetics internal newsletter, asking for responses to the researcher. There were four focus groups with 16 undergraduate and 8 postgraduate students in Materials, Biochemistry, Computer Science, Chemistry, Medicine, Psychology, and Biomedical Sciences. In addition, interviews were conducted with nine College Librarians.

Following a conference on the benefits of using UX (User Experience) research techniques in libraries to investigate space requirements, the researcher partnered with the Head of Reader Services at University College London library to conduct a mutual UX assessment. The Head of Reader Services brought a small team of library staff from UCL and, working to a brief from the researcher, undertook UX assessment on the Radcliffe Science Library. Techniques used included observations, cognitive mapping, and anthropological interviewing techniques.

The data from the survey, focus groups and UX was combined with statistical data, existing feedback from the 2012 Reader Survey, and external research in order to identify common themes in three areas:

1. Whether Oxford needs a physical library for the sciences.
2. The resources scientists use / want to use in libraries.
3. The spaces scientists use for study / research.

The need for a science library



The results clearly show that there is a need for a physical science library located in the science area. Academic staff and students agree about the need for undergraduate, taught postgraduate and research postgraduate students to have a silent space with no distractions to work / study / revise / write up. However, academic staff feel that this should be provided by colleges or departments; students find that provision by colleges and departments is not adequate.

Unlike 10 years ago, students do not work in their rooms – viewing them as spaces reserved for relaxation and leisure. In fact the Librarian at one college where many students do work in their rooms reported that the college administration was taking steps to discourage it – partly to foster a greater sense of collegiate academic community, partly for welfare reasons. In addition, while there is a great deal of affection for college libraries, they do not provide a suitable environment for many STEM students when they need to focus on their work. This is for a number of reasons: college libraries are too noisy; they are a social space where you see your friends (even if not noisy) and this is distracting; they are too busy and so there is no space; they are humanities-focused and STEM students do not feel welcome.

In addition, STEM students from undergraduate through to first year doctoral students (with some exceptions notably Psychology and Computer Science)

mainly use textbooks as their key information source - mostly physical books, either because they prefer them or because e-books are not available. Therefore, there is also a need for a physical science library to provide a lending collection of course texts. Most students would prefer to borrow such texts from their college library due to the longer loan periods and less distance to carry them back to their room. However, colleges have uneven provision of STEM course texts, with many not having the latest editions and none having enough copies for all students.

Resources

While STEM academics primarily use journal articles, students use textbooks, supplemented by journal articles (electronic) as they progress throughout their academic career. The exceptions to this are Psychology students, who use articles from early on in their undergraduate career, and Computer Science students, who primarily use tutor-created resources, such as worksheets and lecture notes.



The EnergyPod from metronaps:
www.metronaps.com

Other resources used by STEM students are referencing software, web tools such as Facebook (for connecting with others on the same course), Google (for resource discovery), and YouTube (for tutorial videos). They are heavy users of printing and scanning facilities, and also make use of specialist librarians to help them locate and use scientific literature. One facility desired by students but not provided in the current science library is large dual screens that can be used with the PC provided or with a laptop – large screens are helpful for data analysis.

Spaces

In line with their reasons for using the Science Library as a study space, students want a quiet study environment with no distractions. They wish to work alongside their peers in companionable silence – they use their college

“I like to sit at the computers in the entrance hall, with my back to the desk. That way I am not tempted to go on social media or play games, as I know the librarians can see what I am doing, and will judge me.”

library for social study. There is little need for group study rooms, as very few group assignments are set in Oxford, and for informal discussions they tend to use *ad hoc* spaces in the departments “My friends and I sit on the benches outside the lecture theatre to discuss what we have just learned [in the lecture]”.

STEM students choose to work in the Science Library because they need to knuckle down to meet a deadline. They therefore wish to be there all day and so need facilities such as a café where they can buy food and drinks as well as eat their own ‘packed lunch’. They want relaxation spaces within the building so they can take a break, simple things like lockers for valuables while they are away from their desk, and even more unusual things like ‘sleep pods’ (Manchester University Library has recently installed these).

As with humanities students, a comfortable environment is very important – temperature, lighting, ventilation, furniture, availability of drinking water and decent toilets all contribute to an environment that is pleasant to spend time in. Also in line with the findings from humanities students is the need for large desks to accommodate a selection of information resources and writing tools. However, when revising for exams, students would rather there were more seats and smaller desk spaces.

The study space (the Lankester room) in the Radcliffe Science Library basement is universally disliked, in particular because of the lighting, temperature (cold) and “oppressive atmosphere”. A number of spaces in the current building feel unwelcoming, and wayfinding is difficult and confusing.

As is expected for today’s students fast, stable, reliable Wi-Fi is an essential. However, this does not mean that all students bring laptops with them; there is still a desire for PCs to be provided by the Library. This is for one of two reasons: (1) students do not wish to carry around their laptop, either for

Companionable silence

security or weight reasons and (2) students are using the library as an external force to make them concentrate on the work in hand – there is a (incorrect) perception that library staff are monitoring what readers are doing on library PCs, and this is the impetus they need to avoid wasting time on the internet etc.

Academic staff expressed the need for more teaching space, particularly interdisciplinary teaching space for students in Centres of Doctoral Training, and also multipurpose rooms that can be used for classes, seminars, meetings etc.

A 21st century social science library



Consultations with the University Social Science community ran during November 2015 – June 2016. The researcher ran three focus groups with 14 undergraduate and postgraduate students in Law, Anthropology, Politics & International Relations, Education, Economics, Sociology and Socio-Legal Studies.



During February 2016 the University-wide library survey was re-run, again using LibQual+ methodology. One of the aspects of this survey is Library Space, and the results were analysed, along with pertinent free-text comments, and incorporated into the synthesis for this research.



Social Science students use electronic journals and datasets, and hard copy literature such as report series. They use both physical and electronic books, depending on what they are using them for. E-books are used when searching for a particular concept, or for reading a single chapter, but physical books are preferred when reading large portions, reading for a long time, or when needing to flick back and forth through the book. This preference is primarily due to inadequacies in the e-book reading software, with a few scholars still preferring the haptic experience of physical books.



All those taking part in the focus groups would prefer to be able to borrow the physical books they need rather than have to stay in the specific subject library to use them. Some scholars also use special collections, primarily archives.

“comfy, but not too comfy”

Social Science researchers would like to receive face-to-face assistance in data analysis tools in the Library, as they see this as a natural place to come for assistance. Large dual-screens on PCs or that laptops can be connected to would assist with such analysis.

All students found the Social Science Library to be “almost perfect” because it is comfortable, has a variety of study spaces, feels spacious, is close to a good café, and has a “business-like” environment that promotes focus and silent working. One student particularly liked that they could buy earplugs if they were finding it too distracting.

“I wake up and see which library I feel like that day”

Some scholars like to move from library to library as this assists them in re-focusing after a period of concentration. Others use different libraries for different purposes: “I like the philosophy library for reading as it is comfortable. But the SSL has bigger desks so I go there to write”. Yet others use different libraries depending on their mood: “I wake up and see which library I feel like that day”. Students do not work in their rooms, finding them too distracting. Most use college libraries during the night or at weekends when the Social Science Library is not open. However, they do not feel they are as productive as when working in one of the Bodleian Libraries. Postgraduate students would like vacation opening hours of the Social Science Library to mirror those during term-time.

As seen previously, scholars want a comfortable environment - temperature, natural lighting, ventilation, furniture, availability of drinking water and nice toilets. Also in line with the findings from other disciplines is the need for large desks to accommodate a selection of information resources and writing tools. Ideally these large desks would be individual rather than shared with other readers. Students also want to be able to use their own devices, so need power and Wi-Fi, yet also wish to use PCs provided by the library.



Students would like more informal seating, particularly adjacent to the current periodicals display so they can ‘flick through’ the new issues when on a break. As with other disciplines, students do not wish to leave the ‘mental bubble’ of the library as they feel they will get distracted and not return to finish their work.

Many students spend so long in the Social Science Library that they would like it to feel more ‘homely’. There were also requests for armchairs with pull-out desks, and more informal options such as beanbags. Some students would also like to be able to work in the green space immediately outside the library in the summer months.

Graduate students expressed a need for bookable rooms where they are able to undertake data collection via interviews (face-to-face and via Skype), focus groups or tests. Such facilities are not available to them in their departments.

Focus group participants highlighted that the best way to make connections with researchers outside their area was in the library, as that was where everyone studied. Therefore, the 21st century social science library should provide inter-disciplinary interaction spaces.

All those who took part in the focus groups appreciated the friendly, holistic support they received in Oxford social science libraries.

Themes across disciplines

A number of themes, common across all disciplines, emerged from this research.

Libraries defined by types of study spaces not collections

Firstly, there is a change in how libraries are viewed by students. All students now wish to select which library they study in based on the characteristics of the physical library itself – location (convenient to college or department / ‘off the beaten track’ for them); architecture (historical / modern); nature of quiet (absolute silence / background hum); type of seating (carrels / large table to spread out / tucked away desks etc); temperature; food and drink facilities (both to consume brought-from-home, and to buy); opening hours. This is a fundamental change in the way we view libraries, which have historically been on the basis of the physical collections housed within them.

Variety of spaces to suit different people

Secondly, different readers want different types of study space, and individual readers want different types of study space at different times. For example, a postgraduate might want an architecturally inspiring space with absolute silence when they are thinking, but prefer an off-the-beaten track (for them) library with a background hum when they are writing on their laptop. An undergraduate might want a conveniently located library with large tables close to a source of excellent coffee during normal term time, but during exam revision want a silent location where there are no distractions and they feel comfortable staying all day. There is no driver to provide all environments in each library as readers are happy to move between libraries. The exception to this is where readers must use a particular library as the open-shelf items cannot be borrowed and are not available electronically. These readers (typically in the Old Library, Radcliffe Camera, and Law Library) want a variety of study environments to be available where they are ‘forced’ to work.

Variety of study spaces to suit the same person at different times

Comfort	Whatever the other characteristics of a physical library, readers want it to be comfortable - ergonomic furniture, good temperature control, excellent light (preferably natural), good ventilation, pleasant toilets, and easy access to drinking water.
Companionable silence in Reading Rooms	As a reflection of the changing nature of research, readers need to work across and between disciplines. In general, readers want to work in 'companionable silence' within reading rooms. However, to facilitate a feeling of community they want a social meeting area outside the reading rooms, but within the library with coffee and snacks available and a common room vibe so readers could discuss work with others, either in the same discipline or outside it. In addition, students wish to have spaces where they can work alongside colleagues from other colleges.
Social meeting space in library	Taught students expect the central University libraries (ie the Bodleian Libraries) to equalise and ameliorate uneven provision across Colleges and Departments/Faculties. In addition, there are aspects of Library provision (resources, staff, technology) that it is only economically viable to provide centrally for the whole University.
Equality of provision	Finally, readers' wants and needs from a physical library change throughout the academic year. Therefore the 21st century library needs to have the flexibility to change in-year.
Flexibility to change in year	

Library design review

Methodology: library design review

The first part of the design review began in February 2013 and ran until May 2014. Coverage was international in scope and included buildings and spaces designed by high profile as well as lesser known architects.

Between February and July 2013 the 21st Century Library project researcher analysed selected recently designed new libraries and recent renovations and/or extensions and produced a list of physical and virtual features considered significant in assisting the 21st century students/researchers to work more effectively.

The next step in reviewing current library design was to visit recently designed or renovated buildings in order to examine them more closely. Dame Vivien Duffield had expressed interest in accompanying Bodley's Librarian, Dr Sarah Thomas, on these visits. However, the departure of Dr Thomas to Harvard necessitated the postponement of these visits. The visits were undertaken by Dame Vivien and Richard Ovenden (Bodley's Librarian from January 2014) during 2015 and 2016.

In March 2013, the centennial issue of *The Art Bulletin* appeared with a telling front cover for the 21st century reader: a photograph by the artist Martha Rosler of an installation of her travelling library (Paris, 2007-2008). Rosler's image shows a well-lit space with crowded book shelves, and, prominently



placed, a chair inviting the browser to take a seat. What remains unexpressed, however, is the fact that even eight years ago when the photograph was taken, some library users might have preferred to read Rosler's books on their laptops rather than sit with her hard-copy editions.

Oxford Libraries

Supporting the research and study activities of the University's departments, faculties, centres, institutes and schools, Oxford's libraries are many and varied. A feature common to all of them, however, is that none is housed in a space designed before the true impact of the internet age and its continuously emerging technologies came to be appreciated.

Recent new libraries / refurbishments include:

Pitt Rivers Museum Research Centre & Balfour Library (completed 2007)
Pringle Richards Sharratt Architects

Middle East Centre Library & Archive (completed 2015)
Zaha Hadid Architects

China Centre Library (completed 2014)
David Morley Architects

Radcliffe Science Library extension (completed 2007)
Pringle Richards Sharratt Architects

Weston Library (completed 2015)
WilkinsonEyre

Recently designed new libraries

Aberdeen

Aberdeen U./U.L. (completed 2011)

<http://www.abdn.ac.uk/library>

Schmidt Hammer Lassen

Selected other bldgs: See Copenhagen; London

Selected literature: A. Dunlop “Quietly pleased” *Architects’ j.* v.234/19 (Dec 2011) p 22-29

P. Lewis: “Light reading” *Architecture today* n. 222 (Oct 2011) p 80-82, 85-86, 89 --
Abstract: “iconic expression”; “The library combines the attributes of the ‘new learning landscape’ at the same time as providing study space for reading and reflection”

Comments: “21st century learning and research environment for students, university staff, visitors and the public”; “how an architect can make a difference”; “The library combines the attributes of the ‘new learning landscape’ at the same time as providing study space for reading and reflection”;



Alexandria (Egypt)

Bibliotheca Alexandrina (completed 2001)

http://www.bibalex.org/Home/Default_EN.aspx

Snøhetta

Selected other bldgs: See Raleigh

Selected literature:

P. Davey “The Great Library” *Architectural review* 210/1254 (Aug 2001) 16-18

“Noble volume: the heroic Great Library of Alexandria clearly merited an Aga Khan Award” *Architectural review* 217/1295 (Jan 2005) 63-[65]

“Wonder of the world: Bibliotheca Alexandrina” *Volume* (Amsterdam, Netherlands) 15 (2008) 54-59



Baltimore

Morgan State University/Earl S. Richardson Library (completed 2008)

http://www.morgan.edu/university_library/library_information/library.html

Sasaki Associates

Selected other bldgs: See El Khoura, Kansas City, Saint John

Selected Literature: *Libraries* [ed. by Katy Lee] (Hong Kong: Design Media, 2011)

Comments: “inherently flexible in order to accommodate changes in library services and pedagogical evolution” (Architects). “has spaces to accommodate the diverse ways in which [. . .] students study—an honors area for those who prefer private study, as well as group study areas for conversation and collaboration” (Architects).





Berlin

Frei U./Philological Library aka “The Brain” (completed 2005)

<http://www.fosterandpartners.com/Projects/0980/Default.aspx>

Foster + Partners

Selected other bldgs: London/Millennium Bridge; London/Great Court, British Museum; Oxford/Social Science Library

Selected literature:

“Foster and Partners: the Free University's Faculty of Philology Library - Berlin, Germany 1997-2005” *A & U: architecture & urbanism* 1/508 (Jan 2013) 36-39
P. Makovsky “Thought bubble: Foster and Partners' new library in Berlin utilizes decades of research, taking green building to the next level” *Metropolis* 25/6 (Feb 2006) 73-[81]

N. Foster and others *Free University of Berlin: Foster + Partners* (Munich: Prestel, 2011)

Humboldt U./Jacob und Wilhelm Grimm Zentrum (completed 2009)

<http://www.ub.hu-berlin.de/>

Max Dudler Architekt

Selected other bldgs: See Essen; Frankfurt/Neue Deutsche Börse

Selected literature:

<http://www.dailytonic.com/jacob-und-wilhelm-grimm-zentrum-in-berlin-germany-by-max-dudler-architects/>
U. Brinkmann “Die Bibliothek als Stadtraum [The library as urban space]” *Bauwelt* v. 100 n. 38 (Oct 2009) p 16-23

F. Kaltenbach “Kritisch betrachtet: Jacob-und-Wilhelm-Grimm-Zentrum in Berlin [A critical view: Jacob and Wilhelm Grimm Centre in Berlin]” *Detail* 49/12 (Dec 2009) p 1314-1315

“Max Dudler: Jacob and Wilhelm Grimm Center, Central Library of Humboldt University, Berlin - Berlin, Germany 2005-2009” *A & U: architecture & urbanism* 1/508 (Jan 2013) 150-153

F. Saverio Fera “Jacob und Wilhelm Grimm Zentrum library, Humboldt Universität zu Berlin (Max Dudler)” *Casabella* 74/786 (Feb 2010) p 13-23

Comments: “With its strict symmetry and impressive galleries it creates a common culture space in the sense of the ‘old library’.”

Bilbao

Universidad de Deusto/Biblioteca-CRAI (completed 2008/2009):

<http://www.biblioteca.deusto.es/>

José Raphael Moneo

Selected other bldgs: Museo del Prado extension

Selected literature:

A. Garcia-Abril “Rafael Moneo: bibl. Unv. A Bilbao” *Casabella* 73/782 (Oct 2009) p

86-99

Features: Spaces: 4 lecture halls, 4 seminar rooms, 11 group study rooms, 42 carrels, 10 workrooms (“talleres”), Reprographics Services

Comments: Building faces Frank Gehry’s Guggenheim Bilbao, a hard act to follow

Calgary

University of Calgary/Taylor Family Digital Library (completed 2012)

<http://tfdl.ucalgary.ca/>

Kasian Architecture

Architect’s comments: “Design can fundamentally change the way people perform in a space”

Features: modular/movable walls which create enclosed area simply by touching a button; technology sandbox space which enables students to make their own systems; collaborative work-areas for students; Learning Commons; café; film and audio rooms, digital editing and recording suite; multimedia labs; quiet study zone; seminar and consultation area; 265,000 square feet; 6 floors; 32,000 print monographs

Chicago

University of Chicago/Mansueto Library (completed 2011):

<http://mansueto.lib.uchicago.edu/>

Jahn

Selected literature:

D. Madsen: "The Joe and Rika Mansueto Library" *Architectural lighting* 26/7 (Nov-Dec 2012) 23-25

K. Gerfen "Joe and Rika Mansueto Library, Chicago" *Architect* (Washington, D.C.) 100/10 (Oct 2011) 98-104

“Joe and Rika Mansueto Library” *ArchDaily* (14 June 2011):

<http://www.archdaily.com/143532/joe-and-rika-mansueto-library-murphy-jahn/>

Delft

Delft University of Technology (completed 1997)

<http://www.library.tudelft.nl/en/>

Mecanoo Architecten (Francine M.J. Houben)

Selected other bldgs: See Birmingham/Birmingham Public Library

Selected literature:

J.-C. Kucharek “The everyman library” *RIBA j.* (July 2009) p 32-35 (also on Birmingham Public Libr.)

Comments: “Mecanoo’s approach is to dismiss any idea that there should be a contemporary library typology.”



**Düsseldorf****Heinrich-Heine-Universität: Ort des Austauschs des Studiums & der Entwicklung (O.A.S.E.)**

<http://www.medizin.hhu.de/studium-und-lehre/oase.html>

HPP Architects

Selected other bldgs: Leipzig Opera House (renovation)

El Khoura (Lebanon)

University of Balamand/Learning Centre (completed 2012)

ARCHIKA Kamal Homsy Architects & Sasaki Associates:

Selected other bldgs: See Baltimore, Kansas City, Saint John

Features: complements traditional library facilities: incorporates: learning commons, experimental classrooms, remedial and distance education center, group study and meeting spaces, café, lounge

Comments: “spatially fluent” (Architects)

Essen

Folkwang University of the Arts/Library (completed 2012)

<http://www.folkwang-uni.de/home/hochschule/organisation/bibliothek/>

Max Dudler Architekt

Selected other bldgs: See Berlin/Humboldt U.

Selected literature:

<http://www.folkwang-uni.de/en/home/hochschule/organisation/library/new-library-building/>

“Folkwang Library/Max Dudler” *ArchDaily* (18 Jan 2013):

<http://www.archdaily.com/320254/folkwang-library-max-dudler/>

Comments: Note rendering on the exterior; interior resembles Berlin/Humboldt U

Footscray (Western Australia)**Victoria U./Exercise Science and Learning Commons Precinct**

<http://www.johnwardlearchitects.com/projects/category/3-educational/project/4-exercise-science-and-learning-commons-precinct>

John Wardle Architects

Selected literature:

<http://www.archdaily.com/369898/victoria-university-exercise-science-and-sport-precinct-and-learning-commons-john-wardle-architects/>

A.Johnson “Victoria University ESSP and Learning Commons” *Architecture Australia* [aka *ArchitectureAU*] 100/4 (Jul-Aug 2011) p 71-77:

<http://architectureau.com/articles/victoria-university-essp-and-learning-commons/>

Features: Collaborative teaching spaces; contrasting interior landscapes; 1300 “learning spaces”



Helsinki

Helsinki U. of Technology/Keskustakampuksen Kirjasto (Central Campus Library) <http://www.archdaily.com/40151/the-university-of-helsinki-city-campus-library-anttinen-oiva-arkkitehdit/>

Anttinen Oiva (Selina Anttinen, Vesa Iova)

Selected literature:

"Helsinki U. Main Library" *A + U: architecture and urbanism* n.8(503) (Aug 2012) p 112-117. (Abstract: Five faculty libraries are joined to make a single administrative group.)

N. Saieh "The University of Helsinki City Campus Library / Anttinen Oiva arkkitehdit" *ArchDaily* (08 Nov 2009): <http://www.archdaily.com/40151>

Features: Five faculty libraries combined into one bldg



Hongsung-gun (S. Korea)

Chungwoon University Library (completed 2011)

<http://english.chungwoon.ac.kr/>

Hyunjoon Yoo Architects

Literature:

Libraries [ed. by Katy Lee] (Hong Kong: Design Media, 2011)

<http://www.archdaily.com/90694/chungwoon-university-library-hyunjoon-yoo-architects-danu/>

<http://fancycribs.com/3814-chungwoon-university-library-by-hyunjoon-yoo-architects-danu.html>

Comments: "The ideal life style at the library is reading a book by the window with a natural view" (Architects). "The floating cube library" (Architects).



Joondalup (Australia)

Edith Cowan U./U.L. (completed)

<http://www.ecu.edu.au/centres/library-services/overview>

Jones Coulter Young

Selected literature:

K. Hislop: "Edith Cowan U. Library: a 'third place' . . . accessible gateway" *Architecture Australia* 97/3 (May-June 2008) p 66-73: <http://architectureau.com/articles/edith-cowan-university-library/>

Comments: "its public space is strongly reminiscent of an airport transit lounge" – noise; "the core purpose of the library has not been replaced, but amplified"

Lausanne

École polytechnique fédérale de Lausanne/Rolux Learning Centre (completed 2009)

<http://roluxlearningcenter.epfl.ch/page-45189-en.html>

SANAA (Kazuyo Sejima, Ryue Nishizawa)

Selected other bldgs: London/Serpentine Gallery Annual Pavilion (2009)

Selected literature (the most extensive coverage of all the libraries listed here):

C.A. Pearson «SANAA's built landscape» *Architectural record* 198/3 (Mar 2010) p 25

J. Payne "Lausanne" *Architecture today* n 206 (March 2010) p 10-15

F. Albanese "SANAA's solid garden" *Domus* n.934 (03/2010) p 17-26

"À la loupe: le génie d'une construction » *Architecture d'aujourd'hui* n.377 (Apr-May 2010) p 37-76

S. Devabhaktuni "A little space called space" *AA files* n. 58 (2009) p 74-77

Comments (extensively covered):

"building like no other", "functionally and formally surprising"; "the genius behind the bldg." (other comments, however, have been less enthusiastic); SANAA's sources behind the creative process: "we start from the environment and the program"; "fluid architectural space"; "feels like a space for the young and fit" (sloping floors of up to 30° gradient); "suspicion that prestige has precedence over function"; internal walls are replaced by distance as a means of differentiating spaces.

Features: Focus on the horizontal rather than the vertical: on one continuous, undulating floor – "internal landscape"; moving platforms aka "horizontal lifts". Each bookshelf includes a flat scanning platform so books can be photographed from above w/out damaging them.

London

U. of East London/Stratford Campus Library (2016)

Hopkins Architects

Selected other bldgs: London Olympics Velodrome; V&A Masterplan, incl. Long Gallery and Raphael Tapestry Court

Features: advanced digital library, self-issue and return services, automatic book sorter; acoustic strategy that ensures the learning areas are isolated from the ground floor 'hub' space

Paris

Université Panthéon-Assas/Bibliothèque (completed 2011)

http://www.u-paris2.fr/1212137322916/0/fiche___document/&RH=Bibliotheque

SAREA Alain Sarfati

Selected literature:

M. Guislain "Bibliothèque de la Faculté d'Assas [New library at the Université Panthéon-Assas, Paris]; Architects: Alain Sarfati Architecture" *Moniteur architecture AMC* n. 212 (Feb 2012) p 104-106



**Prague****National Technical Library (Národní technická knihovna)** (completed 2009)

projektíl architekti

Selected literature:*Libraries* [ed. by Katy Lee] (Hong Kong: Design Media, 2011)O. M. Razetto and others "Grand Prix winner: National Technical Library, Prague" *Architekt* (Prague) 56/3 (2010) 20-25A. Skalickâý "Library, Prague" *A10: new European architecture* 29 (Sept-Oct 2009) 31033

M. Vasko "Economics [National Technical Library (NKT), Prague]" 275/8628 (18) (7 May 2010) 52-54

Comments: "Meant to be a "technical handbook", so you can see all the wires, pipes, structure.**Princeton (US)****University/Lewis Library** (completed 2008)<http://scilib.princeton.edu/about/lewislibrarybuildingproject.html>**Frank Gehry**Selected other bldgs: Bilbao/Guggenheim MuseumSelected literature: "Frank O. Gehry: Lewis Library" *GA document* 106 (Dec 2008) 8-[27]**Raleigh, NC****North Carolina State U. (NCSU)/James B. Hunt Library** (completed 2012/2013)<http://www.lib.ncsu.edu/huntlibrary/vision>**Snohetta** (Craig Dykers, Kjetil Tr  dal Thorsen)Selected other bldgs: See AlexandriaSelected literature:<http://www.archdaily.com/354701/hunt-library-snohetta/#.UV3eaoz7CjI.mailto>W. Hanley "Unveiled: Snohetta's Hunt Library" *Architectural record* 201/3 (March 2013) 31Comments: NCSU has a "reputation for an intense and sustained focus on how students learn and how faculty create and share knowledge in an age of digital technology and collaboration"**Saint John (New Brunswick, Canada)****University of New Brunswick/Hans W. Klohn Information Commons** (completed 2011)**Sasaki Associates**Selected other bldgs: See Baltimore, El Khoura, Kansas City



Santiago (Chile)

Universidad Diego Portales/Biblioteca Central (completed 2011)

<http://www.udp.cl/biblioteca/>

Mathias Klotz

Selected literature:

“Bibl. central Universidad D. Portales” *Casabella* n.811 (Mar 2012) p 64-65

J.T. Franco “En construcción: Centro de Extensión y Biblioteca Central UDP”

Plataforma arquitectura (01 Feb 2011):

<http://www.plataformaarquitectura.cl/2011/02/01/en-construccion-centro-de-extension-y-biblioteca-central-udp-mathias-klotz/>



Seville

Seville U./Central Library (on hold)

<http://www.zaha-hadid.com/architecture/university-of-seville-library/>

Zaha Hadid

Selected other bldgs: See Vienna; Oxford/St. Anthony's College

Selected literature:

D. Cohn “[Zaha Hadid's Central Library for the University of Seville]” *Architectural record* 197/9 (Sept 2009) p 36-37



Singapore

Nanyang Technological University/The Hive (completed 2015)

<http://media.ntu.edu.sg/NewsReleases/Pages/newsdetail.aspx?news=a161986e-ddb6-47de-8cf6-25264cefd934>

Heatherwick Studio

Selected literature: <http://www.archdaily.com/607594/learning-hub-heatherwick-studio>

<http://www.architectural-review.com/today/learning-hub-in-singapore-by-thomas-heatherwick/8681493.fullarticle>

Comments: “the most important function of this new university building was to be a place where students and professors from various disciplines could meet and interact with one other” (Architect)



Singapore

Yale-NUS College/Learning Commons (completed 2015)

<http://library.yale-nus.edu.sg/>

Pelli Clarke Pelli and Forum Architects

Selected literature: http://www.architectmagazine.com/project-gallery/yale-nus-college_o

<http://www.archdaily.com/254921/yale-nus-college-campus-pelli-clarke-pelli-architects>

Comments: “The Learning Commons, which contains the library and a multi-media center, is set on a slope to symbolize the pinnacle of knowledge.” (Architect)



Tokyo

Musashino Art University/Museum & Library (completed 2010)

<http://mauml.musabi.ac.jp/en/>

Sou Fujimoto Architects

Selected other bldgs: London/Serpentine Gallery Annual Pavilion (2013)

Selected literature: N. R. Pollock “Musashino Art University Museum & Library”

Architectural record (25 March 2011)

T. Daniell “Beyond the virtual body: Toyo Ito interviewed on his Sendai Mediatheque and Tama Library” *Volume* (Amsterdam) n. 15 (2008) p.60-64



Tokyo

Seikei University/University Library (completed 2006)

Shigeru Ban

Selected other bldgs: Centre Pompidou-Metz

Selected literature:

F. Blevinal “Design Seikei University | The future of Libraries? In Japan, elevated study pods encourage conversation” *Empower network* (March 3, 2013):

<http://www.empowernetwork.com/infobiz/blog/design-seikei-university-the-future-of-libraries-in-japan-elevated-study-pods-encourage-conversation/>

Features: Elevated glass study pods (“isolation rooms” or “planets”) – also for group study and talking



Tokyo

Tama Art University/Library (Hachioji campus) aka Hachioji Library (completed 2007) <http://tamabi.ac.jp/english/about/library.htm>

Toyo Ito

Selected other bldgs: Sendai: Mediatheque (multimedia centre, completed 2000); London/Serpentine Gallery Annual Pavilion (2002)

Selected literature:

http://www.world-architects.com/en/projects/26481_seikei_university_library

T. Daniell “Beyond the virtual body: Toyo Ito interviewed on his Sendai Mediatheque and Tama Library” *Volume* (Amsterdam) n. 15 (2008) p.60-64

N.R. Pollock “Toyo Ito combines a new kind of grid w an innovative system of arches” *Architectural record* 196/1 (Jan 2008) p 49

“Tama Art University Library [photos by Ishiguro Photographic Institute]” *Dezeen* (11 September 2007): <http://www.dezeen.com/2007/09/11/tama-art-university-library-by-toyo-ito/>

“Tama Art University Library” *Architectuul*: <http://architectuul.com/architecture/tama-art-university-library>



Tsinghua (China)

Humanities and Social Sciences Library (completed 2011)

<http://www.lib.tsinghua.edu.cn/english/>

Mario Botta

Selected other bldgs: San Francisco/SF MoMA

Selected literature:

<http://eng.lib.tsinghua.edu.cn/News/Document/1306/1306.html>

Le courrier de l'architecte (Cahier special, 2011) :

http://www.lecourrierdelarchitecte.com/album_2644



Utrecht

Utrecht/Univ. Library (completed 2004)

<http://www.uu.nl/En/Pages/default.aspx>

Wiel Arets

Selected other bldgs: Sendai: Mediatheque (multimedia centre, completed 2000)



Vienna

Vienna U.of Economics & Business Admin/Library and Learning Ctr (completed 2013)

<http://www.dezeen.com/2008/12/18/library-and-learning-centre-at-the-university-of-economics-business-by-zaha-hadid-architects/>

Zaha Hadid

Selected other bldgs: See Oxford/St. Anthony's College; Seville

Selected literature:

D. Sokol "Zaha Hadid chose to design Vienna library" *Architectural record* (20 Jan 2009): <http://archrecord.construction.com/news/daily/archives/090120hadid.asp>

"Zaha Hadid design for University of Vienna campus is underway" *Designboom*:

<http://www.designboom.com/architecture/zaha-hadid-design-for-vienna-campus-is-underway/>



Vilnius (Lithuania)

Vilnius U./U.L., National Open Access Scholarly Communication & Information Centre (completed 2012/2013)

<http://www.mkic.mb.vu.lt/> (in Lithuanian)

R. Paleko ARCH Studija

Selected literature:

<http://www.archdaily.com/357038/vilnius-university-library-science-communication-and-information-center-paleko-arch-studija/>



Worcester

Worcester U. et al./“The Hive” (completed 2012):

Feilden Clegg Bradley:

<http://www.fcbstudios.com/projects.asp?s=6&ss=2&proj=1411&search=hive>

Selected literature:

“The Hive” De Zeen magazine (12 April 2012):

<http://www.dezeen.com/2012/04/12/the-hive-by-feilden-cleggbradley-studios/>

C. Wright “Secular cathedral: Feilden Clegg Bradley Studios in Worcester”

Architecture today n. 228 (May 2012) p 32-39



Recently designed library renovations/extensions

Auckland (NZ)

Massey U. (U. of New Zealand)/Albany Library/Study Centre (completed 2010)
<http://www.massey.ac.nz/massey/research/library/about-us/campus-libraries/albany-library.cfm>

Opus Architecture

Selected literature:

N. Stock "Massey UL" *ArchitectureNZ* n. 5 (Sept/Oct 2010) p 59-65

Beijing

National Library of China/NLC extension (completed 2008)

<http://www.nlc.gov.cn/old/old/english.htm>

KSP Jurgen Engel Architekten

Selected other bldgs: Documentation Center, Bergen-Belsen Memorial

Selected literature: O. Prizeman "Typology quarterly: libraries" *Architectural review* 230/1377 (Nov 2011) 83-95

Berkeley (CA)

University of California, Berkeley/C.V. Starr East Asian Library (completed 2008)

<http://www.lib.berkeley.edu/EAL/>

Tod Williams Billie Tsien Architects

Selected other bldgs: New York/American Folk Art Museum; Philadelphia/Barnes Foundation

Selected literature:

J. Minutillo "Bay watch: new projects for San Francisco, Oakland, and Berkeley" *Architectural record* 197/1 (Jan 2009) p 78-85

Birmingham

Birmingham City U./Kenrick Library (completed 2007/2008)

<http://library.bcu.ac.uk/>

Robothams Architects

Selected other bldgs: Birmingham/University of Central England refurbishments, 2005 & 2006 (Perry Barr Campus and Gosta Green Campus)

Selected literature:

J. Andrews "Kenrick Library, Birmingham City U." In *Renewing our libraries: case studies in re-planning and refurbishment*, ed. M. Dewe (Franham, 2009) 79-88

**Boston (US)****Boston Public Library** (completed 2005)<http://www.bpl.org/central/mckim.htm>**Shepley Bulfinch**Selected other bldgs: Princeton/Marquand LibrarySelected literature:M. Casey "In a new light: renovation and restoration bring to life John Singer Sargent's century-old masterpiece" *Architectural lighting* 24/1 (Jan-Feb 2010) 48-52**Chicago (US)****Loyola University/Richard J. Klarchek Information Commons** (completed 2007)<http://www.luc.edu/ic/>**Solomon Cordwell Buenz**Selected literature:J. Gonchar "The total package: Loyal University Information Commons" *GreenSource* (Nov-Dec 2008) 3/5) 128-135"The Richard J. Klarchek Information Commons" *ArchDaily* (19 May 2012):<http://www.archdaily.com/236302/the-richard-j-klarchek-information-commons-solomon-cordwell-buenz/>**Copenhagen****Royal Library/Black Diamond** (completed 1999)<http://www.kb.dk/en/dia/index.html>**Schmidt Hammer Lassen**Selected other bldgs: See AberdeenSelected literature: http://en.wikipedia.org/wiki/Black_Diamond_%28library%29**Dartmouth****U. Mass Dartmouth/Claire T. Carney Library** (opened 2012)<http://www.lib.umassd.edu/about/library-building-renovation-and-expansion-program>**designLAB Architects**Selected literature:"Claire T. Carney Library renovation and addition" *Architectural record*:http://archrecord.construction.com/projects/building_types_study/adaptive_reuse/2013/1302-claire-t-carney-library-renovation.aspComments: Paul Rudolph Brutalism, made less brutal

**Exeter****Exeter U/UL & Forum** (opened 2012):<http://as.exeter.ac.uk/library/about/opening/forumlibrary/>**Wilkinson Eyre**Selected literature:I.Latham "Wilkinson Eyre's Exeter Forum" *Architecture today* n. 229 (June 2012) p 34-42**Glasgow****Glasgow U./UL** (completed 2004)<http://www.lib.gla.ac.uk/displays/timeline/refurbishment.html>**William Nimmo & Partners**Selected literature:www.glasgowarchitecture.co.uk/glasgow_university_library.htmH. Durndell "Glasgow UL: from book warehouse to lighthouse for study" In *Renewing our libraries: case studies in re-planning and refurbishment*, ed. M. Dewe (Farnham, 2009) p 89-99**Groningen****University of Groningen: EBR Library** (completed 2010)<http://www.rug.nl/science-and-society/library/>**pvanb architecten***Libraries* [ed. by Katy Lee] (Hong Kong: Design Media, 2011)<http://www.archdaily.com/94516/wsn-building-pavilion-pvanb-architecten/>**Kansas City (MO)****University of Missouri/UMKC Miller Nicholls Library****Sasaki Associates**Selected other bldgs: See Baltimore, El Khoura, Saint JohnComments: Sasaki involved students and faculty in beta testing prototypes for a variety of technology-rich, collaborative study spaces**Leicester****Leicester U./David Wilson Library** (completed 2008)<http://www2.le.ac.uk/library>**Associated Architects LLP**http://www.e-architect.co.uk/england/david_wilson_library_leicester.htm<http://www.fgould.com/uk/projects/university-of-leicester-the-david-wilson-library/>



London

Imperial College/Central Library Learning Centre (completed 2008/2009)

<http://www2.lse.ac.uk/library/home.aspx>

Madoc Arc. (Pascal Madoc-Jones)

Selected literature:

http://www.imperial.ac.uk/centenary/current_campus_renewal_project_details.shtml#one
 “Sound bites . . . sometimes learning means making a noise” *RIBA j* 116/7 (Jul 2009)
 p 56-58

Comments: “sometimes learning means making a noise”



Los Angeles

UCLA/Charles E. Young Research Library (completed 2011/2012)

<http://www.library.ucla.edu/research-library-renovation>

Perkins + Will

Selected literature:

J. Chang “Dual mode: an elegantly restored research library at UCLA brings the analog and digital worlds together” *Metropolis* 32/1 (Jul-Aug 2012) 54-57,80-81



Lucerne

Universität Luzern/Pädagogische Hochschule (UNI/PH) Teacher Education Centre and Library (completed 2011/2012)

<http://www.luzern.phz.ch/index.php?id=265>

Enzmann + Fischer

Literature:

C. Gabler, K. Klenz and U. Baus “Industriebauten, neu genutzt [Industrial buildings - new uses]” *Bauwelt* 103/33 (24 Aug 2012) 14-33

A. Schindler „Von Postsäcken zu Bücherkisten: Umbau des Postbetriebsgebäude von Enzmann Fischer Architekten” *Bauen & Wohnen* n. 11 (2011) 22-29

P. Hauke and K. U. Werner „The second hand library building: sustainable thinking through recycling old buildings into new libraries” [paper delivered at IFLA meeting, Puerto Rico, 2011]: <http://conference.ifla.org/past/ifla77/196-hauke-en.pdf>

Comments: Conversion + expansion of a 1985 postal distribution centre to provide lecture halls, seminar rooms, offices and student facilities and a library



New York

New York Public Library: Donnell Library (53rd St.) (completed 2015)

Enrique Norten/TEN Arquitecto

Selected other bldgs: See Berlin/Frei U.

Selected literature: R. Pogrebin “A Place to Hang Out (Read, Too)” *New York Times* 06 May 2013 (http://www.nytimes.com/2013/05/07/books/design-for-new-donnell-library-by-enrique-norten.html?_r=0)



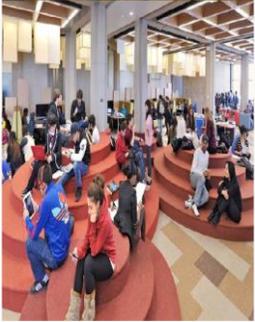
New York

New York University/Bobst Library (Phase II renovation completed 2013):

<http://library.nyu.edu/>

Jacob Alspector

Selected other bldgs: New York/New York Public Library Science, Industry and Business Library, & City University of New York Graduate Centre

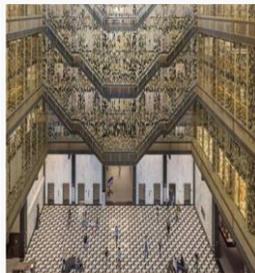


Princeton, NJ

Princeton U./Marquand Library (completed 2003)

Shepley Bulfinch

Selected other bldgs: Boston Public Library renovation



Rome

Pontificia Università Lateranense/Pius IX Library (completed 2008)

http://www.pul.it/?page_id=393&lang=en

King Roselli Architetti

Selected literature: "Lateran University Library" *ArchDaily* (15 May 2008):

<http://www.archdaily.com/859/lateran-university-library-king-roselli-architetti/>



Southampton

Southampton U./Hartley Library (completed 2004)

<http://www.southampton.ac.uk/estatedevelopment/landmarkbuildings/hartleylibrary.html>

Atelier Ten

Selected literature:

Michael Dewe, ed. *Renewing our libraries: case studies in re-planning and refurbishment* (Farnham, 2009)

Comments: "research-oriented"; some bright red walls

Features: configuration changed radically from a subject arrangement to one based on material type, eg all periodicals in one single sequence



York (Canada)

York U./Scott Library Learning Commons (completed 2012)

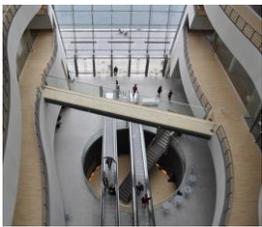
<http://www.library.yorku.ca/cms/learning-commons/the-space-2/>

Levitt Goodman Architects

Selected other bldgs: Riverside (Ontario): University of Washington School of Architecture

Selected literature:

"Levitt Goodman Architects to design new Learning Commons at York University" *Canadian architect* 55/1 (Jan 2010) p 9

'Black Diamond'**Library visits**

June 2013. Royal Library: National Library of Denmark and Copenhagen University Library aka 'Black Diamond'.

Also the Science Library, University of Copenhagen.

The Black Diamond is a modern waterfront extension to the Royal Danish Library's old building in central Copenhagen, Denmark. It is connected to the original building by several skyways, and the combined buildings now have five times the reading and study seats than before. Its quasi-official nickname is a reference to its polished black granite cladding and irregular angles. Designed by Danish architects Schmidt Hammer Lassen, the 'Black Diamond' was completed in 1999.

The circulation desk is located in the 18-metre-wide main skyway which connects the old and the new building above Christians Brygge. There are six reading rooms, including specialist reading rooms for the Centre for Maps, Prints and Photographs, and for the Centre for Music and Theatre. The Reading Rooms face the atrium, providing them with natural light, and consist of double-height rooms with a projecting mezzanine floor. In the large reading room for materials from the library's collection which are restricted to the premises, it is possible to obtain a permanent seat for a specific amount of time.

Apart from its function as a library, the building houses a number of other public facilities and activities, most of which are located around the central, top-lit atrium which cuts into the building with a huge glazed front facing the harbour. The facilities include a 600-seat auditorium - the Queen's Hall - used for concerts, literary events, theatrical performances and conferences. There

are also exhibition spaces, a bookshop, a restaurant, a café and a roof terrace. Two museums are based in the Black Diamond: the National Museum of Photography; and a small museum dedicated to cartoon art.

The building of the new Royal Library, with its link to the University of Copenhagen Library, physically indicates the integration of these two organisations. The building was a project for the Millennium, and although is of a nature and scale which cannot form a template for Oxford, the iconic nature of the overall design does illuminate the cultural impact of a library. The 'Black Diamond' has rapidly become one of the most recognisable and beloved buildings in Copenhagen.

The Science Library at the University of Copenhagen is a dedicated facility for science students and researchers, located within the science campus. The building is a mixture of 19th and 20th century structures which have been adapted to meet the evolving needs of scientists via successive extensions and changes to the interior.

The facility has a number of features which respond to the needs of the science community at the University:

- 24/7 opening (in part of the building);
- Reduction (but not removal) of 'formal services' (such as main enquiry desk) in favour of 'roaming' library specialist staff who have more informal appointment system and deliver services in Faculty buildings as well as the library;
- Flexible desking and seating, where students are encouraged to rearrange the furniture;

- Low-cost 'discussion zones' with whiteboards and screens for students to pursue group study;
- Adaptability of some spaces (e.g. carrels) to become smaller during exam time, allowing more seats to be provided in the library;
- New services frequently added such as 3D Printing; and
- Mix of design styles for interior spaces - some traditional reading room layout, others more colourful, less formal; and
- Constant experimentation with new and different types of seating/furniture.

September 2015. The Hive at Nanyang Technological University, Singapore. [NB some spaces were not yet in service at the time of the visit]
Also the Art and Design Library and Main Library within NTU.

The eco-friendly learning and innovation hub known as The Hive was designed by British designer and architect Thomas Heatherwick and incorporates a library as an integrated part of a busy mix of campus services for all students at NTU. It is marked by its innovative design – highly unconventional for the University and for Singapore as a whole - which looks set to become as iconic on campus as the 'Black Diamond' is in the city of Copenhagen.

The mix of services is an interesting co-location, with an atmosphere more like a student dorm than a traditional 'faculty' space. The seminar rooms and group study rooms are designed in cellular fashion (to pick up the 'Hive' theme) and the design also created exterior study spaces, which, at the upper levels, benefited from natural ventilation. Typically, the ground floor spaces were the busiest, and also the noisiest and least formal.

'The Hive'

The building does not have a highly finished quality, instead being focused on low-cost, but carefully designed. It is predominately of concrete, much of it pre-cast and molded, with sections bolted on; pipe and cable runs are visible in many locations. Most of the building is not treated with air-conditioning, but relies on the building design for natural ventilation. This is a bold step in the Singapore climate and, based on the use of space noticed during the visit, is going to prove a 'hard sell' for the students.



The library is a branch of the main library system, and comparatively small. It is well-equipped with a variety of well-designed and well-made furniture. There are printed books designed for general educational reading (including fiction) and a DVD collection. The facility has been designed partly as a study environment and partly as a small lending collection. The interesting technological features include a 'vending' machine for the loan and return of course textbooks.



In addition to The Hive, the Art and Design Library and Main Library within NTU were also visited. Both consist of a mixture of print and electronic provision alongside study areas, and some innovative services. The Art and Design Library has a small print collection and a large, busy study area. Between the two is an area of very highly designed informal seating, adjacent to large display screens. This did not appear to be popular among students who clearly preferred the more traditional library reading desks/tables. The Main Library serves a general academic population, although mostly drawn from the physical and engineering science communities, and provides a mixture of study environments ranging from large reading rooms to small study carrels.



Yale-NUS



An interesting service provided by both the Art and Design Library and the Main Library is a small seminar room where students can film themselves giving practice presentations. These are sound-proofed rooms seating, a lectern and good quality AV equipment. In the Art and Design Library the room is also used for film viewing.

September 2015. Learning Commons at Yale-NUS College, Singapore.

Yale-NUS College (a collaboration between the National University of Singapore and Yale University), designed by [Pelli Clarke Pelli Architects](#) in collaboration with [Forum Architects of Singapore](#), opened the new buildings on its campus in Singapore in Autumn 2015. This facility is an attempt to bring a US-style liberal arts college to Asia, with the quality of the buildings and services to match.

Yale-NUS College includes a variety of study environments, which are aimed predominantly at an undergraduate level. They cover all disciplines and include a wide range of facilities for types of study covering fields such as the performing arts and sport. A Writers' Centre and film viewing facility are also provided, and although small in scale (to suit the Yale-NUS scale overall) are extremely well equipped technologically.

The Main Library is a traditional in layout, with mostly formal seating, interspersed among library shelving. The quality of the furniture is high, although of a very traditional kind (oak and leather), even in the high-tech environment of Singapore. The library also has a variety of other study spaces, both indoors and outside (again, to suit the Singapore climate), including relaxed seating and group study spaces. The group study spaces and other

'The Brain'

more formal lecture and seminar rooms were booked through a centralised booking system which delivered booking information to small screens on the outside of each room.

**November 2015. Freie Universität Philologische Bibliothek, Berlin.
Also the Social and Historical Sciences library.**

The Philological Library at the Freie Universität in Berlin was designed by the British Architects Foster + Partners and was opened in 2005. Its striking dome shaped design has encouraged Berliners to give it an adopted name: 'The Brain'.



The building is a remarkable facility, set among the complex of interconnected structures at the Freie Universität, but ostensibly a separate building. It has no external views – indeed there are no windows at all - and in many respects runs counter to the accepted design requirements of a modern library. It does seem, however, to be highly successful, with high reader numbers and high levels of reader satisfaction reported by staff.



The interior layout is one of tiered galleries of seating and shelving, which look out onto a large open space within the dome. The feeling is one of great spaciousness and although the lighting is predominantly artificial, the sense of the space is that it is not an 'internal' or 'underground' space at all. The readers' spaces mostly look out over balconies into the large internal area under the dome. The design of the galleries utilises organic forms, with generous sweeping curves, and few angularly geometric forms evident. The atmosphere of the building was one of being conducive to quiet study and concentration, and it is clearly used for that purpose by the students/readers.

The library services have been designed to be integrated within the building. There are a few small (in size) service points/enquiry desks and other service points such as photocopying/scanning rooms (with impressive multilingual interfaces). Outside the library there is generous provision of lockers, as readers are not allowed to enter the building with large amounts of personal possessions.

The structure of the built elements of the library are such that there is little or no flexibility for changes, however, and this was the most important 'negative' element reported by library staff. The demand for staff training rooms and bookable group study rooms had not been apparent in the design brief, but the change in study practice and pedagogic approaches since 2005 had meant a higher demand for such facilities. Space has had to be converted in an adjacent building to allow for library collections to be used in these rooms – it would have been more efficient to have these facilities in the main library building, and there is space in the internal volume for them, but the lack of flexibility in the design of the structure makes it impossible.

The Freie Universität campus also now boasts another new library, completed in 2015, for social and historical sciences. Like 'The Brain' it is largely an internal library, with few external viewpoints. It has a large underground component. The design is much more traditional however, with a mixture of formal rows of study desks, and collections (on both fixed and mobile shelving). The facility seemed less busy than 'The Brain' although similar in size.

November 2015. Humboldt Universität: Jacob und Wilhelm Grimm Zentrum, Berlin.

Grimm Zentrum



In the centre of Berlin, the Humboldt University occupies prime position just north of Unter-den-Linden. Its new library building (opened in 2010) by German architect Max Dudler provides an architecturally stunning new research and learning facility.



The building is more traditional in design than 'The Brain' but it has been built to a higher specification, with the finishes and furniture being of a particularly high standard. The aesthetic is very formal, with clear, clean lines and decoration pared down to a minimum. The building, like 'The Brain', was very busy indeed, so much so that there is a strict seating policy enforced - any desk left unoccupied will have its contents removed so that another student can occupy it. This is in part because of a general 'open door' policy from the University to allow students from other institutions in Berlin to use the library. This has caused other problems for the library – they did not allow enough space for lockers for example, resulting in long queues to be able to lock personal possessions away, and the library café was not built to accommodate the current levels of demand.



The library also accommodates a large print collection on this site – over 2.5 million volumes - the majority on open shelves. The study environment is designed around two enormous 'halls' of impressive scale with serried ranks of study desks (physically bolted to the floor to remove the possibility of them being moved).

In other parts of the building, more familiar modes of service provision are apparent: small library service points (e.g. for enquiries) as well as specialist 'booths' for IT support, inter-library loans, and other facilities. The library also offers a crèche.

In parts of the building individual study-rooms (essentially large carrels with doors) are available to be booked, but there are only two group study rooms available. A number of other spaces providing alternative types of seating (e.g. day-beds) are also provided.

As in 'The Brain' however, the main problem with the building from the perspective of the library staff was the inflexibility of the structure. The shelving has been designed to be integral with the structure meaning that no changes can easily be made to the building. In retrospect, library staff wish that there were fewer physical books stored in the building and that they had more study space, especially spaces for group study and for teaching as these are the areas of current high demand given the changes in study practice and in pedagogy.

February 2016. École polytechnique fédérale de Lausanne (EPFL): Rolex Learning Centre. Lausanne, Switzerland.

The Rolex Learning Centre at the EPFL is one of the most striking new facilities incorporating library collections and services to have been built in Europe in recent years. It was opened in 2010 and designed by the Japanese practice SANAA.

Rolex Learning Centre



The Rolex Learning Centre has been built on the main EPFL campus outside metropolitan Lausanne and, with space being plentiful, the architects have created an astonishingly spacious structure predominantly made from concrete treated in a most playful manner. Viewed from the air, the structure appears to be a large slice of Swiss cheese, with many 'holes' inside a rectangular outline. The other striking feature of the design is that of interior artificial 'hills' which break up the internal expanses and provide for visual enjoyment, though somewhat at the expense of practicality.

The building has a large underground car park and ample provision for lockers and personal storage, which is sensible as many visitors to the library will arrive and spend the whole day there.



Inside the building (to say that it had four walls would be misleading) are a mixture of campus services: the library takes up the most space, but there is also a campus bookstore, bank, the Alumni Office, Careers Service, Student Union offices, several cafes and IT support. There are also some public facilities such as a large auditorium (also used by the EPFL) and a high-quality restaurant.



The facility is open long hours (7am-midnight) but has a skeleton staff from 8pm onwards. The collection is small: 260k volumes, and has been an amalgamation of 10 smaller departmental libraries, unified through use of a single classification scheme. The facility has 860 workspaces spread throughout the large building, mostly in an open environment, but with some more closed areas for deeper research activity (notably for mathematics and for special collections).



The library staff feel that opportunities were missed during the design of the building – the EFPL as a whole was the client rather than the library, and insufficient consultation with the library took place.

Overall the Rolex Learning Centre is a success in the eyes of the students, who all call it ‘the library’ and are very enthusiastic about it; the energy and liveliness of the building was palpable, and the concept of bringing different functions in close proximity to the library is sound. But the execution leaves a lot to be desired. The major issues include:

- Open-plan offices have had to be made more secure;
- Lavatories are underground and difficult to access;
- No teaching room for information skills delivery;
- Insufficient group study facilities: demand is for three times the current provision;
- The building is too far away from Faculty offices;
- Insufficiently integrated with research groups;
- Carrels were not planned into the building for researchers: high demand for these; and most of all
- No flexibility because of internal ‘hills’.

September 2016. Amsterdam Public Library (Openbare Bibliotheek Amsterdam), The Netherlands.

The Amsterdam Public Library (OBA) was completed in 2007 and designed by Dutch Architect Jo Coenen. It is the Central Library of a system of 25 branch libraries, and has a print collection of 1.3m volumes on 8 publicly accessible floors, on a site in the old docklands of Amsterdam. The building includes a theatre/lecture hall, conference rooms, catering services, local radio, and

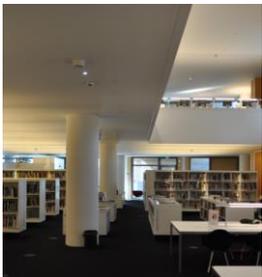
Amsterdam Public Library



maker's spaces (e.g. with 3D printing). There is a separate children's library in the lower part of the building. The main collections and services are located on a series of five large open floors with escalators in the middle. These floors also had views out of the building as well as inside into the small (but deep) atrium, which gave a general sense of interconnectedness and spaciousness. The uniformity of layout the main floors allowed for a sense of ease and clarity of use.

The sense of the building is as a genuine 'hub' with the library at the heart. The building has been designed as much for interaction as for quiet study - though quiet study is still a strong element within the building. The building is very popular and busy with 4-5k visits per day being typical, and with almost 500 study spaces, the library can easily cope with the demand.

Overall the design of the building was very impressive. It was light, transparent, allowed the collection and services to 'breathe'. The reading/study spaces were co-located well with the collections, and there was very clear signage as well as small but well-situated service points. The mixture of wood, concrete and plaster finishes made the spaces seem contemporary but allowed for flexibility in the creation of 'zoned' spaces: some were clearly for intense and quiet study, others for more relaxed seating, still others for meetings and seminars/group study.



Although the facility is a public library rather than a university library, the arrangement of spaces, the design treatment, the 'feel' of the spaces, and the incorporation of collections and services provided the most compelling model of all of the visited libraries for any new Oxford library.

Lessons learned for Oxford from visits

Libraries still relevant

Iconic spaces

Flexibility

Adaptability

Variety of spaces

Easy maintenance

Books and digital services

Library as a hub

The library visits and design literature review have been enormously valuable for the University of Oxford and its Bodleian Libraries in determining ideas, planning inspiration, and informing on trends and directions of thought in the industry. Two major library redevelopments will learn the lessons (positive and negative) from these visits (and related work): the 'Future of the Radcliffe Science Library Project', and the new Humanities Library as part of the new Humanities Building on the Radcliffe Observatory Quarter will both benefit directly from this work.

1. New library buildings remain essential infrastructure for academic institutions

Investment by universities and other institutes of higher learning across the globe in recent years can be seen in the resurgence of innovative and excellent new library buildings. Although a crude analysis might suggest that the rise of digital information has rendered the physical library as an anachronism, the popularity of libraries among core user groups, and the recognition of investment which numerous institutions have made in libraries is evidence of their continued centrality in the missions of universities.

2. Libraries are iconic spaces on campus

Given the continued vitality of the library as a working concept, the physical manifestation of their work continues to be a 'statement' of the nature of the institutions of which they form a part. The Rolex Learning Centre at Lausanne, and 'The Brain' at the Freie Universität in Berlin have (in their different ways) become landmark structures signaling the values of the institutions they are

situated in. It is clear that any new library building in Oxford should be designed in such a way that it reflects the values and intentions of the academic community in which it is situated.

3. Libraries are changing and their buildings need to be flexible and adaptable

Although the physical library remains a core element of any university, its nature is adapting at a fast rate. As modes of information distribution and management are continuing to evolve and change, and as pedagogic styles and fashions are also changing, the nature of physical libraries is also changing. Many of the libraries visited (most clearly seen at the Rolex Learning Centre and the Grimm Zentrum in Berlin) had needed to adapt their physical space to suit changes in requirements in the short space of time since their projects had been designed. Many of the buildings were not easily adaptable as this requirement had not been specified at the planning stage. This is perhaps the most important lesson to come from the visits.

4. There is no single study environment that suits every reader

The best new libraries accommodate a wide variety of study environments, and recognise that the needs of readers cannot be met by a single type of study environment. This was seen in libraries as diverse as the Nanyang Technological University Library in Singapore and the Rolex Learning Centre in Lausanne. The variety of spaces demarked by library design, furniture, ambience, and lighting is a critical element in a successful new library. The mix of quiet and more relaxed spaces, together with the right balance of group as opposed to individual study spaces, highlights the need in Oxford to carefully consider the zoning of spaces, and to ensure that the right mix and variety of study environments is provided (considering the broader availability of study environments in the rich provision of Oxford libraries).

5. Ease of maintenance

Given the popularity of new library buildings, the quality and nature of library furniture and finishes is of critical importance. The abundance of pure white plaster may look attractive when new, but is easily marked and made dirty through use. Floor finishes, if not considered carefully, can become rapidly worn. Several of the new libraries visited had not taken these factors sufficiently into account, or had chosen poorer-quality finishes on grounds of cost, and were now regretting these decisions.

6. Physical and digital services

All of the libraries visited, including those (such as Copenhagen University and NTU) which were science-focused, continue to maintain significant print as well as significant digital collections and, therefore, maintain a similarly blended provision of services. Print collections will continue to feature in all new Oxford library buildings, but the flexibility to transfer print provision to other functions must be built into any new design. The growth in digital services will also require some new approaches in terms of training facilities, power supplies, and cooling for server rooms etc.

7. Library as a hub

In almost all of the libraries visited, the institution had ceased to be a straightforward facility for storing collections and enabling quiet study. These functions remain highly important (and highly valued by users) but they are no longer the sole element of library provision. The co-location of other services, such as digital services (maker-spaces in Amsterdam), or event and discussions spaces (at the Rolex Learning Centre, and in both institutions in Singapore), as well as the co-location with other campus activities (cafes, bookshops, careers services, crèches) such as in Berlin, Singapore, and Lausanne, all make for the growing sense of library as a 'hub' around which

other services and facilities are best situated. The library attracts large numbers of users, and that they will all find the ability to hold discussions, engage in teaching (as either teachers or learners), performance etc. either adjacent to, or sometimes inside the library, is evidence for the changing nature of libraries. The physical arrangement of these elements, within and/or alongside the more traditional aspects of libraries is the key to a successful new library building, and will be a critical factor in the brief for, and the criteria for selection of, an architect for any new Oxford library.

Outcomes and ongoing benefits

Outcomes of the project

The results of the research described above have been communicated to colleagues in the University through a series of presentations to the two major library projects which are under consideration in Oxford at the moment: the Radcliffe Science Library redevelopment and the Humanities Library Project, which is part of the broader Humanities Development on the ROQ. The project has also been of use to several college library projects including The Queen's, Nuffield and Pembroke Colleges and a further presentation is planned for Corpus Christi College.

The project has been of particular value to the Humanities Library project and to the wider initiative to develop a Humanities Building on the ROQ:

- The research informed the development of a suite of possible scenarios for library provision on the ROQ site, which formed the basis for a joint Bodleian Libraries–Humanities Division discussion day that began the re-evaluation of this project in 2013.
- Data and other preliminary research findings were included in submissions to the ROQ Humanities Building pre-feasibility study.
- A presentation was made to the pre-feasibility Study design team in May 2016.

These discussions revealed that the key considerations in determining the form of a humanities library on the ROQ site are the academic ambitions of the University as a whole and of the Humanities Division in particular.

As the project continues to develop, both in terms of Business Planning and more specifically in terms of the development of the Design Brief and the choice of architect, the fruits of the 21st Century Library project will be fully realised. The detailed findings from the surveys and other data gathering exercises in Oxford will be essential in providing a knowledge base for the project, and the library visits have provided a rich seam of comparative data and reference images, as well as a considerable list of 'things to avoid' and lessons learned.

The Radcliffe Science Library Redevelopment project has included a pre-feasibility phase which was informed by the 21st Century Library project, both the research findings, the library visits and in particular the User Experience (UX) research.

Conclusions

This project enabled a thorough investigation of the future of physical libraries, through the lens of architects, librarians, and 21st century scholars. Without the funding provided by the Clore Duffield Foundation, such a project would not have been possible.

The research has produced a number of novel findings and the results have fed into planning for new libraries at Oxford, and will continue to do so.

Although how libraries are viewed by scholars and students is changing, there will continue to be a need for comfortable, appropriate, centrally provided study space in the University of Oxford. Humanities scholars and students will still use physical library resources alongside increasing use of electronic resources. There will continue to be a need for centrally provided study spaces for science and medicine students while there is unequal provision across colleges. And there will be an increasing need for inter- and cross-disciplinary working spaces.

Libraries as physical entities, focusing on the needs of students and researchers, remain a vital component of any institution of higher learning. They are no longer simply places where books are housed: they are vibrant hubs for research, learning and creativity.

Bibliography

Research and learning spaces of the future

- Adema, J. and Rutten, P. (2010) *Digital monographs in the humanities and social sciences: report of user needs*. Available from: <https://openreflections.files.wordpress.com/2008/10/d315-user-needs-report.pdf>
- Baker, N., Furlong, K., Consiglio, D., Lankewicz Holbert, G., Milberg, C., Reynolds, K. and Wilson, J. (2015) 'Demonstrating the value of "Library as Place" with the MISO Survey', *Presented at the 11th Northumbria International Conference on Performance measurement in Library and Information Services, Edinburgh*.
- British Library (2012) *Researchers of tomorrow: the research behaviour of Generation Y doctoral students*. Jisc. Available from: <http://www.webarchive.org.uk/wayback/archive/20140614040703/http://www.jisc.ac.uk/publications/reports/2012/researchers-of-tomorrow.aspx#menu>
- Bulger, M., Meyer, E.T., de la Flor, G., Terras, M., Wyatt, S., Jirotko, M., Eccles, K., and Madsen, C. (2011) *Reinventing research? Information practices in the humanities*. Research Information Network. Available from: http://www.rin.ac.uk/system/files/attachments/Humanities Case Studies for screen_2_0.pdf
- Council on Library and Information Resources (2008) *No brief candle: reconceiving research libraries for the 21st century*. Washington, D.C. : Council on Library and Information Resources. Available from: <https://www.clir.org/pubs/reports/pub142>
- Curtis, G. (2011) *Academic libraries of the future: Final report*. SCONUL. Available from: <http://www.sconul.ac.uk/publication/academic-libraries-of-the-future-6>
- Courant, P.N., Henry, C., Henry, G., Nielsen, M., Chonfeld, R.C., Smith, K. and Spiro, L. (2010) *The idea of order: transforming research collections for 21st century scholarship*. Washington, D.C. : Council on Library and Information Resources. Available from: <https://www.clir.org/pubs/reports/pub147/pub147.pdf>
- Cullingford, A., Peach, C. and Mertens, M. (2014) *Unique and distinctive collections: opportunities for research libraries*. RLUK. Available from: <http://www.rluk.ac.uk/wp-content/uploads/2014/12/RLUK-UJC-Report.pdf>
- Emmott, A. and Rison, S. (2005) *Towards science 2020*. Microsoft Research. Available from: <http://research.microsoft.com/en-us/um/cambridge/projects/towards2020science/downloads.htm>

- Freeman, G.T., Bennett, S., Demas, S., Frischer, B., Peterson, C.A., and Burr Oliver, K. (2005) *Library as place: rethinking roles, rethinking space*. Washington, D.C. : Council on Library and Information Resources. Available from: <https://www.clir.org/pubs/reports/pub129/pub129.pdf>
- Housewright, R., Schonfeld, R.C., and Wulfson, K. (2013) *UK survey of academics 2012*. Ithaca S+R, Jisc, RLUK. Available from: <http://www.sr.ithaka.org/publications/ithaka-sr-us-library-survey-2013/>
- Kloda, L. and Cook, C. (2015) Getting work done alone, together: A one-day snapshot survey of visitors to a research-intensive university library. *Presented at the 11th Northumbria International Conference on Performance measurement in Library and Information Services, Edinburgh*.
- Long, M.P. and Schonfeld, R.C. (2013) *Supporting the changing research practices of chemists*. Ithaca S+R. Available from: <http://www.sr.ithaka.org/publications/supporting-the-changing-research-practices-of-chemists/>
- Long, M.P. and Schonfeld, R.C. (2013) *Supporting the changing research practices of historians*. Ithaca S+R. Available from: <http://www.sr.ithaka.org/publications/supporting-the-changing-research-practices-of-historians/>
- Long, M.P. and Schonfeld, R.C. (2014) *Supporting the changing research practices of art historians*. Ithaca S+R. Available from: <http://www.sr.ithaka.org/publications/supporting-the-changing-research-practices-of-art-historians/>
- Long, M.P. and Schonfeld, R.C. (2014) *Ithaca S+R library survey 2013*. Ithaca S+R. Available from: <http://www.sr.ithaka.org/publications/ithaka-sr-us-library-survey-2013/>
- Mandel, L.H. (2015) Visualizing the library as place. *Performance Measurement and Metrics*, 17(2), pp.165-174
- Meyer, E.T., Bulger, M., Kyriakidou-Zacharoudiou, A., Power, L., Williams, P., Venters, W., Terras, M., and Wyatt, S. (2011). Collaborative yet independent: information practices in the physical sciences. IOP Publishing. Available from: http://www.iop.org/publications/iop/2012/page_53560.html
- OCLC (2014) At a tipping point: education, learning and libraries. A report to OCLC membership. Dublin, Ohio: OCLC. Available from: <https://www.oclc.org/en/reports/tipping-point.html>
- Primary Research Group (2014) *International research library benchmarks, 2015 edition*. Primary Research Group, Inc.
- Roos, A. (2015) Medical scientists' information practices in the research work context, *Health Information and Libraries Journal*, 32, pp. 23-36.

- Rowlands, I. and Fieldhouse, M. (2007) *Information behaviour of the researcher of the future: A British Library / JISC study. Trends in Scholarly information behaviour*. Available from: <http://citeseerx.ist.psu.edu/viewdoc/download;jsessionid=4E04A24627C44A72FBBD1B28453E4370?doi=10.1.1.643.8344&rep=rep1&type=pdf>
- Schonfeld, R.C. (2015) *Meeting researchers where they start: Streamlining access to scholarly resources*. Ithaka S+R. Available from: <http://www.sr.ithaka.org/publications/meeting-researchers-where-they-start-streamlining-access-to-scholarly-resources/>
- Schonfeld, R.C. (2014) *Does discovery still happen in the library? Roles and strategies for a shifting reality*. Ithaka S+R. Available from: <http://www.sr.ithaka.org/publications/does-discovery-still-happen-in-the-library-roles-and-strategies-for-a-shifting-reality/>
- Schonfeld, R.C. (2013) *Stop the presses: Is the monograph headed toward an e-only future?* Ithaka S+R. Available from: <http://www.sr.ithaka.org/publications/stop-the-presses-is-the-monograph-headed-toward-an-e-only-future/>
- Shaw, C. (2013) University libraries are shaping the future of learning and research, *The Guardian*, 6 August 2013. Available from: <https://www.theguardian.com/higher-education-network/blog/2013/aug/06/university-libraries-learning-shapes-design>
- Showers, B. (2014) *A national monograph strategy roadmap*. JISC. Available from: <https://www.jisc.ac.uk/reports/a-national-monograph-strategy-roadmap>
- Sullivan, B.T. (2011) Academic library autopsy report, 2050. *The Chronicle of Higher Education*, January 02 2011. Available from: <http://www.chronicle.com/article/Academic-Library-Autopsy/125767/>
- Williams, P., Stevenson, I., Nicholas, D., Watkinson, A. and Rowlands, I. (2009) The role and future of the monograph in arts and humanities research, *Aslib Proceedings: New Information Perspectives*, 61(1), pp.67-82.
- Williams, P. Nicholas, D. and Rowlands, I. (2010) E-journal usage and impact in scholarly research: A review of the literature, *New Review of Academic Librarianship*, 16(2), pp.192-207.
- Wilson, A. (2009) *Future directions for arts and humanities research: a consultation*. Arts & Humanities Research Council. Available from: <http://webarchive.nationalarchives.gov.uk/20090327054742/http://ahrc.ac.uk/About/Policy/Documents/Future%20Directions.pdf>
- Wolff, C., Rod, A.B., and Schonfeld, R.C. (2016) *UK survey of academics 2015*. Ithaka S+R, Jisc, RLUK. Available from: <http://www.sr.ithaka.org/publications/uk-survey-of-academics-2015/>

- Wolff, C., Rod, A.B., and Schonfeld, R.C. (2016) *US survey of academics 2015*. Ithaka S+R. Available from: <http://www.sr.ithaka.org/publications/ithaka-sr-us-faculty-survey-2015/>
- Wright, E. (2015) 'Library of the Future' Presented at the 11th Northumbria International Conference on Performance measurement in Library and Information Services, Edinburgh.
- Zickuhr, K., Rainie, L., and Purcell, K. (2013) *Younger Americans' library habits and expectations*. Pew Internet. Available from: <http://libraries.pewinternet.org/2013/06/25/younger-americans-library-services/>

Design review

- K. Antell and D. Engel "Stimulating space, serendipitous space: library as place in the life of the scholar" in *The library as place: history, community, and culture*, ed. J. E. Buschman and G.J. Leckie (Westport, CT: Libraries Unlimited, 2007) 163-176
- B. Bergdoll, M. Le Coeur and C. Bélier, eds. *Henri Labrouste: structure brought to light* (New York: Museum of Modern Art, 2013)
- U. Brinkman "From repositories of knowledge to public paradises: 21st century libraries" Part of a special issue: *Bibliotheken: wird langst nicht mehr nur gelesen und archiviert* [In the library: no longer just learning and archiving]" *Bauwelt* 99 n. 44 (Nov 2008) p 14-15 [reports on a symposium in Frankfurt on 21st century libraries]
- M. Britto "Planning and implementation considerations for the Information Commons in academic libraries" *Library student journal* (December 2011): http://librarystudentjournal.org/index.php/ljsj/article/view/255/317#newgeneration?CSRF_TOKEN=fd6e3ee237fdbfc0ac13a0dace1f0c802b7f626d
- J.E. Buschman and G. J. Leckie, eds. *The library as place: history, community, and culture* (Westport, CT: Libraries Unlimited, 2007)
- W.T. Caniano "Academic library design: a commons or an athenaeum" *Library philosophy and practice* 2010 <http://unllib.unl.edu/LPP/caniano.htm>
- Michael Dewe, ed. *Renewing our libraries: case studies in re-planning and refurbishment* (Farnham, 2009) [On Birmingham City U., Glasgow U., Southampton U.]
- K. E. Fisher and others "Seattle Public Library as place: reconceptualising space, community and information at the Central Library" in *The library as place: history, community, and culture*, ed. J. E. Buschman and G.J. Leckie (Westport, CT: Libraries Unlimited, 2007) 135-160
- Walter Gropius "Tradition and the graduate center" *Harvard alumni bulletin* (14 Oct. 1950)

- D.A. Gyure “The heart of the university: a history of the library as an architectural symbol of American higher education” *Winterthur portfolio* 42/2-3 (2008) 107-132
- C. Jones and B. Shao *The Net Generation and digital natives: implications for higher education: a literature review commissioned by the Higher Education Academy* (Milton Keynes: Open University, Final version 26 June 2011) 15, 17 (pdf at <http://www.heacademy.ac.uk/assets/documents/learningandtech/next-generation-and-digital-natives.pdf>)
- W. Kremer: “The pleasures and perils of the open-plan office” BBC news magazine (28 March 2013): <http://www.bbc.co.uk/news/magazine-21878739>
- K. Latimer, H. Niegaard, eds. *IFLA library building guidelines* (München: K.G. Saur, 2007)
- M. Lamster “Still here: a funny thing happened on the way to its predicted obsolescence. The library became more popular than ever” *Metropolis* 32/1 (Jul-Aug 2012) 45-49,79
- P. Leighton, K.D. Metcalf and D. Weber, eds. *Planning academic and research library buildings* (2nd ed.) Chicago: American Library Association, 1986
- [Libraries of today and tomorrow: special issue] *Volume* (Amsterdam, Netherlands) 15 (2008)
- J. Murdock “Beauty and the book: libraries in the digital age raise questions about the place of books” *Architectural record* v.199, n.3 (Mar 2011) p 55-59 (http://archrecord.construction.com/projects/Building_types_study/libraries/2011/Libraries-Intro.asp?bts=LBS)
- M. Roth *Library architecture + design* ([Salenstein]: Braun, 2011)
- W.W. Sannwald *Checklist of library building design considerations* (5th ed.) Chicago: American Library Association, 2009
- R. Wærn “Controversial Stockholm library extension is cancelled after protests” *Architectural review* v.227/1355,] (Jan 2010) p17 Available online via *The Free Library* [address is too long to paste in but a web search on the title should find it]
- B. Whitlow “Space planning for the analog to digital transition” *Visual Resources Association Bulletin* 36/3 (winter 2009) p 33-35
- K. Worpole *Contemporary library architecture: a planning and design guide* (London: Routledge, 2013)

Noted features for the 21st century academic library

Architecture	
	Iconic building
	Non-iconic building
	Did you like the look and feel?
	Adaptability
	Flexibility
Collections	
	Print monographs and journals onsite
	Print monographs and journals open shelves
	Print monographs and journals offsite
	Rapid recall from closed stacks?
	Current periodicals display area
	Reference collection
Design	
	Minimalist colours
	Colour accents
	Strong colours throughout
	Engagement with the location's context
	Furniture variety used to designate different spaces
	Variety of chairs – what did you like / dislike?

Appendix

	Variety of desks / tables - what did you like / dislike?
	Lockers
	Shelving
	Tech-enhanced furniture (e.g. shelving with scanners, video viewers in armrests)
	Glass used to compartmentalize, aid navigation
	Glass doors
	Glass-sided spaces
	Glass study pods
	Glass walls / partitions
	Light used to designate different spaces
	Natural light
	Adequate artificial lighting
	Individual desk lamps
	90° angles
	Non-90° angles
	Curves / circles
	Extensively browse-able shelving
	Fixed shelving
	Shelving low enough to obviate need for ladders
	Rolling shelving
	Technology incorporated shelving

Maintenance	
	Easy and inexpensive to maintain
	Signs of wear and tear
	Building fabric maintenance
	Glass & window cleaning (costs?)
	Energy saving / Sustainable
Navigation	
	Sliding doors
	Glass doors
	Main / reader entrance
	Floor plans – printed
	Floor plans – e-versions
	Electronic information boards
	Fixed information boards
	Number of reader lifts
	Number of staff lists
	Number of book lifts
	Number of service / delivery lifts
	Easy to understand / read signage
	Easily updatable signage
	Wall colour used to aid navigation
	High definition video walls

	Walls as sliding partitions
Noise	
	Conversation areas
	Group study areas
	Quiet study areas
	Quiet close doors
Opening hours	
	24/7 opening?
	Latest closing time if not 24/7
Services	
	Access gates (ID verification)
	Bicycle racks for students
	Book detectors
	Book drop inside the library
	Book drop outside the library (available 24/7)
	Book sorter
	Book trucks – personal and lockable
	Café outside the library (same building)
	Circulation desk
	Drinking fountains on every floor
	Helpdesk – centralised
	Helpdesks – dispersed around the library

Appendix

	Laptop loans
	Library guides – audio
	Library guides – online
	Library guides - printed
	Lockers for laptops
	PCs distributed throughout library
	PCs centralised
	Photocopiers / printers / scanners on every floor
	Reception
	Reservations for services (room bookings / carrels / PCs)
	Reserve collection / short-term loan
	Re-shelving areas
	Scanners – basic
	Scanners – high tech
	Security staff desk
	Security gates at exit
	Self-issue
	Self-reservation (in library use, overnight holds)
	Self-collection of offsite materials
	Staircase lobbies isolated from quiet areas
	WCs on every floor
	WiFi throughout building

Spaces	
	AV area – 3D visualization / recording space / teleconferencing / film viewing
	Bookshop
	Café inside the library
	Carrels
	Relaxation spaces / taking a break spaces
	Informal interaction spaces
	Digital studio
	Exhibition space
	Gathering space
	Graduate-only spaces
	Dissertation writers' room
	Graduate reading room
	Graduate lounge
	Graduate research commons
	Group study spaces
	IT support pods
	Laptop-friendly zones
	Non-laptop / computer zones
	One-to-one research consultation with staff pods
	Printing / copying / scanning sound-proofed room(s)
	Seminar rooms

	Study areas where you can be surrounded by other people working (but not working with them)
	Subject specialists offices
	Teaching / training room(s)
	Teaching / training IT room(s)
	24/7 accessible area
Staff areas	
	Staff-only bicycle racks
	Book truck parking areas
	Café (staff only)
	Common room (staff only)
	Deliver bay
	Entrance (staff only)
	Hot desks
	Lift (staff only)
	Lift (service / deliveries / books)
	Lockers (staff only)
	Offices (not open plan)
	Open plan
	Quiet zone
	Server room
	Showers
	Storage rooms / cupboards

Appendix

	WCs (staff only)
Working environment	
	Air conditioning
	Energy saving climate control
	Drinks permitted in the library?
	Views
	No views
	Temperature – too warm
	Temperature – too cold
Universal Design see http://en.wikipedia.org/wiki/Universal_design for full description	
	Control buttons distinguishable by touch
	Contrast controls on visual output
	Volume controls on audio output
	Speed controls on auditory output
	Choice of language on speech output
	Large print instruction labels Wide interior doors, hallways, alcoves: 60" x 60" turning space at doors and dead-ends
	Sliding, automatic doors
	No revolving doors
	Functional clearance for approach
	Entrance at ground level
	Smooth entrance without steps

Appendix

	Adjustable furniture
	Audio and visual output on information displays
	Meaningful icons with text labels
	Choice to listen or read descriptions / information
	Closed captioning on TV networks
	Signs with light-on-dark contrast
	Level handles rather than twisting knobs
	Lifts – more than one (in case of breakdown)
	Task lighting
	Bright and appropriate lighting
	Light switches with large flat panels rather than toggle switches
	Clear lines of sight when navigating round building
	Well-planned circulation spaces
	Stable, firm, slip-resistant floors
	Accessible WCs inside the library on every floor
	WiFi throughout library

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