DEVELOPING AND ENHANCING LIBRARY PHYSICAL SPACE: THE CHALLENGES POSED BY THE DIGITAL LIBRARY

Introduction

One of the most obvious challenges posed by the digital library is what to do with the large spaces that have become empty in library buildings as a result of digitized content. At the highest strategic level, there are three clear choices. The library can give up all library space to academic departments previously taken up by books, journals and special collections and divert all funding to digital resources. Another option would be to give up some library space previously taken up by books, journals/ special collections to academic department but use the remaining space for the library to support learning, teaching and research. It is also feasible for the library to strategically not pass over any library space previously taken up by books, journals/ special collections and still use the library space to support learning, teaching and research.

The Medical Library at John Hopkins University in the USA has reduced its print information by 80%, has given up its building and moved to a more remote location (Schofield, Woodson & Heskins 2010). The University of Texas at San Antonio Library has been providing a print bookless service for 4 years at the same time with virtually no physical space. This is not confined to the USA when in 2009, the University of Strathclyde Library in Scotland produced its strategic plan (Law 2009). One kilometer of print shelving was being added each year and the cost of building utilities was escalating. The Library therefore proposed to give up 50% if its space to teaching departments, invest more heavily in e-content, introduce rolling stacks and discard much print material with the following mantra ‘don’t just go to the library - take it with you’.

The purpose of this paper is to explore in more detail how libraries can address the challenge of the digital library strategically by using physical space in different ways. An overview will be provided on how technology has impacted on library space over the years. There will also be a discussion about what makes ‘library’ space different to other space. Consideration will be given to how library space can be strategically developed to support learning/ teaching and research. The paper will finish with a case study exploring how a university library changed its space in the context of the digital library including developing a business case, ensuring close links between physical and digital library spaces and impact.
assessment. This paper’s context will be informed by a recent book on the digital environment and university library space (Matthews & Walton 2013)

**Technology and library space over the years**

Table 1 shows the different technologies that have impacted on university library space both in the past and currently. It shows that technology had virtually no impact on physical space until the 1960s when micro format technologies were being applied to overcome problems of storage.

**Table 1 Impact of technologies on changing use of library physical space**

<table>
<thead>
<tr>
<th>Time period</th>
<th>Technology applied within library setting</th>
<th>Impact on space</th>
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<tbody>
<tr>
<td>Up until late 1950s</td>
<td>• No technology applied apart from minimal experimental uses.</td>
<td>• Library physical space very little changed</td>
</tr>
<tr>
<td>1960 - 1970</td>
<td>• Automation of early processes including provision of large microform sets.</td>
<td>• Need to provide equipment and storage for microfilm and micro format readers</td>
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<tr>
<td>1970- 1980</td>
<td>• Online databases for Library staff to use for cataloguing.</td>
<td>• Library staff space needed to access databases (shared)</td>
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<td></td>
<td>• Lack of space as more and more print added so more reliance on micro format</td>
<td>• Some staff have PCs computers</td>
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<td></td>
<td></td>
<td>• Free standing dedicated CD-ROM workstations provided.</td>
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<tr>
<td></td>
<td></td>
<td>• Book circulation desks changed to install computers for book loans/ returns</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Changes to staff space</td>
</tr>
<tr>
<td>1980 - 1990</td>
<td>• Online catalogues appear</td>
<td>• Card catalogue retained as well as online catalogue.</td>
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<tr>
<td></td>
<td>• Free standing CD-ROMs allowed end user searching for the first.</td>
<td>• Some staff have PCs computers</td>
</tr>
<tr>
<td></td>
<td>• Microcomputers make an impact</td>
<td>• Free standing dedicated CD-ROM workstations provided.</td>
</tr>
<tr>
<td></td>
<td>• Systems begin to be developed for issuing/ returning books online.</td>
<td>• Book circulation desks changed to install computers for book loans/ returns</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Changes to staff space</td>
</tr>
<tr>
<td>1990 - 2000</td>
<td>• Internet and World Wide Web invented and applied</td>
<td>• Fast connection speeds gives remote access to large files.</td>
</tr>
<tr>
<td></td>
<td>• Modems superseded by fast connection.</td>
<td>• Print indexes and abstracts discarded as delivered online</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• No longer necessary to come into the Library to access resources</td>
</tr>
<tr>
<td>2000 - 2010</td>
<td>• Wireless access.</td>
<td>More space available as:</td>
</tr>
</tbody>
</table>
• Increased digitization of journals and books.
• Google, Amazon etc offer alternative services
• Laptops become more powerful

• Reference collections no longer needed.
• E-journals very successful so paper journals discarded.
• E books having later impact than e-journals but now allowing space to be freed up
• Information / learning commons began to appear as complimentary to libraries

• 2010 -
• Increased capabilities of hand held devices
• Cloud computing

• Library services no longer need as many front line desks

There was a gradual increasing impact between 1970 and 1990 but from 1990 the pace of change has accelerated (and continues to do so) as a result of the Internet and World Wide Web appearing.

Library as a physical place in the digital world

The professional librarianship literature about physical space has significantly increased number in the past 10 years. Most of these papers start by considering what should happen to these large buildings whose primary function was to be a warehouse for print information which is now digital. For many years, the view has been expressed that the library is the centre of the university but now the ability to access services digitally anywhere challenges this assumption. In a very influential discussion paper, Freeman (2005) argues that this central position can be re-claimed. The reason for this is that the library is the main building on a campus where the intellectual community can be found. If integrated into the library building, ICT makes it become a new centre for critical, reflective and collaborative thinking. People can feel isolated by the Internet but the Library does the opposite in that it brings people together in a building which is intended to support teaching, learning and support.

Over many years, library space has also developed a brand or symbol whereby the library is seen as more than the collection. Weise (2004) and Demas (2005) describe this as being centres of learning, culture and more. Librarians can be criticised for developing this symbolic representation more into a museum for books, rather than a centre for learning (Manoff 2001). This concept of the library as a symbol was explored in a Delphi study on the future of university library space (Child, Matthews and Walton 2013). The participants
perceived the symbolic view as being one of the most continuous trends, even amongst all the change and evolution. One participant said that the library ‘is one of those places where…it kind of has that gravitas, that identity. Usually it sends a message of somewhere secure to go …to actually study’.

Another range of ideas about space and libraries have evolved from concepts of Third Space developed by Oldenburg. The third space is an area where social gatherings take place as well as the social gatherings that occur in the first space (home) and the second space (work). The third place is between the private realm of the modern nuclear family and the formalized work place. It is typified by accessibility, purposefulness and its capacity for informal gatherings. The most prominent examples include restaurants, cafes, public houses and hairdressers. This idea of an informal and open public place between the categories of private and work related place is very influential in modern approaches to library space.

Libraries have been described as a Third Space, that is neither home or personal space, nor a formal classroom or public setting, but something of a hybrid, a public space where people can choose to study alone, socialize with friends, and interact with campus professionals as needed and desired. The freedom inherent in this set of options has made academic libraries probably the most crowded place on many campuses, especially during evening and weekend hours (Miller 2013). Indeed one university library (Portsmouth University: http://www.port.ac.uk/library/services/3rdspace/) has named its social learning space ‘3rd Space’.

The importance attributed to ‘library as place’ is challenged by Ross and Senney (2008) who argue that the primary purpose of the library building is to be a storehouse. If this purpose is no longer paramount, then they question why the building should be labelled ‘library’ if print material is vanishing. The challenge for the digital library provider is, if they decide that physical library space is strategically important, how to configure it so it meets the needs of 21st Century learners and researchers.

Whether the library strategically sees itself as purely digital or hybrid, what is not questioned is that the ‘major purpose of an academic library is to support the …mission of its parent institution’ (Moran 1992 p. 1157). With the main activities of universities being learning and teaching and research, if the university decides the library’s space is to be developed by the library, they need to decide how this is best achieved. This is a real challenged as Bennett (2005, p. 23) identified that ‘here is no paradigm for the academic library of the future because we have not yet brought what we know…to bear on library design. When we do so, we will be able to align library operations and library space with the
fundamental… missions of the colleges and universities that sponsor them. It is by realigning
libraries with institutional missions that the paradigm for the future will be found’. This need
to fundamentally re-assess the role of library space is further endorsed by Freeman (2005)
who stated that the library ‘must be viewed with a new perspective and understanding if it is
to fulfill its potential in adding value to the advancement of the institution’s academic
mission and in moving with that institution into the future.

**Library space and strategic support for learning and teaching in the digital age**

Before libraries embark on changing their space, a detailed understanding about
current trends learning and teaching is needed. In terms of learning and teaching, Jamieson
(2013) claims that there has been a paradigmatic shift as a result student learning research.
Many studies about student learning have been completed and used to influence approaches
to learning and teaching. Traditional teaching centred models where good teaching equates
with passing of knowledge have been replaced with the student centred approach where the
emphasis is on construction of knowledge through shared situations. It is also now
appreciated that there are variations in student learning styles with individual preferences for
learning which has resulted in a move towards student centred teaching. AMA (2006)
established other changes in learning and teaching. The move to knowledge-driven economy
has ensured a demand for more qualified, highly skilled, creative and flexible workforce. The
new emphasis on critical thinking and complex problem solving has replaced the emphasis on
factual knowledge. New knowledge is based upon what people already know and believe and
that when these beliefs are identified, challenged and changed, effective learning occurs.
Bransford et al (2000) identified three key learning styles that are supported by a strong
knowledge base: learning through reflection, learning by doing and learning through
conversation.

Alongside the changes in pedagogy, the influence of Information and Communication
Technologies (ICT) in higher education learning and teaching is also significant Beetham and
White (2013) investigated university students’ expectations and experiences of ICT. They
acknowledge that factors such as school experience, national culture and family background
but the majority of students now expect:

- robust and ubiquitous Wi-Fi across campus locations
- teaching staff with the ICT skills to operate effectively in a digital environment
- the capacity easily to connect their own devices to the university network and to have
  (e.g. helpdesk) support in using their own devices and services on campus
• access to a range of learning spaces with robust Wi-Fi, storage facilities, desk space, power sockets
• access to institutional devices alongside their own, especially desktop computers and printers

AMA (2006) have identified seven different spatial types of learning space that are needed to support the changing pedagogical styles as well as incorporating Information and Communication Technologies (ICT). The following four are specifically

Different range of learning spaces identified to for learning and teaching (AMA 2006)

• **Group teaching/learning space:** traditional format of lecture rooms being challenged. Learners to see each other and have learner-centred tables to encourage group work. Equipment to film proceedings

• **Peer-to-peer and social learning spaces:** traditionally seminar rooms but now more informal gathering spaces (in cafes, group room, shared access computer rooms. Sophisticated hardware and software so that exceeds individually owned computers. Range of desks and chairs to cope with short and long stays

• **Learning clusters:** groups of learning spaces designed for different learning modes including interactive and group learning spaces, social learning spaces

• **Individual study spaces:** typically in library areas, computer rooms and study rooms to support active solo study and writing/creation. More ICT introduced with better ergonomic and environmental conditions. Power and data are essential. Quiet acoustics and good air quality.

Bennett (2003 p. 1) points out librarians and others in the university need to ask how can library space can advance the ‘core learning and teaching missions of their institutions’

How libraries choose to make their space valid and relevant in the learning and teaching world described above where ICT is central is a real challenge. Many advocate a radical approach with Watson (2010, p. 49) stating the choice is to ‘completely re-think how we design and configure our Library or we can accept where we are and build new old libraries’.

Freeman (2005) has identified some features of library space:

• **IT becomes the catalyst that transforms the library into a more vital and critical intellectual center**

• **Library is the only centralized location where new and emerging IT can be combined with traditional knowledge in a user focused, service rich environment**
• Library space must be flexible, accommodate evolving IT and usage as well as become a lab for new ways of teaching and learning in a wired/wireless environment
• The premise for planning libraries should be 24 hours access, with critical services and technology provided and located when and where they are needed’
• The Library ‘must include flexible spaces that ‘learn’ as well as traditional reading rooms that inspire scholarship.

In terms of the challenge of the digital library, many universities across the world have chosen to invest heavily in developing physical space to support learning and teaching. In the UK alone, massive investment has been made in new buildings or in major refurbishments at Aberdeen, Birmingham, Leeds and Manchester Universities. A short perusal of the Designing Libraries web site (http://www.designinglibraries.org.uk/) will show the creative and innovative ways new library space is being developed across the world. One trend is the creation of information commons (Heitsch & Holley 2011) which were developed first in the 1990s. Alternative names for these spaces are Information Arcade, Information Hub, Media Union, and Learning Commons. The rationale for the information commons is to move library design away from storing books to being focused on what the users need. Information Commons contain much of what there is in a traditional libraries but also different learning spaces and technologies.

**Library space and strategic support for research in the digital age**

Libraries seeking to develop their space for research, also need an insight into the changing research landscape. Included amongst the developments and issues are:

• Open access publishing
• Cloud computing
• Online social networking
• Cross disciplinary research teams
• Policy developments and funding body mandates
• Increases in scholarly outputs in many fields
• Ability to share large amounts of rare data
• Rise of digital humanities (where computing technologies used in kinds of questions that are traditionally humanities)

A manifesto has been produced by Bourg, Coleman and Erway (2009) on how academic libraries should support the research process. They argue that in the midst of rapid and often unpredictable change, academic libraries can retain their position as critical
partners in the research enterprise by anticipating, understanding and addressing the challenges and opportunities inherent in new research practice.

Carroll (2011) explores the kind of physical space that researchers need. The nature of their work means that they can feel isolated and are increasingly requesting space to support interaction. This would foster generation and sharing of new and creative ideas. They still value private study environments but aspire to blended and flexible spaces that can be adapted to their needs. A single convenient location that offers different (and conflicting?) requirements is something that would be valued. At the same time, researchers are using physical library space in different ways, illustrated in a study of postgraduate students in 3 UK university libraries (Beard and Bawden 2012). They came up with various findings including:

- Library space is less valid for postgraduates as they have their own space
- Silent study space is the most important for them compared to group and communal areas
- Different nationality postgraduates have varying views about library spaces
- Print resources are unsatisfactory alternatives to e-versions

The conclusion of the study is that postgraduates would like the library to provide space that has excellent computing facilities, adequate silent space and group areas that are separate from main spaces. There is also need for staff sufficiently knowledgeable about the collection, especially e-resources. Similar findings have been outlined by Gannon-Leary, Bent and Webb (2008) who highlighted as well the importance of good computing, silence areas and individual study spaces.

Corrall (2014) provides an insightful view on how university libraries can provide space specifically to meet researchers’ needs. She argues that doctoral and post-doctoral staff/early career researchers who may not have their own offices are key audiences for library space. The initiatives by several university libraries to provide ‘research commons’ as part of new build or refurbishments are mentioned. Facilities are typically access controlled to exclude undergraduates with the space being used to support interdisciplinary data intensive research. Services are offered in partnership with other university services including grant writing, research conduct, copyright and open access publishing. There are various university libraries across the world that have developed their spaces to be focused on the needs of researchers, including the New York University and North Carolina State University in the USA, University of Auckland in New Zealand and Warwick University in the UK.
Case study of developing university library space

Some of the key issues that need to be addressed in strategically developing library space will be explored using the recent £4.8 million ($8,066,773) refurbishment of Loughborough University Library as a case study. Loughborough University has a single campus in the centre of England and is research intensive with 1000 academic/research staff, 12000 undergraduate students, 1400 postgraduate (taught) students and 921 postgraduate (research) students. The Library has invested heavily in electronic information and provides a wide range of digital library services:

- Providing over 37,000 e-journals
- Library app developed to allow mobile access to services
- Access provided to over 150 electronic databases
- Over 200 open access computer work stations provide in Library
- Library Online Public Access Catalogue replaced by resource discovery tool
- Library web pages, Facebook, Tweet, blog used to communicate and market services to users
- Extensive and detailed digital literacy programmes delivered to students
- Institutional repository overseen and managed with over 12,000 full text items
- Around 10,000 e-books

The current Library building was a three storey building opened in the mid 1980s but there had been very little investment in physical space up until 2013. The £4.8 million was used to:

- Increase space with an additional Level
- Increase and improve group study facilities 10 group rooms and 6 bookable booths
- Re-design Level 3 to make a state of the art learning environment
- Make the Library entrance area more impressive
- Increase in number of open access PCs from 160 to up to 200
- Replace all toilet facilities and increase from 20 to 39
- Install drinking water fountains on all four Library levels
- Increase study spaces by 300 to around 1370
- Create 70 silent study spaces area
- Re-carpet throughout
• Use natural lighting more by opening up an atrium
• Installed new information and enquiry desks throughout
• Re-locate the PC clinic to the Library
• Improve and enhance Wi-Fi throughout building

Persuading Loughborough University to provide £4.8 million to refurbish its Library had to be achieved through a thorough and well thought through business case that showed that the University would receive a Return on Investment. Like many countries, the UK is experiencing financially challenging times with budget cuts taking place in most public sectors. Universities have certainly not escaped these restraints where expenditure is continually being questioned and reduced. Using data from a wide range of sources, the Library provided the University with a comprehensive business case which resulted in the release of funding. The arguments made in the Business Case alongside the evidence used to prove the case are included in Table 2.

The Library also ensured that digital space and physical space were integrated and not seen as being different or in competition. Careful planning took place to ensure the physical library space should support the digital library and vice versa. In terms of the Library physical space, reliable and speedy WiFi is provided throughout the building with students being able to use their own devices through study desks fitted with two power sockets and data connection points. Group study rooms are equipped to allow students to collaboratively use ICT (both University provided and their own devices). There is a PC Clinic provided in the Library where students can bring their own devices to seek guidance if there are problems. Digital signage is present throughout the Library highlighting digital resources.

In terms of how the digital library space can support physical library space, people can book group study rooms from the Library web page. The Library web pages also include information about the range of learning spaces provided in the building. Social media such as FlickR, Library Blog, Twitter, Facebook are used to market the Library space and also as a way of gathering feedback.

Table 2 Arguments used in University Library’s business case to Loughborough

<table>
<thead>
<tr>
<th>University to invest in Library refurbishment</th>
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<tbody>
<tr>
<td><strong>Argument 1:</strong> Library users are dissatisfied with the number, range and quality of the study spaces provided</td>
</tr>
<tr>
<td><strong>Evidence (Walton 2010):</strong> Only 65% were very or fairly satisfied with study facilities. Quotes from students included: <em>Increase the size of the library overall for more of everything/ Make the library bigger since there’s</em></td>
</tr>
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</table>
only one library for the whole university/ Larger quiet areas/ more social learning environment

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<thead>
<tr>
<th>Argument 2:</th>
<th>Students experience difficulties in accessing a networked PC in the Library</th>
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<tr>
<td>Evidence (Walton 2010):</td>
<td>Only 41% people were very or fairly satisfied with Library PC provision (ranked 14th out of 15 services in terms of overall regarding satisfaction). Improving access to PCs was the second highest on users’ wish lists for developing Library services</td>
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<tr>
<th>Argument 3:</th>
<th>Library building space attracted negative comments from its users:</th>
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</thead>
<tbody>
<tr>
<td>Evidence (Stephens &amp; Estall 2011) Quotes from students included Overall I would describe the Library as excellent although I think it could do with a fresh coat of paint throughout/ The building isn’t a nice place to work (it feels dull and drab inside)/ Very ugly building, bare concrete walls and exposed ventilation pipes in the ceiling.</td>
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<tr>
<th>Argument 4:</th>
<th>In terms of study spaces per student, Loughborough University Library compares very poorly with competitors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evidence (SCONUL 2010)</td>
<td>Loughborough University has 1:11 Library seats per undergraduate compared with 1:7 averages similar UK universities</td>
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<tr>
<th>Argument 5:</th>
<th>The Library has increased its study spaces as much as it can, there are no further options</th>
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<tr>
<td>Evidence 6:</td>
<td>Between 2008/09 and 2009/10 there was 11% increase in study spaces. Between 2009/10 and 2010/11 there was 0.6% increase. Between 2010/11 and 2011/12 there was 0%</td>
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<tr>
<th>Argument:</th>
<th>When selecting a university, prospective students and their parent increasingly see the provision of a spacious, modern university library as a key quality indicator</th>
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<tr>
<td>Evidence 7:</td>
<td>Number of parents and prospective students visiting Library on Open Days to review facilities is increasing year on year</td>
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<th>Argument:</th>
<th>Refurbishing the Library will be cost effective</th>
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<tr>
<td>Evidence 8:</td>
<td>estimated Loughborough University Library estimated costs per additional study space is £16,000. Competitor universities costs per additional study space are £21,300 and £18,500</td>
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<tr>
<th>Argument 9:</th>
<th>Refurbishing the Library will be good environmentally</th>
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<tr>
<td>Evidence</td>
<td>Reduction in energy consumption from the proposed refurbishment is 63,343 kWh which = 40.5% reduction and an annual reduction in carbon emissions of 12.7 tonnes</td>
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<tr>
<th>Argument 10:</th>
<th>The Library building is heavily used and the level of use is increasing annually</th>
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<tbody>
<tr>
<td>Evidence (SCONUL 2011) Percentage increase in usage between 2008/09 and 2009/10 - 16%. Percentage increase between 2009/10 and 2010/11 - 8%/ Percentage increase between 2010/11 and 2011/12 - 7%</td>
<td></td>
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<tr>
<th>Argument 11:</th>
<th>Researchers and postgraduates have identified the need for an effective silence space</th>
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<tbody>
<tr>
<td>Evidence (Walton 2010): postgraduates and researchers indicated the Library should use any extra space for silent study purposes</td>
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<tr>
<th>Argument 12:</th>
<th>The Library has a very high profile as most students use the building</th>
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<tbody>
<tr>
<td>Evidence (Loughborough Students Union 2011)</td>
<td>97% students use the University Library</td>
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</table>

Loughborough University released the funding for the Library’s refurbishment but it expected evidence to show the benefits from their investment. A diverse range of data has online user survey, an online Library staff survey and some focus groups of internal University stakeholders (including Library staff). An ethnographic study has been undertaken on one of the social learning spaces. One off focused student surveys have been completed at various
times to assess how certain spaces are being used. The controlled access to the Library building allows detailed metrics on occupancy levels to be collected. The Library has ensured that these outcomes are shared with the wider University so they can be assured their investment has been justified.

**Conclusion**

In 1998, Lynch wrote a chapter entitled ‘Recomputerizing the Library’ where he considered how digital technologies would impact on libraries. In his conclusion, he made a statement which is even more relevant now than it was then: ‘in this digital environment, libraries are both immeasurably valuable and intensely vulnerable’ (Lynch 1998), p. 20). This captures the tensions as to how physical space fits into the digital library. Does the physical space freed up from storing print material become a threat or an opportunity? If the library decides to provide physical space, it not only has to be what students, researchers and academics require but it also has to be at least as good as what is elsewhere. Libraries can become purely digital or significantly reduce physical space or change how its space is used. All strategies are valid but the common factor they should have is that they reflect what users need and the institution requires. There can be no expectation that once a strategy is chosen, all the issues will be addressed. If physical space is to be developed to meet the digital library challenge, it is not an easy option. Many questions need answering including:

- What services and facilities should be offered in libraries?
- Should there be controlled access to library space?
- Should use groups like researchers/academics have their own dedicated library space?
- Will the library manage its own space or will it become a joint partnership with others?
- How should staffing be provided in the library space?
- Should certain activities be in the library or elsewhere

The former Librarian at the British Library, Lynne Brindley encapsulates the challenge by stating that ‘we have to work with uncertainty and complexity and chart a course into our digital future which is appropriate for our own institution and for the mission it seeks to achieve (Brindley ix 2010)

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