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From devices to people

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edited by
Gill Needham and **Mohamed Ally**

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Contributors

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Lizzie Caperon is the e-learning Officer at Leeds University Library in the UK, and the subject librarian in the School of Medicine. She enjoys the variety these two diverse roles provide – project managing e-learning projects in one role, and directly supporting medical students with information literacy and academic skills in the other. Lizzie wrote her

master's dissertation on the use of mobile technologies in academic libraries and surveyed Leeds' students to establish their needs from a mobile library service. From this work she constructed suggestions for improving provision at Leeds, dispelling some myths about the mobile services users really want to use. She is passionate about new technologies and the best ways to embed these within learning to improve educational experience. As e-learning Officer, Lizzie is able to put her passion for new technologies into action by working with an energetic team at skills@library to create and disseminate a range of interactive online resources. Lizzie has been involved in organization initiatives and projects which focus on moving towards a flipped classroom and blended learning approach. As a subject librarian Lizzie is then able to directly implement such pedagogical approaches and see their impact when teaching in the School of Medicine. Lizzie enjoys travelling: last year she attended the SLA Conference in San Diego on a young career award bursary and she represented the University of Leeds by presenting the online resource 'Flying Start' created by skills@library at the Media and Learning Conference in Brussels in 2012.

Andrew Carlos is one of the STEM and Web Services Librarians at California State University, East Bay in Hayward, CA. He is the liaison for the Engineering, Mathematics and Computer Science, Psychology, and Earth and Environmental Sciences departments, as well as an instructor for the Liby 1210 course, Introduction to Information Literacy. His research interests including emerging technology, makerspaces, user interface design, mobile technology, popular and viral culture, and information literacy instruction. He is currently pursuing a master's degree in Instructional Science and Technology at California State University, Monterey Bay, to better inform his teaching methodology. He is an active member of the California Library Association and the California Conference on Library Instruction.

Dr Klaus Ceynowa is the Deputy Director General of the Bavarian State Library at Munich, Germany. His main fields of work are strategic and financial planning, human resources management and controlling and marketing for libraries in the digital age. He was responsible for negotiating the contract between the Bavarian State Library and Google for the digitization of the complete copyright-free collections of the Library

from the 17th to the 19th century, comprising more than 1 million books. He is deeply engaged in all innovative projects of the Bavarian State Library, e.g. 3D-Internet applications, ScanRobotics, technologies for long-term digital preservation, Linked Open Data, gesture-based computing, liquid publications infrastructures, and mobile applications as well as augmented reality tools and location-based services for libraries. Due to his professional profile, Klaus is especially interested in the development and implementation of organizational structures and tools that facilitate the rapid generation and spread of library innovations, and the seamless integration of library services in the new user-scenarios of the mobile digital world.

Dr Seema Chandhok is a Deputy Librarian at Indira Gandhi National Open University, New Delhi, India. She has more than 27 years' professional experience. She has master's degrees in Public Administration, Distance Education and Library and Information Science and a PhD in Library and Information Science. She has presented many papers at national and international conferences and published 25 papers in professional journals, edited books and conference proceedings. She is also a member of various selection committees in educational institutions of repute.

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Md. Maidul Islam works as a Lecturer in the Department of Information Science and Library Management (ISLM), Faculty of Arts, University of Dhaka, Bangladesh. He obtained first class first position with distinctions in both his BA Honours and MA final examinations in ISLM. His research interests revolve around human use of electronic information products and services. He is particularly interested in exploring the factors affecting end-users' searching of information retrieval (IR) systems and in adopting a user-centred approach in designing user interfaces. His research areas cover LIS education, digital library, knowledge management, knowledge sharing, human computer interaction (HCI), informatics, information literacy, information science, information theory (mathematics) and

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Dr P. K. Jain has more than 26 years' experience in the field of library and information science. He holds PhD, MPhil and MLIS degrees in library and information science and a master's degree in economics and sociology. From 1987 to the present he has worked as Librarian at the Institute of Economic Growth, University of Delhi Enclave, Delhi, India. He is a member of the Special Libraries Association (SLA), USA; the Indian Library Association; and IASLIC, DELNET, SLP and MANLIBNET, India. He is Past President, Asian Chapter, SLA (2002–3) and has received many awards from SLA, including: Distinguished Leadership and Service 2013; Outstanding Achievement in Business Librarianship 2012; International Librarian 2010; Presidential Citation 2009; Professional Award 2008; DDLP 2004; SIS Fellow 2011; and many more. He has written 25 articles, has presented at national and international conferences, has published in reputable journals and has edited two conference proceedings. He has attended many conferences in India and abroad and presented papers. He has also organized many events, lectures, seminars and conferences in India and abroad in the last 10 years, including the International Conference of Asian Special Libraries (ICoASL 2008) in India), ICoASL 2011 in Japan and ICoASL 2013 in the Philippines; the Conference on HRD in 2013; and the Library and Information Summit (LIPS 2012) in India.

Okeoma Chinelo Jiagbogu started her long journey in building a career in librarianship when she gained employment in the Anambra State Public Library, Nigeria, as a library assistant. She subsequently got an admission into the institution of higher learning to study library and information science. She obtained her first degree in library and information science from Nnamdi Azikiwe University Awka, Anambra State in 2004. After the mandatory National Youth Service in her home country, she proceeded to the University of Ibadan, Nigeria, for her second degree, Master of Library and Information Studies (MLIS). Having continued her

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Dr Sanjay Kataria is a University Librarian at Jaype Institute of Information Technology Noida, UP, India. He has more than 14 years' experience in institutions of repute. He has a PhD in library and information science and has been the recipient of many awards and fellowships, including Commonwealth Professional Fellowship of the Commonwealth Scholarship Commission, UK; SATKAL Young Librarian Award 2012; and the A. N. Marappan Memorial National Best Young Librarian Award 2009 from SALIS. He is a member of various conference/seminar advisory committees and also of the editorial boards of various LIS journals, including the international journal *New Review of Academic Librarianship*. He was nominated by the University Grants Commission (Higher Education Regulatory Agency) in India as an observer for the selection committee for the post of Professor under the Career Advancement Scheme of the University Grants Commission. He has published more than 25 research papers and has also edited five books and conference proceedings. He has also delivered about 40 invited talks in India and abroad. Dr Kataria has assisted in many international and national conferences, seminars and UGC refresher courses. He has also organized four International Symposia (ETTLIS 2008, ETTLIS 2010, ETTLIS 2012 and ETTLIS 2015) held at the Jaypee Group of Educational Institutions. He has visited many countries for the purpose of academic and professional activities, including England, Scotland, Taiwan, Thailand, the USA, Singapore, Croatia, Malaysia and Sri Lanka. He is a member of various national and international library associations and societies, and may be contacted at skataria.jiitu@gmail.com.

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Hong Kong Design Institute Library experience' (2013, with Dickson Chiu and Wilson Chu); 'Learning the Importance of Archives Law through the Tragic Loss of 39 Lives' (2013); 'A Conversation with Robert Sutherland, the Chief Librarian at the Metropolitan Opera Library' (2013); 'Reviving Traditional Chinese Theatre Arts via the Chinese Opera Information Centre at the Chinese University of Hong Kong' (2013); and '"The Most German of All German Operas": an analysis of Richard Wagner's *Die Meistersinger* and its influence on Hitler's Nazi ideology' (2009).

Alison Mackenzie is currently Dean of Learning Services at Edge Hill University, UK, with responsibility for a wide range of academic services. One of her current priorities is to encourage greater engagement by her staff with the various client groups they support. She is an elected member of the SCONUL Executive Board and chairs the Performance Measurement and Quality Strategy group, which is actively investigating the current and future roles of impact, value and analytics for academic libraries. She also chairs the CPD group of the North West Academic Libraries (NoWAL) consortium. An active advocate for the future of the profession, she has recently published, with her colleague Lindsey Martin, *Mastering Digital Librarianship: strategy, networking and discovery in academic libraries* (Facet Publishing, 2013), which discusses the impact of digital on the demarcation of traditional roles and services.

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Kay Munro is a College Librarian at the University of Glasgow Library, UK, providing support to the College of Social Science. Kay has a particular interest in the impact of technology in libraries. She has a key role in a number of library projects looking at particular aspects of emerging communications and information technology developments. These include the implementation of the library's mobile technologies strategy, the development of a more user-focused website and social media presence, and the development of a library game, which it is hoped will add the social and fun elements of gaming into interactions with the library for users. She has co-published a number of articles and papers relating to mobile technology initiatives at the University of Glasgow Library, including 'Mobilizing your Library' in *Mastering Digital Librarianship*, edited by Alison Mackenzie and Lindsay Martin (Facet Publishing, 2013). She can be contacted at kay.munro@glasgow.ac.uk, or follow her on Twitter, @kayjmunro.

Gillian Nowlan is a Liaison Librarian for music, education, and media production and studies at the University of Regina, Canada, and has been involved in the creation and management of the University's social media accounts. She has also constructed policies detailing procedures for social media use at the Library, and has worked closely with the University's Social Media Committee to create best practices for social media use in an academic environment. Gillian has presented at international conferences and has been awarded the Canadian Library Association Emerging Leader Award for her leadership and dedication to the profession. Her research interests include mobile technologies, information literacy and social media and its applications in academic libraries and higher education.

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Nitin Parmar is responsible for identifying, implementing and evaluating transformational initiatives to enhance the student learning experience at the University of Bath, UK. Much of his current work involves producing Massive Open Online Courses (commonly known as MOOCs) which have been undertaken by several thousand learners across the world through the UK-based FutureLearn platform. He is a popular speaker at

conferences, where he speaks passionately around good practice related to the innovative pedagogical use of online platforms and classroom technologies. He brings wider sector context and has bid for, received and contributed to several projects funded by JISC, SCAP and HEA, based both at the University of Bath and further afield. Moving to the south west from the outskirts of London, Nitin read for a BSc (Hons) degree in computer information systems and completed a PGCE in information and communication technology (ICT) during his first stay at the University of Bath. Following this, and as a member of Kellogg College, he read for an MSc in educational studies (e-Learning) at the University of Oxford. In addition to being a qualified performance coach, he is a Senior Fellow of the Higher Education Academy (SFHEA) and a Certified Member of the Association for Learning Technology (CMALT).

Shri Ram has worked as Deputy Librarian at Jaypee University of Information Technology, Solan, India, since 2002. Earlier he worked at the Indian Council of Medical Research, New Delhi, and CEMCA India in various capacities. After completing a double master's in anthropology and library and information science with NET, he is pursuing his PhD degree in library and information science from Osmania University, Hyderabad. He has recently been awarded a Commonwealth Professional Fellowship at the University of East London, UK. He has published more than 20 papers in peer-reviewed international and national journals and presented at conferences of international and national repute.

Kate Robinson is University Librarian at the University of Bath, where she is a member of the University's Executive and other key committees which shape and lead the University's strategy and vision. Originally a theology graduate from the University of Manchester and with a master's in library and information studies, she has worked in libraries since the 1980s, contributing to a range of sectors within the profession, including public libraries, private members' libraries and the advertising industry. Prior to moving to Bath in 1998, initially to take up the post of Academic Services Librarian, she worked at Manchester Metropolitan University as the Deputy Librarian of its Business Library. Her professional interests are user-focused and she particularly enjoys collaborative projects, experimenting with new ideas to encourage a positive impact from new technologies on learning and libraries. Kate is a Fellow of the Chartered

Institute of Library and Information Professionals (CILIP) and Vice Chair of CILIP's Professional Registration and Accreditation Board. She is a member of the Executive Board of the Society of College, National and University Libraries (SCONUL), which represents all university and national libraries in the UK and Ireland, and many of the UK's colleges of higher education. She is also a Fellow of the Royal Society of Arts, Chair of Governors of a Somerset first school and a magistrate.

Marie Salter is e-Developments Manager in the central e-Learning Team at the University of Bath, supporting the development and delivery of technology-enhanced learning opportunities for undergraduate and postgraduate learners across the campus, at a distance and within the University's partner colleges. Having originally studied languages at the University of Aberystwyth, she has been involved in distance and e-learning for the past 20 years, before which she lived and worked in Germany teaching English and German. She is particularly interested in how technologies can be used most effectively and successfully to open access to higher education and enhance the learning experience for those studying remotely. She is currently working on a variety of projects, which range from exploring the use of webinar software with both campus-based and remote learners; encouraging a department-wide approach to transforming assessment and feedback practices, supported by technology; developing appropriate mechanisms for improving evaluation response from both on-campus and remote learners; and working on a number of cross-institutional pilot projects to investigate the potential of using augmented reality in a learning and teaching environment. Most recently, Marie has been responsible for supporting the design, development and delivery of the University's first MOOCs, which are being offered globally through the FutureLearn platform.

Dr Sarah-Jane Saravani is the manager of the Learning Hub at the Waikato Institute of Technology (Wintec), Hamilton, New Zealand. She has responsibility for the provision and development of access to a range of information and learning resources, and for services to staff and students to support their development as lifelong learners in the 21st century. She is past convenor of the ITPNZ Libraries Forum and the Forum's representative on the Strategic Advisory Committee to the National Library of New Zealand. She is a New Zealand representative on two

international standards committees in relation to IT in education. She is in the completion stages of doctoral studies through Curtin University, Perth, Australia, investigating the impacts, issues, barriers and benefits of increased use of mobile devices and applications on librarians and the library experiences of users. She continues to develop a comprehensive basis of knowledge around applications of mobile technologies within the library and information environment. Wintec Library is active in the promotion of library service delivery to mobile devices, including integrating appropriate elements of social media interactivity. Dr Saravani is currently engaged in curriculum development for a postgraduate qualification in transdisciplinary research and innovation and will co-supervise students seeking industry-specific solutions. She has presented at a number of national and international conferences on the use of technology in library services and has contributed chapters and articles to a range of publications on the impact of mobile technologies on the library and information profession within the Australasian tertiary environment.

Karen Stevenson works within the Digital Library Team at the University of Glasgow Library. She is the Library Management System Co-ordinator and also focuses on usability of the Library's search and discovery services. She has been a member of the Library's Mobile Technology Group since it was established in 2010 and takes a key role in aspects relating to training and skills development in the mobile environment. She has co-published a number of articles and papers relating to mobile technology initiatives at the University of Glasgow Library, including 'Mobilizing your Library' in *Mastering Digital Librarianship*, edited by Alison Mackenzie and Lindsey Martin (Facet Publishing, 2013). She can be contacted at karen.stevenson@glasgow.ac.uk.

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2008. In 2012 he won the AU Wellness Award by designing and developing an IOS app to promote health and wellness in the workplace. He attained his Master of Library and Information Sciences from the University of Alberta, Master of Arts and Bachelor of Arts from McGill University and Bachelor of Education from University of Alberta. He has published articles and book chapters and presented at conferences on topics such as library technology, digital libraries and mobile libraries.

Pep Torn is currently the Director of the Academic and Library Services at Universitat Oberta de Catalunya, Spain. Before that he was Director of the Library (2009–11) at Universitat Oberta de Catalunya. From 2008 to 2009 he worked as Deputy Director at the same library. From 2002 to 2008 he was technical head of Digital Library Services at the Universitat Politècnica de Catalunya, and for the same period Subject Librarian for ICT Engineering and for Multimedia Design. He started his professional career in university libraries at the same institution as Cataloguer Librarina in 1997. Before that he did some stage programmes in Universitat Pompeu Fabra (Barcelona), Universitat Oberta de Catalunya and Università degli Studi 'La Sapienza' in Rome. He has a bachelor's and a master's degree in LIS areas. He followed a leadership programme for emerging leaders sponsored by LIBER in 2011/12 and is currently following a specialization in business management.

Nkechi Sabina Udeze holds Bachelor of Library Science (BLS) and Master of Library Science (MLS) degrees from Abia State University Uturu, Abia State, Nigeria. She is also studying for her PhD in library and information science at Nnamdi Azikiwe University, Awka, Anambra State. She is registered with the Librarians Registration Council of Nigeria (LRCN). She held various positions (Public Relations Officer, Assistant Secretary) in the Anambra State Chapter of Nigeria Library Association from 2005 until 2013. Under the services of the State Library Board, Nkechi has worked as a Reference Librarian and a Divisional Librarian at Onitsha Divisional Library, and as a Divisional Librarian at Nnewi Divisional Library. She is currently a Chief Librarian in charge of Readers Services at the Prof. Kenneth Dike State Central e-library, Awka Anambra State. Nkechi has presented papers at both state and national conferences and published in peer-reviewed journals. She has a great passion for public library development.

Michael J. Whitchurch is the Virtual Services/Learning Commons Librarian at Brigham Young University's Harold B. Lee Library, USA. He has engaged with technology from the time his parents purchased their first computer in 1986. His interests lie in a variety of technology related fields, including mobile services and user interface design, information management, and information-seeking behaviours. He received his MLIS from the University of Illinois at Urbana-Champaign in May 1999. After a short time with library instruction, and as a result of his involvement with CMS in instruction, he was asked to assume the role of WebCT (CMS) Administrator for the University of Utah campus. He began at Brigham Young University almost 10 years ago, shortly after the Learning Commons in the Harold B. Lee Library opened, and developed a thriving 'No Shhh! Zone' where collaboration and innovation occur frequently. Non-traditional service to students in a centralized location presented opportunities to show the value of libraries in all aspects of academic life. Recently his job responsibility grew to include co-ordination of library virtual services, including chat/text reference (synchronous reference), LibGuides (subject guides), LibAnswers (online help), reference statistics tracking, the library tour (required for all First-Year Writing students), and other virtual services. In addition he is a mobile services advocate, where he co-ordinates, tests and evaluates mobile technologies and services for potential implementation at the library.

Mark Williams is the UK Access Management Federation manager at JISC, which provides advice, digital content and network and IT services to the UK educational sector. He was a teacher in schools and further education for ten years before he moved into the world of e-learning and so understands the pressures chalk face/interactive whiteboard staff have when adopting IT. Having been involved in content discovery and access and identity management for the last 11 years, his interest in the mobile area comes from concerns over how mobile affects our current access and authentication models, particularly the impact upon the end-user.

Anna Zuñiga Ruiz is currently the Director of Library Research Support Services of Universitat Oberta de Catalunya (UOC). Previously she was Director of Library Services (2008–10) and Library Innovation and Communication Manager (2005–8) at the UOC. She was formerly manager of the Information Center at Doxa Consulting (2000–5). She has

deep knowledge of virtual libraries, team management, information sources, content access and library service deployment in virtual environments. She has a degree in library and information science (Universitat de Barcelona, 1993), a degree in sociology (Universitat Autònoma de Catalunya, 1998), and holds an MBA (Universitat Pompeu Fabra-Idec, 2005). For further information, see documents in the UOC Institutional Repository: http://openaccess.uoc.edu/webapps/o2/simple-search?query= anna+zu%C3%B1iga+ruizLinkedIn http://es.linkedin.com/in/annazuniga.

Foreword

Libraries have moved quickly into the mobile environment, and the papers in this volume, from presentations at the 5th M-Libraries Conference in Hong Kong in May 2014, reflect the wide array of developments in the field. When I gave a keynote at the first M-Libraries Conference, held at the Open University, UK, in 2007, my talk focused on trends and suggestions for the future because there were so few examples of mobile applications in libraries at that time. This volume will provide many avenues for libraries to pursue as they develop a portfolio of content and services suited for mobile devices and their users.

An international conference such as M-Libraries, with speakers and attendees from many countries and continents, makes us realize how much we are part of the global information environment. Libraries must simultaneously keep in mind the world of information while tailoring their own offerings to their own user community. For public libraries, this means understanding the particular needs of their citizens: from small children, who are increasingly reading and playing games on tablet devices, to senior citizens, who are keeping in touch with family members far away via various video chat platforms. For special libraries, this means tailoring content and services for the particular needs of an industry or profession. For academic libraries, this means focusing very intentionally on how the mobile information environment can support the research, teaching and learning activities of the institution. The key is to keep the programmatic needs of the user community as the focus rather than library operations as the focus.

While many libraries are already providing fundamental services for

mobile devices (such as easy information about the hours and location of the library, group room reservations, catalogue access and chat reference service), they can use the mobile environment/platform to pilot services that reach more deeply into the work of their clientele. For academic libraries, in which I have a particular interest, this can involve working at the institutional level on e-content policies and procedures, determining who is going to have the responsibility for acquiring, licensing, storing and maintaining all types of content that might be useful on mobile devices, from e-journals to e-textbooks to image collections. Librarians should be working with academic departments to understand new directions in the curriculum and research that may have implications for the need for information resources suited to access on mobile devices. For example, the field of health sciences is making heavy use of information on mobile devices because of clinical work. Mobile devices are also used increasingly by faculty who have an interest in active learning, involving students in problem-solving activities during class or field work. Librarians can be involved in locating and providing information resources for these situations.

As faculty create new content, whether textbooks or multimedia materials for their classes, libraries can be involved by making available standard content platforms and facilitating the publishing and stewardship of their work. Librarians with instructional technology and media production backgrounds can serve as partners with faculty as they develop new educational resources, and librarians can provide information on intellectual property issues, including use of public domain content in the new work and on applying Creative Commons licences to products.

Librarians should also be thinking about their responsibilities for stewardship of the kind of content associated with mobile devices. In recent years, some of the most highly publicized political revolutions around the globe have been facilitated by communication via mobile devices using applications such as Twitter and Instagram. For national and academic libraries who collect resources for scholarship, future historians and cultural analysts will use curated assemblages of selected Twitter feeds, photos posted on social networking sites, and other content, as primary resources.

Libraries are usually very capable in communicating factual information to their user communities. They generally feel a responsibility to have readily available basic information for the community on their websites and on flyers distributed in the library. Often they are not as experienced

in generating excitement about or engagement with their content and services. Many interesting resources in library collections remain hidden, and users must work hard to figure out what the library has that might interest them. The mobile environment offers libraries opportunities to better communicate about their content and services in new ways. Some innovative libraries are developing mechanisms for their user community to have access to rich local archival content, often visual, when they are touring various locales. Tours of campuses and cities can be linked, through geolocation and augmented reality, for example, to photos, maps, and other materials in a library's special collections or archives departments. Even tours of library buildings can be made more interesting by including activities that students engage in on mobile devices as they move around the facility.

I believe that there are two major challenges for libraries that want to move ahead in mobile applications, both related to staff: resistance to the mobile environment and lack of skills. We need to ensure that the more senior people in our profession, like myself, encourage our colleagues, young and old, who want to innovate and try new things. When we have the opportunity to hire new staff, we should look for individuals who can bring new technology skills into the library, and we should send existing staff to training courses to improve and enhance their technology skills.

Partnerships and giving up full control are also means to achieve advances in the mobile world. Many innovative librarians partner with centres for teaching and learning, instructional technologists, publishing specialists, and others to achieve their goals.

Let's embrace mobile technologies for libraries. Mobile devices allow us to access information as we move around our world, in our professional lives and in our personal lives. We can make sure that libraries and librarians have a strong role in providing the content and services for the ubiquitous mobile access to information.

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Joan K. Lippincott,
Associate Executive Director,
Coalition for Networked Information,
Washington, D.C., USA

</div>

Introduction

This is the fifth volume in the M-Libraries series and once again we have the opportunity to reflect on the impact mobile technologies have had on the development of library services across the globe. This year we have 22 chapters from 13 countries, as far apart as India and Germany, Hong Kong and Zimbabwe, Scotland and Bangladesh. The experience and level of development, not surprisingly, varies considerably. Some libraries are at the stage of establishing user needs and preferences while others are experimenting with advanced technologies like augmented reality.

We open Part 1 of this volume, entitled 'Best practice for the use of mobile technologies in libraries', with two complementary chapters from John Paul Anbu K., Sanjay Kataria and Shri Ram describing work carried out at the Jaylee Institute of Information Technology and Jaypee University Institute of Information Technology in India. The first chapter focuses on the evidence base for best practice in designing a mobile library website and incorporates the results of the user survey they conducted to inform the development of their site. In the second chapter the authors explore the use of mobile technology to deliver an information literacy programme, again informed by the results of a user survey.

The Open University of Catalonia (Universitat Oberta de Catalunya, UOC) Library is unique in that it has operated solely in a virtual space since its inception in 1995. The chapter by Pep Torn, Anna Zuñiga Ruiz and Carme Fenoll Clarabuch describes an exciting initiative to work collaboratively with the public library service to use the apps developed at UOC to give their students access to their service via the most convenient public library.

Michael Whitchurch is the Virtual Services Librarian at Brigham Young University in the USA. In his chapter he reflects on the journey his library tour has made through various incarnations, as developing technologies have afforded new opportunities, as he says, from analogue to digital to mobile.

One of the problems faced by libraries providing mobile services is that the electronic resources they provide to their users may not be mobile-friendly. Mark Williams' chapter describes an initiative led by his UK organization JISC to develop a set of guidelines for publishers to observe in order to address this issue. A series of workshops was held in 2013 involving publishers and librarians in developing the checklist.

Parveen Babbar and P. K. Jain carried out survey work to establish the range of mobile apps and services being provided by leading international library database providers. Their detailed results are presented in this chapter.

BRAC is a private university in Bangladesh. The university library introduced its mobile website in April 2013. Maidul Islam, a lecturer in information science at the University of Dhaka, conducted a detailed study of the students' satisfaction with the site and their impressions of its usability. In this chapter he reports his findings and his recommendations for improvement in the next version of the mobile site.

In the final chapter in this section, Gillian Nowlan describes her experience of planning and developing mobile services at the University of Regina in Saskatchewan, Canada. Prior to development, students were surveyed about their preferred devices and the services they required. Library staff faced a number of decisions, the most fundamental of which was whether to build a native or a web-based application. The pros and cons of each approach are weighed up in the chapter and some practical guidelines provided for libraries contemplating similar developments.

Part 2 of the book focuses on 'Challenges and strategies' for libraries embracing mobile innovation.

The first three chapters consider the role of library staff in the move to mobile delivery.

At the University of Glasgow, in the UK, the library management adopted a strategic and systematic approach to the challenge of developing staff skills for working in an increasingly mobile environment, exploiting the opportunities offered by the technology to improve both staff working practices and services to users. Kay Munro and Karen Stevenson describe

their innovative staff training programme and their review of its impact.

Sarah-Jane Saravani and Gaby Haddow carried out a piece of detailed research in vocational education college libraries in New Zealand to investigate whether attitudes to engaging with mobile technologies would vary between staff in different roles. They interviewed staff in three categories, library managers, system librarians and qualified librarians, and their results and conclusions are presented in their chapter.

But what about the librarians of the future? If mobile services are to become more widespread, we will need those librarians to be comfortable with the technologies from the very outset. Dana Dukic, Dickson Chiu and Patrick Lo surveyed library and information science students at the University of Hong Kong and the University of Tsukuba in Japan about their perceptions and experience of using smartphones for study.

Nkem Osuigwe and his colleagues were interested in the potential use of SMS messaging to challenge traditional library service delivery. They hypothesized that use of this technology could help to revitalize public library services in Nigeria, particularly with younger potential users. In this chapter they report on a detailed piece of research they carried out to test the attitudes and perceptions of public library staff to this proposed development.

Geeta Paliwal and P. K. Jain give an overview of the potential uses of mobile technologies to enhance library services in India, where mobile phones have become almost universal. They reflect on the journey libraries have taken from physical to digital resource provision and now to mobile and the use of social networking. In a complementary chapter, Seema Chandok and Parveen Babbar illustrate how mobile services are developing in Indian academic libraries with their survey of services in universities in New Delhi.

In the final chapter in this section, Alison Mackenzie from Edge Hill University in the UK describes the evolution of her library's mobile strategy from its inception to implementation. She aptly demonstrates the benefit of involving the entire library staff in a systematic and strategic approach, and, in particular, the importance of working with colleagues in various units and disciplines across the university.

Part 3 brings together two chapters which give specific examples of innovative uses of mobile technologies to deliver information to support the wellbeing of the world's population.

The health and wellbeing of older adults and, in particular, the

prevalence of dementia is a global challenge. Colleen McMillan and Tony Tin quote a source which claims that by 2050 there will be 115 million people affected worldwide. Research suggests that exercise in older people can help to reduce the risk of dementia. In this Canadian paper they describe an innovative project to develop and test an app aimed at helping older people keep active and healthy, based on the Chinese exercise of Qi Gong.

The chapter by Collence Chisita and Thembani Malapela addresses a different global challenge – sustainable food production to support the Millennium Development Goal of reducing hunger and poverty. They illustrate the importance of access to information to enhance agricultural production in Zimbabwe and the role libraries can play, using mobile technologies, to provide this access.

In Part 4, the final section, we consider how mobile technologies are changing library services and will continue to do so into the future.

Kristy Lee, from the State University of New York, describes how the library's iPad-lending service influenced the integration of iPads into the University's learning and teaching. The use of iPads developed from their role predominantly as e-readers to the provision of specialist apps to support literacy and accessibility and use of the conferencing facility for reference enquiries and instruction.

Augmented reality is regarded by many as the 'next big thing' for libraries. At the University of Bath, a collaboration of the Library with the eLearning team provided a perfect starting point for experimentation. Nitin Parmar, Kate Robinson and Marie Salter worked with the Students' Union and colleagues across the University to pilot some applications which would help to engage the community with this emerging technology.

The Bavarian State Library is one of the largest research libraries in the world. It has used augmented reality to bring aspects of its invaluable collections to life. Klaus Ceynowa describes the multimedia app which allows users to superimpose an interactive historical map on their current location, pointing out places of interest. He calls this 'a historical version of Google Maps'.

In his chapter, Andrew Carlos focuses on the importance of geographical location to the delivery of mobile services. He makes suggestions for ways in which librarians could make use of geographical information to enhance service delivery.

In our final chapter, we ask the question 'what will users want from

our mobile-enabled libraries of the future?' Lizzie Caperon carried out research at the University of Leeds to address this. She recognizes that libraries have a great opportunity to act as innovators with mobile technologies, but the challenge will be to adopt service models which are sufficiently flexible to change as the next technological opportunity appears.

As the world becomes more mobile, users will access information using mobile technologies. Hence, libraries have to make the transition to provide mobile service. Hopefully, this book is contributing to help libraries to become mobile-friendly so that they can meet the needs of the current and new generations of users.

Part 1

Best practice for the use of mobile technologies in libraries

1

Design and testing of mobile library websites: best practices in creating mobile library applications

John Paul Anbu K. and Dr Sanjay Kataria

Introduction

The advancements in the field of information and communication technologies (ICT) and the unprecedented innovations and inventions have brought enormous change in all walks of life around the globe. The growth of the mobile communication medium is one of the important support systems of ICT which has seen a sea change over the years. This growth is ascribed to the desire of users for a number of different communications media to access the internet. From desktop computers, the mode of computing shifted to laptops and further into tablets. The proliferation of mobile technology, especially the 3G hype and the subsequent Wi-Fi innovations, have triggered an unprecedented change in the tools for access to the internet. Song and Lee observe that the users have 'widely adopted mobile devices, such as smartphones, tablet PCs, and e-readers as their primary tools to access information' (2012, 574). It is also worth noticing that in this rapidly changing environment, people have become 'more dependent on wireless communication systems' (Olatokun and Bodunwa, 2006, 530). The growth of mobile telephony, especially the ever-expanding growth in Asia and Africa in the use of cellular telephony, has seen a number of innovations both in the technology and in the service delivery of mobile communication technology. Academic institutions have benefited greatly from these innovations, as they form the cornerstone of the information society. Over the years the libraries, which act as the focal point of the academic community, have adapted these changing technologies in their service delivery. With the cosmic change

of the mobile revolution around the globe, it is no surprise that libraries stand in the forefront of providing information to their users through the new mode of mobile technology.

Mobile technology and academic institutions

With the fascinating growth of the mobile communication system, it is worth noting the growth of its user base, especially amongst the academic community. Olatokun and Bodunwa observe that 'Mobile phones have become an inseparable part of everyday life' (2006, 530). Smith, Salaway and Borreson Caruso, in their study of undergraduate students and information technology (EDUCAUSE, 2009) shed light on the mindset of undergraduate students with respect to mobile usage. According to their study, 76.7% of undergraduate students have used smartphones not only for communication but also for accessing information. It's significant to note Song and Lee's (2012) study of mobile device ownership among international business students, which clearly showed that close to 82% of students owned smartphones and used them to access information. This is mainly because the smartphones have been designed to allow users to browse the web with ease, irrespective of the design of the websites.

Mobile communication system and libraries

With the rapidly changing ICT environment and with swift advancements in mobile technologies and their applications throughout the world, libraries and their services are left with no other choice than to join the mobile bandwagon to realign their strategies and services to suit mobile users. With more and more e-commerce and entertainment sectors making rapid inroads in the mobile revolution, it is imperative that libraries also take stock of the opportunities these mobile services offer to them and the challenges which lie ahead. Interestingly, while the innovations of mobile technology have captured the imagination of e-commerce it is only now catching up with the library and information sector. It is worth observing that libraries are slowly but strongly beginning to make inroads into the world of mobile learning, especially information dissemination through mobile phones (Walsh, 2009). Most of the initiatives are only aimed at starting basic services for mobile users and unfortunately in the mobile app marketplace libraries have not started to make any

significant inroads. La Counte (2012) observes that with computers and internet facilities libraries had the upper hand and provided state-of-the-art services to their clients but in the case of mobile applications, out of the hundreds of thousands of mobile applications available for phones, the number of apps that librarians have built for libraries can be counted on one hand!

While there is great potential to provide all the library operations through a mobile-based solution the ignition needed to spark that revolution is still missing in libraries. There is no doubt that libraries are slowly moving towards offering mobile-based applications but the concentration seems to be on providing some specific or isolated part of the library service as a mobile application. Griffey (2010, 2) observes that 'libraries have, over the past five years, focused heavily on providing digital services, especially reference services, via mobile channels'. The focus of libraries with regards to mobile technology seems to be on ready-reference queries. This concept is slowly changing with the advent of smartphones.

Smartphones have redefined the mobile communication paradigm and have reinvented the mobile computing phenomenon. The convergence of web-enabled smartphones, mobile applications and the mobile interface designed for smartphones, along with cloud computing, is rapidly changing how people interact with each other and with their environments. It is predicted that in the coming years there will be an explosion of fully featured smartphones. This is good news for libraries, as the chance of total realignment of library services to match the mobile communication world seems feasible and within their grasp. The starting point, of course, is to begin with library websites, as they are the face of libraries in the desktop computing world.

Literature review

When looking at the wealth of literature written about mobile library initiatives, a general search shows that there is an increasing interest amongst academic institutions in the use of mobile devices to support teaching and learning. There is no doubt that mobile usage is the trend in academic as well as institutions of higher learning. Wisniewski from the University of Pittsburgh predicted that 'by 2014 mobile internet usage will surpass desktop web usage' (2011, 54) which seems to be true. He

further analyses what is in store for libraries because of the proliferation of mobile usage. His conclusion is that 'the future is mobile and the future is now' and it's up to libraries to choose which mobile path is right for their library, which depends on different factors: the environment, the budget, the goals and the skill set of the library professionals. Canuel and Crichton (2010), while analysing the impact of mobile web on Canadian academic libraries, point to the fact that among the Canadian Association of Research Libraries (CARL) mobile penetration is around 34%. This figure is consistent with the 35% mobile penetration of the Association of Research Libraries (ARL), which shows that mobile application penetration overall amongst libraries is on the increase. Cummings, Merrill and Borrelli's (2010) study on the use, impact and implications for libraries answers most of the questions researchers have on the application of mobile technology for library applications. Their study points out that close to 55% of the respondents were using mobile-based internet services and close to 45.2% of respondents indicated that their desired search medium is mobile catalogues, which clearly indicates that the choice of the users is mobile.

Since library websites are considered to be the face of many libraries, the obvious choice for any library to initiate its mobile presence is through its library website. Bridges, Rempel and Griggs (2010, 310) confess that if the question is asked: 'Should the library develop a fully mobile website?', the answer is an unequivocal yes. Their decision is based on the ECAR (EDUCAUSE, 2009) study, which strongly suggests that a substantial number of traditional college-age students regularly use web-enabled mobile devices; this reinforces the rationale behind creating mobile websites. Their study also highlights the need for mobile catalogues and the mobile library catalogues that will be available soon. Yun-hong Lv's (2012) investigation of China's mobile library development and the analysis of global mobile library development brings to the fore the mobile library service process which paves the way for a mobile synthesized library process. Yun-hong Lv concentrates more on developing a domestic mobile library model, as opposed to a global framework. His innovative contributions towards mobile library development include video streaming, personalized customization service and video reference advisory service, to name a few. Hoivik (2011) provides an illustrative interface flowchart model for creating mobile web display for libraries. His combination of a push-and-pull content delivery model is promising for future mobile

library website developments. He also provides insight into how, using simple JavaScript code, the devices can be identified and appropriate website design can be displayed. The major drawback with Hoivik's script is that the system suggested is only for Android users, which excludes iOS and Windows users. Griffey (2010) feels that mobile browsing, especially for library websites, has become better because of the advancement of technology. With a little bit of tweaking of the existing library website coding or by using a conditional mobile cascading style sheet (CSS) with a simple 'command of max-device-width' an effective mobile-based website can be created for libraries. This seems to have influenced a lot of library website developers to combine their desktop as well as their mobile websites using a single web design with conditional style sheets.

The newer generation of designers is influenced by the responsive web design techniques which provide the same design for any device. Baturay and Birtane (2013) provide a glimpse of the responsive web design for instructional content in their paper 'Responsive Web Design: a new type of design for web-based instructional content'. The responsive web design aims to provide a 'suite of techniques for building fluid, standards-based websites that adapt to user devices' (Reidsma, 2013). Using fluid grids and CSS media queries to change style according to devices it is possible to provide a single web design for multiple devices. Mairn (2013, 93) concludes by saying that the development of different websites for different gadgets will be a concept of the past, as newer technologies and techniques are aimed at strengthening the mobile website presence as the prime source.

Mobile library websites – where to start

As addressing the mobile presence of library websites gains momentum, the logical place to start the library website is to receive inputs from the users. Murray (2010, 235) recalls the questionnaire in which she asked her library users to identify the various services which they thought would be useful to them. She concludes by saying that it is imperative for 'each library to learn which mobile web resources library users consider most useful'. One way of doing that is by going through the page statistics of the existing library website to see which pages are most often visited. Another way of gauging the needs of the users is to find out through questionnaires which services the users would like to have on their mobile as a priority.

The next important aspect of planning for the mobile website is to understand the mobile-using habits of the users. This is very important in designing the website to suit the nature of browsing by the users. There cannot be a *set in stone method* for the design template, as the browsing nature of each set of library users will be different from that of the others. An added factor will be the kinds of devices they use. A survey of the devices being used will come in handy while designing the website. The display area of different phones, especially that of the wider web-ready smartphones versus the older smaller-screen mobile phones, poses an interesting challenge while designing mobile websites. With more and more smartphones being used, the central design of a mobile website depends on the percentage of users who own such phones. Another important aspect of planning for the mobile website is to determine the user base, especially its demography. If the user base consists of multiple geographic locations the issues of bandwidth, availability and accessibility should be considered in designing the website.

Once they have the required data the library administrators will be in a better position to determine whether they should plan for a separate library application for users of handheld devices, or think about developing the mobile website for them. This is an important decision for the library administrators because developing a separate application for the library will help the users with faster loading of information and easier searching of its catalogues. Developing separate applications for the library will also enable the developers to include a number of mobile-specific, built-in advantages and applications, such as device orientation, GPS-enabled location finding maps, QR and barcode scanning, making phone numbers clickable and making use of the inbuilt camera or other utilities. But the downside is that with a number of mobile platforms the developers need to develop applications for each platform and keep developing as and when new platforms appear. Testing and releasing applications through app stores is a cumbersome process.

The starting point: a case study of the JIIT University library

As indicated, the best starting point for mobile website creation is the users. In this study, in order to ascertain the attitude of the users towards a mobile library website a user study was conducted by the Learning Resource Centre, Jaypee Institute of Information Technology (JIIT) during March 2014. JIIT is located at Noida, UP, India, with a student and staff

complement of close to 35,000. It offers graduate, postgraduate and doctoral research programmes. The campus is also equipped with a Learning Resource Centre (LRC), which provides close to 42,500 print copies of books along with 123,883 e-resources. In order to survey the kind of mobile website needed for this library, along with the different choices which the library users need, a small questionnaire with eight specific questions was administered. The results of the questionnaire are discussed next.

Survey population

A total of 229 respondents replied to the questions sent to them. The breakdown of the survey population is shown in Table 1.1. A balance between students and staff was required in order to have an unbiased response. A ratio of around 1:10 of staff to students was achieved.

Table 1.1 JIIT survey population

Total survey population	229	100%
Teaching faculty	22	9%
Non-teaching staff	4	2%
Students	205	89%

The library on mobile phones

The first question was on the willingness of the user to have the library website on mobile phones and to use it. This was specifically aimed at gauging the reaction of library users and to note how they would respond when the library website was presented to them. The response is shown in Table 1.2.

Table 1.2 Willingness to use resources on mobile phones

Yes	218	95%
No	11	5%

The result of this question was an overwhelming 'yes' to the idea of having the library services on mobile phones.

Separate mobile library website for mobile phones

The next question was aimed at trying to find out how the library users wanted to access the library website on the internet, either as a separate

website or as it is currently available to them. To the question of whether a separate library website for mobile phones was needed, the response was that nearly 94% (216 respondents) answered that they would like to have a separate website, while only 6% (14 respondents) indicated that they did not mind whether it was a separate website or not. This gave a clear indication that the users wanted to have a mobile-friendly website in addition to the desktop website which is currently available to them.

Types of mobile phone owned

In order to develop a good website it is also imperative that the mobile phone types used by the population are taken into consideration. This is important because it will form the basis for the design and development of the library website for the mobile phones. A specific question was asked on the type of mobile phone used. The results are displayed in Table 1.3. This was a big eye-opener for the administration, as close to 95% of the users used internet-enabled phones and the biggest proportion of these were Android users, followed by iOS and other internet-enabled phones.

Table 1.3 Types of mobile phone owned

iOS (iPhones)	19	8%
Android phones	148	65%
Windows phones	20	9%
Other internet-enabled phones	31	13%
Mobile phone without internet	11	5%

This has given us confidence that the library should be moving towards creating a library website for mobile users. It has also given an idea for the future, when we want to develop apps for the libraries, of our target operating system and the users.

Patterns of mobile internet use

While we had all this background information, we also wanted to check the internet-using pattern of our users in order to plan for information literacy provision and marketing of the mobile library services. First we wanted to see how frequently the users accessed the internet through their mobile phones. A specific question related to this was asked, and the results are in Table 1.4.

Table 1.4 Frequency of internet access through mobile phones		
Frequently	188	83%
Rarely	30	13%
Never	9	4%

The response was very positive for us, as 96% of our users were using the internet through their mobile phones and among them 83% were using it frequently, which told us that our concentration on the marketing should only be on advertising the service rather than providing information literacy support.

While we concentrated on the frequency of access, we were also conscious of how users connect to the internet, as this would directly impact on our design process. If the users are using their data packs to access the internet the best possible idea is to minimize the graphics and balance the content. A question on how the users accessed the internet was asked, and their responses are shown in Table 1.5. To our surprise we found that close to 58% use their own paid data packs, which made us realize that our content should not be too heavy on the screen for downloading, as it might impact them financially.

Table 1.5 Methods of internet access from mobile phones		
Campus Wi-Fi	51	23%
Wi-Fi hotspots	44	20%
2G/3G data packs	129	57%

Also a question on how they would like to see the library website was posed to them as this would make the design process easier. As can be seen from Table 1.6, close to 73% of the respondents replied that they would like to have balanced content, which we thought was a fair call as it clearly reflected our thinking as well.

Table 1.6 Mobile website design preferences		
More text and links	33	15%
More graphics and text	28	12%
Balanced	164	73%

Once we had all these details a more specific question was asked about which links they would like to have prominently in the website. The answers are shown in Table 1.7. Most of the users preferred to have the OPAC as their main preferred link in the mobile library website, closely

followed by the electronic resource database link, and circulation-related information as the next preferred link. Keeping these preferences in mind, the design phase of the library website was handed over to the technical team for further action.

Table 1.7 Links preferred in the mobile library website

OPAC (book search facility)	188	82%
E-resource database link	150	66%
Instructions on how to access databases	84	37%
Library tours	57	25%
Circulation-related information	145	63%
Library rules	46	20%

Best practices in creating library websites

Mobile library websites – the content

Once having decided to develop a mobile website for the library there are some basics which need to be observed. Murray (2010) refers to the basic design recommendations based on the Mobile Web Best Practices Report (www.w3.org/TR/mobile-bp). On a general note, this best practice guide will help to optimize the output of mobile website design. This report is most comprehensive and very helpful in the design process of any mobile website. Close to 60 different aspects of mobile website basics are analysed in detail and serve as guidelines for any developer. With more and more platforms evolving and more and more innovations being introduced into mobile telephones, it is necessary to follow some broader guidelines to optimize the design of library websites.

A separate mobile URL and redirecting the users

The general observation from the developer's point of view is that it is important to have separate websites created in parallel for both mobile and desktop users. The advantage is that the specific features and identities of each website can be monitored when they are kept separate. By nature the features and navigation menus differ vastly between desktop and mobile sites. This is because of the limited screen size of mobile phones, which do not have any fixed screen sizes, compared to the fewer fixed display widths of desktop computers. With mobile sites

it is advisable to have a smaller number of navigation buttons and it is necessary to have back and forward buttons for each page, which are not needed by desktop sites. It is imperative to redirect users visiting the site, depending on the device with which they have accessed it. Griggs, Bridges and Rempel, in their paper 'Library Mobile: tips on designing and developing mobile web sites' (2009), provide an algorithm for such a device and for redirection. According to them, with the use of server-based script using PHP it is easy to detect device types by reading the UserAgent string. Most mobile devices are captured using this algorithm, but the problem with this approach is that, with numerous browsers on the market, the inconsistency in the list of browsers make this task very tough.

Linking to appropriate CSS file

Once the device is detected and redirected to the mobile site an appropriate CSS file should be linked to the specific device, which enables the content to be displayed correctly on it. A general mobile CSS file can handle most of the mobile devices, though a specific iPhone CSS file can be created for iPhone devices with the max width of 480 pixels. This way, irrespective of the differences in devices, the screen size is adjusted without compromising the content. Creating a mobile website for specific devices is made simpler using a number of open-source and commercial auto-generated software suites. Starting with Google's Autoconvert and MobiSiteGalore there are a number of site generating software packages. Griggs, Bridges and Rempel (2009) and others provide a list of such software, starting from MyMobileWeb, HAWHAW and Wireless Abstraction Library (WALL).

Simplicity of design

When developing the design of a mobile library website it is imperative to keep it as simple as possible. Though broadband and Wi-Fi are common in the realm of modern mobile communication, the developer should keep in mind that most of the users pay for data while using their mobile devices to browse the website. So a simple design will help both the paying and non-paying users. Most of the mobile site-building software packages support a single column design for mobile websites.

This is because when the page is loaded into a mobile device it zooms all the way out so that it all fits onto the screen. All phones have the automatic facility to zoom the entire screen size to fit the entire page but, in many phones that don't help to read texts, the only facility is to use the inbuilt zoom-in facility which can allow the pages to be read meaningfully. In such cases a single column of data will come in very handy. Also the navigation and user input should be minimized because most of the mobile devices lack pointers and external navigational tools. It is very difficult to interactively input into mobile devices especially with virtual keyboards and smaller screen displays. Also it is advisable to avoid absolute sizes, which will be very difficult for the mobile devices to display; instead, percentage sizes are advisable, so that the images or the columns and blocks are displayed meaningfully.

Avoid flashy desktop technologies

The desktop web pages are often made colourful by using technologies such as Flash, JavaScript, applets, frames, pop-ups and texts and images with scrolling. But with the mobile it is advisable to keep those fancy items to the minimum, since most of the mobile browsers do not support them.

Responsive web design

Modern designers tend to feel that a single approach employing a responsive design could be a possible solution for desktop as well as mobile users. Prompted by the amount of work in maintaining two websites dynamically, responsive web design aims to provide a single solution which could cater to all the users who use different gadgets, including the majority of desktop users. Responsive web design, which was first introduced by Ethan Marcotte in 2010, provides flexible solutions to some of the problems highlighted by traditional web design and allows the users to have the same desktop design for multiple devices. Responsive web design, which is often described as elastic or fluid layout, tends to adjust itself to mobile and tablet devices. The main advantage of responsive web design is to have one design for many devices, with the possibility of automatically zooming and easy navigation. The basics of responsive web design are in the design phase, where a careful wireframe

diagram of each and every step of the website is predesigned so that it serves the purpose of all users.

Testing and validating mobile library websites

For conventional websites, designing and coding a site that will work in all browsers is much simpler, as most of the HTML editors provide an easy preview option which covers most of the browsers. But with mobile sites it is a tedious process, as there are thousands of devices and hundreds of browsers available for anyone to test. W3C, which works towards establishing standards and best practices, has provided the Web Best Practices 1.0 (MWBP) working group, which has a suite of software packages called mobileOk Checker (www.w3.org/TR/mobileOK/#check). This provides the facility to automatically check mobile conformance of a website. This package is in Java and it is open-source available under W3C License. The mobileOK software is designed to improve the web experience for users of mobile devices by rewarding content providers that adhere to good practice when delivering content to them.

Other useful mobile website testing tools

There are a number of other mobile website testing tools available in the market. Most of them do what MobileOK software does. Some of the frequently used testing tools are:

- MobiReady (www.ready.mobi/launch.jsp?locale=en_EN)
- Gomez (www.gomez.com/mobile-readiness-instant-test)
- Opera mini simulator (www.opera.com/mobile/demo)
- Dotmobi emulator (www.mtld.mobi/emulator.php)
- Adobe Device Central CS5
  (www.adobe.com/products/creativesuite/devicecentral)
- iPad Peek (www.ipadpeek.com)
- iphoney (www.marketcircle.com/iphoney)

While most of these tools use random testing of web pages based on the mobile-readiness of the website, MobiReady is based on W3C best practice guidelines. Unlike mobileOK testing, MobiReady allows a complete testing of the entire website for its content and its visual

appropriateness. Products like iPad Peek and iphoney are device-specific and are useful only for simulating content to iPad or to iPhone devices.

Griggs, Bridges and Rempel (2009) and others feel that validating and testing are continuous processes whereby testing is carried out as and when new codes are added. With sites such as library sites, which often need continuous updating, it is imperative that they are tested periodically. Since there are provisions to test the development in the desktop itself it is easy to test the mobile websites in the local development stage. Once they are tested locally they can be uploaded into simulators such as Opera Mini or iPhone Safari for further testing. Alternatively iPhone SDK can be downloaded and installed in the local machines and the websites can also be tested locally.

Conclusion

With all the advances in ICT and in satellite communication systems, there is no doubt that mobile presence will be the key to engage users in the near future. The underlying principle of the next generation of library services is to link people, technology and information together, and to link them using the choice and mode of communication which is relevant to the users. Mobile websites will be the initial mobile venture which any library will be looking to initiate. There is no doubt that such a mobile venture should start with the understanding of the user's behaviour and needs and at the same time the available tools and technologies which the library possesses. A word of caution, though: the secret is not to recreate the entire spectrum and services of the desktop-based website but to start small and elegant and add the complexities as the users become familiar with the mobile sites.

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