

Robin Dresel, Maria Henkel, Katrin Scheibe, Franziska Zimmer and Wolfgang G. Stock*

A Nationwide Library System and Its Place in Knowledge Society and Smart Nation: The Case of Singapore

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Abstract: What role can a library system play in the development of a knowledge society and a smart city or a smart nation? In Singapore, we are able to identify governmental master plans to develop and to consolidate a knowledge society and a knowledge-based economy since around 1980. The current Smart Nation plan aims for comprehensive digital innovations in the country. Singapore's National Library Board (NLB) is an agency of the Ministry of Communication and Information; it is responsible for the Public Libraries, the National Library, and the National Archives. Its duties are regulated by law. This article describes the tasks of NLB and its institutions, the physical as well as digital resources, NLB's services (for instance, OneSearch and the Singapore Memory Project), important programs (e.g. activities to foster digital literacy and information literacy), NLB's social media activities, and, finally, user participation (following design thinking) in the development of NLB's services. In contrast to many other countries in the world, the nationwide library system in Singapore plays an important role on the way towards a knowledge society and Smart Nation as it fosters ubiquitous access to knowledge (content), provides spaces for the community, and attempts to deepen digital literacy skills of all Singaporeans.

Keywords: library system, Singapore, NLB, smart nation, knowledge society

Introduction

In some countries around the world we can observe that the role of library systems fundamentally changed from a quiet place to read or to borrow media (with only minimal influence on the majority of people) into vital knowledge centers serving people, businesses, and administrations (Nicholson 2017) – now with huge influence on smart cities (Barth et al. 2017; Born, Henkel, and Mainka 2018; Mainka et al. 2013; Mainka 2018) and on entire countries of the knowledge society. Notable examples are the Qatar National Library (Henkel et al. 2018a; Gremm et al. 2018), Dokk1 in Århus, Denmark (Bech-Petersen, Mærkedahl, and Krogbæk 2016), and the National Library Board (NLB) of Singapore (Henkel et al. 2019; Rajsic, Bucher, and Osei-Poku 2012; Sabaratnam and Ong 2013), which is our case study. Since the last decade of the twentieth century, there have been huge transformations of the library system in Singapore. In order to fulfill its tasks, nowadays NLB manages 26 Public Libraries, the National Archives, and the National Library. NLB's buzzword for all these developments is “journey.”

Following a development phase of about 35 years, the city-state of Singapore has become a leader in the emerging knowledge-based economy and in knowledge society. The government of Singapore successfully completed its master plans from the first National Computerisation Plan (1981) to the Intelligent Nation Plan (iN2015) and is now working on the implementation of the idea of a Smart Nation. Additionally, there were specialized master plans on Singapore's libraries, namely Library 2000 (from 1994), Library 2010 (2005), and Libraries of the Future Masterplan (2015). Singapore's concept of a Smart Nation includes a digital government, a digital economy, and the digital readiness of all people. Public libraries, in particular, play an important role in fostering citizens' digital readiness. One of the key principles of the present Libraries of the Future Masterplan is capitalizing “on Singapore's Smart Nation programme to build more meaningful interactions with content and community” (Kang and Koh 2015, 2). Our leading research question is: which place do libraries take in the ongoing

*Corresponding author: **Wolfgang G. Stock**, Department of Information Science, Heinrich Heine University Düsseldorf, Universitätsstr. 1, Düsseldorf, D-40225, Germany, E-mail: stock@phil.hhu.de

Robin Dresel, National Library Board Singapore, 100 Victoria Street 14-01, Singapore 188064, E-mail: Robin_DRESEL@nlb.gov.sg

Maria Henkel: E-mail: Maria.Henkel@hhu.de, **Katrin Scheibe**: E-mail: Katrin.Scheibe@hhu.de, **Franziska Zimmer**:

E-mail: Franziska.Zimmer@hhu.de, Department of Information Science, Heinrich Heine University Düsseldorf, Universitätsstr. 1, Düsseldorf, D-40225, Germany

development of the knowledge society and the smart nation of Singapore? The present study is mainly descriptive; however, we are going to analyze NLB's main merits and the success factors of this library system. Maybe, those merits – working well in Singapore – are hints for other libraries all over the world to deal with them more closely.

As research methods, we applied case study research on-site and literature review; i.e. we analyzed research articles and official documents, especially from the Ministry of Communication and Information (MCI) and its statutory boards Infocomm Media Development Authority (IMDA) as well as the National Library Board (NLB). Finally, we systematically studied the institutions' web pages.

Knowledge Society and Smart Nation in Singapore

What do “information society,” “knowledge society,” and “smart nation” mean? “Information society” is mainly technologically defined; it is based on information and communication technologies (ICTs). A “knowledge society” is an information society as well; however, here knowledge (information content) will be available for everyone at any time and any place. The economy in a knowledge society is driven by knowledge, called a “knowledge-based economy” (KBE).

In a knowledge society or in a knowledge-based economy, knowledge itself is not an end-product. No one is able to live from knowledge alone. However, knowledge takes full effect if implemented in commercial or public products and services, in entire markets, or in industries. In such a way, “smart” products, “smart” services, “smart” industries, “smart” cities, and “smart” countries may emerge (Stock 2011). For Mainka (2018), the “smart society” displays all characteristics of information and knowledge societies. Additionally, networks are growing and include the Internet of Things as well as open data; sustainability and health become important factors, and empowered citizens are engaged in their society. Following the macroeconomic theory of Kondratieff (1926), there are long business cycles of about 50 years in length, which are founded in technological innovations (Linde and Stock 2011, 78–80). In the history of capitalistic economy until today, we can identify five Kondratieff waves with their specific basic innovations, namely steam engines (around 1800), steel and

railways (1850), electrical engineering and chemistry (1900), petrochemistry and automobiles (1950), and, finally, information and communication technology (2000). While the prototypical city of the fifth Kondratieff banks on ICT and especially the internet, following Mainka (2018), the city of the emerging sixth Kondratieff cycle is guided by sustainability, the citizens, and their health.

Singapore is a tropical city-state located at the southernmost tip of continental Asia, just about 100 km north of the equator. It is an independent country since 1965. In the ranking of world cities of the Globalization and World Cities Research Network (GaWC) from 2018, Singapore is an Alpha+ city and is in fifth place behind London, New York City, Hong Kong, and Beijing, but ahead of the other Alpha+ cities, Shanghai, Sydney, Dubai, Paris, and Tokyo (GaWC 2018). Singapore exhibits special conditions: it is an island with limited land areas and very limited natural resources (there is not even potable water), it is simultaneously a city and a state, and it is entirely administered by a centralized and stable government. Singapore's government focused on the development of a knowledge society and a knowledge-based economy since about 1980. As a country without natural resources and without a strong manufacturing sector, Singapore has no other choice but to concentrate on trade (especially with its port) and on a knowledge-based economy. From 1980 until today there is an uninterrupted sequence of masterplans towards a knowledge society. From the very beginning of these development plans, libraries played a crucial role, as they manage knowledge (explicit knowledge in documents as well as implicit knowledge in bringing people together): “The Government of Singapore has strongly acknowledged the crucial role played by libraries in a KBE” (Sharma, Lim, and Boon 2009, 100).

Singapore's smart nation initiative is a “whole-of-nation approach to enhance the quality of living for the country” including government efforts to “co-create innovative people-centric solutions with the industry and citizens” (Hoe 2016, 327). Co-creation does not only mean the adaption of, for instance, ICT in the citizens' “smart homes,” but also the “smart participation” in the construction of city-related smart products and smart services, e.g. by attending hackathons (which, in turn, means that the citizens are able to code or at least to understand software development) (Ho 2017).

For Lin and Luyt (2014), Singapore's library system creates a sense of community and forms a building block of the national identity of this city state. Singapore has a population of about 5.6 million, thereof about 4 million

residents; NLB has about 2.4 million members. Consequently, 61 % of all Singapore's residents are NLB members. Mean values for visits per member and year are 10.5 for physical visits and 32.3 for digital "visits" (i.e. downloads) (all numbers from 2017). In international comparison, these values are very high and impressive. Using a "reach index" to aggregate different indicators as unique physical visitors, active members, participants of programs, users of digital platforms, and volunteers (A. Lee 2018), NLB is able to determine population segments that are well-reached and under-reached. By using marketing activities (e.g. Dresel and Kaur 2010) deficits in awareness can be avoided.

A basic function of a library is the provision of information to help its community to transform this information into knowledge (Stock and Stock 2013, 36). In addition, a community space is also needed; a so-called "third place," a (physical as well as digital) space besides home and work or school. Not only are books and other media important for a library, but additionally the provision of spaces for its community. NLB actually offers such third places. Considering the physical third place, the new environmental green designed building of the National Library of Singapore opened in 2005, integrating a reference library and the Central Public Library. In the National Library as well as in the regional and public libraries "the envisioned spaces for collaborative learning, brainstorming sessions and free discussion have systematically been created (i.e. cafes, group learning spaces, discussion corners, etc.)" (Hornidge and Kurfürst 2011, 363). The libraries are located at frequently visited places in Singapore; 13 (out of the 26 public and regional libraries) are in shopping malls, and an additional five are integrated in community centers hosting sports centers, polyclinics, and retailers besides the library. Digital third places are realized via social media, e.g. library blogs or posts on

Facebook, such as the library@esplanade blog and Facebook page support information and discussion on performing arts (the Esplanade is a performing arts venue). The library@orchard runs a blog about the design and lifestyle public library at Orchard Road (which is the major shopping belt and tourist attraction in Singapore).

NLB, National Library, Public and Regional Libraries, and the National Archives

The National Library Board Act established the NLB as a statutory board in 1995. With the National Library Board Act, NLB has been regulated by the government since then; it is by law the umbrella organization for the National Library and the network of Regional and Public Libraries. In 2013, the National Archives (NAS) joined into the NLB to form today's structure (Figure 1). In turn, NLB is (with its sister organization, Infocomm Media Development Authority, IMDA) an agency of the Ministry of Communication and Information (MCI). IMDA develops and regulates the converging ICT and media sectors, while NLB promotes library, information, and archival services. In order to include all Singaporeans in the knowledge society and the smart nation, MCI supervises all activities concerning digital readiness (including digital skills, media literacy, cyber wellness, information literacy, and code for fun enrichment) (IMDA 2017b).

[Correction added after online publication on 23 January 2020: Mistakenly this article was previously published online ahead of print containing a wrong version of Figure 1]

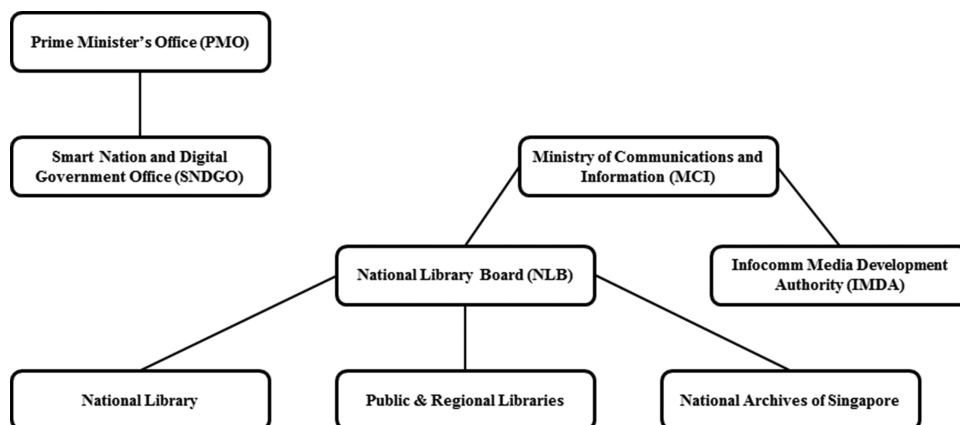


Figure 1: Singapore's libraries in the country's government organization.

The Smart Nation and Digital Government Office (SNDGO) as well as the Government Technology Agency (GovTech) work directly under the Prime Minister's Office (PMO). SNDGO plans the Smart Nation projects, drives the digital transformation of the government, builds long-term capabilities for the public sector, and promotes adoption and participation from the public and industry. GovTech is the implementing agency of SNDGO.

All institutions, which are concerned with Singapore's development towards a knowledge-based economy and smart nation, are organizationally located at the top of the country's government. This clearly shows the importance of this development path and its institutions for the nation. All major tasks of NLB's institutions are regulated by law (Table 1).

Table 1: NLB's tasks by law.

<i>Task</i>	<i>Legal foundation</i>
Establishing and maintaining libraries; provision of library information services	§6(a)
Promotion of reading, encouraging learning	§6(b)
Provision of a repository for library materials published in Singapore	§6(c)
Acquiring and maintaining a comprehensive collection of library materials relating to Singapore and its people	§6(d)
Establishment of standards for the training of library personnel	§6(e)
Provision of advisory and consultancy services concerning libraries and information services	§6(f)
Compilation of a national union catalog and a national bibliography	§6(g)
Advising the government in library-related aspects	§6(h)
Provision of a repository of records of national or historical significance	§6(i)
Conduct of records management programs for the government	§6(j)
Conduct of oral history interviews, production of transcripts, preservation of the interviews	§6(k), § 14 J (2)
Examination of public records in any public office, classification of the records	§14 A(2)(a) (b)
Conduct of archive-related publications, exhibitions and promotions	§14 A(2)(c)
Establishment of a NLB endowment fund (for the provision of training programs for librarians, delivery of lectures, sponsorship for promotional programs, and financing of research on reading and librarianship)	§23

Source: NLB Act 2018 (excerpt, modified).

Public sector organizations are often called dysfunctional, bureaucratic, and inert. Despite being a public service organization, Heracleous and Johnston (2009) call NLB

an inspiring example for private businesses. They praise the internal organization (human resources practices, the reward system, customer feedback, and the performance management system) as well as the offered services (for instance, digital reference, called "cybrarian service," and assistance in the library, called "concierge service"). Over the years NLB has received several prestigious awards in customer service, innovation and human resources, benchmarking against international world class leaders in a confirmation of continuous excellence. The Public Libraries have changed into a "lifestyle library" network equipped with cafes, music, multimedia, and concerts, located in central urban spaces as well as in shopping malls. There are three lessons private companies can learn from NLB, namely (1) technology use: "With regard to re-invention, the NLB has leapfrogged competing offerings and re-defined what the public library industry should be about (using RFID, multi-media offerings, SMS service, self-service libraries, etc.);" (2) strategic change: "The NLB has redefined both librarians' as well as citizens' view of what libraries should be about; not places where librarians safeguard books and tell everyone to keep quiet, but welcoming places for the public facilitating knowledge exploration in an engaging way and for businesses helping create and share knowledge through 'knowledge communities';" and, finally, (3) sense of competition: NLB "knew that citizens have choices about how to spend their leisure time, and it wanted to be near the top of the list of these choices; even where no direct competition was apparent" (Heracleous and Johnston 2009, 376 f.). What is the reason for this success story? What are NLB's resources? What services and programs does NLB provide?

NLB's Resources, Services, and Programs

NLB's activities are guided by the smart application of technologies and standards. This includes physical techniques as the optimization of the library distribution network through pre-sorting of returned media at individual libraries and searching for the shortest vehicle routes. When it became clear that the Resource Description and Access (RDA) guidelines would soon become the standard for describing and formulating bibliographic information, NLB quickly responded and implemented RDA in its cataloguing of books and other media. Singapore's libraries were early adopters of digital technologies as, for instance, the application of radio frequency identification

(RFID) for the issuing and tracking of books. NLB experiments with shelf-reading robots (equipped with an RFID reader) in order to identify books located in the wrong place. To connect documents from different sources (e.g. from the library catalog and from the image databases) NLB explores semantic web technologies (RDF, URI, ontologies) to improve access and discovery.

In our study, we distinguish between NLB's resources, NLB's services, and NLB's programs. We understand "Services" as activities in the long run, which are strongly associated with the institution, its vision, and its tasks. We are going to briefly describe the following services of NLB:

- OneSearch and the NLB App,
- Reference and Information Services of the National Library,
- Singapore Memory Project,
- Oral History Interviews (@Archives Online), and
- Other (e.g. Newspaper SG, Singapore Infopedia, MusicSG).

"Programs" are short-range activities (only for some years) with a specific thematic orientation. NLB runs a lot of programs; we will mention only three important ones:

- READ! Singapore,
- Digital literacy instruction programs, and the
- Information literacy instruction program (S.U.R.E.).

For NLB, their users are prosumers; they may consume services and programs provided by NLB and may contribute to the services by their own material (for instance, photos or music pieces for the digital archives).

We will start by describing NLB's resources. In 2017, the physical collections contained about 7.5 million books and other media; in the digital collection there were 0.7 million e-books. Additionally, NLB hosts 1.3 million Singapore-related materials. The digital collections included fiction and non-fiction books, e-magazines, e-newspapers, and databases from online aggregators (for instance, ABI/INFORM, EBSCOhost, JSTOR, ProQuest, and the full text database Library Literature & Information Science). Most important digital resources in the public libraries are Overdrive (e-books) and PressReader (newspapers and magazines).

Some of the libraries are equipped with makerspaces. The first makerspace in an NLB library (PIXEL labs@Jurong Regional Library) was introduced in 2015, conducted by Infocomm Development Authority (IDA) as a component of IDA's partnership with NLB. In Tampines Regional Library we can also identify additional makerspaces (equipped with, for instance, 3D printers as well as green screen technology and a cooking studio); and in VivoCity's library@harbourfront, with Tinker Truck, there is a "makerspace" especially for children (with, amongst others facilities, augmented reality books, DIY crafts, and puzzles) opened in January 2019 (Figure 2).

OneSearch and the NLB App

OneSearch is a meta-search system that allows searching for all (physical and digital) resources of the National Library Board (NLB), the digital collection of the



Figure 2: A children's "makerspace:" Tinker Truck in Singapore's library@harbourfront (Photo: Robin Dresel).

National Archives of Singapore (NAS), and further public libraries as well as online archives and databases. The system supports “Exact Phrases,” via placing quotation marks around the search phrase, and Boolean operators like “OR” to expand a search or “NOT” to narrow a search. Furthermore, there is an option to use the advanced search, where one can search for terms in exact search fields: keyword, title, creator, publisher, subject, or categories of content. The content is divided into nine different categories, namely books, magazines as well as articles, audiovisuals, images, newspapers, records and papers, websites, physical objects, and e-journals. After searching for the query terms one may use refine filters (e.g. type, collection, subject, language, publisher etc.) to modify and reduce search results. The filters are shown in a list on the left side and applied by simply clicking on it. One may also sort the search results by relevance, date, title, or creator. Everyone is able to search for resources without being logged in; however, for access of some content (home access is limited) users have to be logged in.

As Singapore is a multilingual country and names (of persons, organizations, and places) are spelled differently in the respective languages, NLB runs a controlled vocabulary for all named entities. Since 2016, OneSearch benefits from Named Entity Recognition (NER). To detect the names besides intellectual efforts, automatic NER is applied on unstructured data (from, for instance, Singapore Infopedia) and metadata (from digital catalogs) (Goh 2018).

NLB provides a mobile application, called “NLB Mobile,” which is available for iOS as well as Android systems. In 2018, more than four per cent of Singapore’s residents were using the NLB mobile app. Through the app users are able to get access to digital resources as well as library and account information. Everyone can search for resources of the NLB and check their availability in all supported libraries. The retrieval system supports an advanced search, utilizing specific categories to search (title, author, subject, language, or e-book type). An important feature of the app is the barcode scanner that allows customers to scan and borrow library materials on the spot, skipping the step of having to queue to use a borrowing station. Furthermore, one may browse through and search for events; it is possible to refine the search for an event through several filters, such as date, venue, or category (e.g. arts, business, children, heritage). Users are also able to view a map or a list of all supported libraries and their corresponding information, for instance opening hours or the distance from the user’s location. Registered users have an account with the

opportunity to create additional profiles for family members, which offers an overview of their transactions, loans, and reservations. Users also have the opportunity to make in-app payments. The NLB also has its own prepaid system, which is called “NLB Prepaid.”

One may also borrow audiobooks and e-books in the app to read on the go, with the e-books automatically “returned” after 21 days. Additional functions include a bookmarking system by tagging resources as favorites or sharing a resource on a social networking service (SNS) such as Facebook or Twitter, or with the help of a messaging service such as WhatsApp. Furthermore, the app supports the function to recommend a resource’s title for new acquisitions, to give feedback, and to view frequently asked questions.

Reference and Information Services of the National Library

The Lee Kong Chian Reference Library is a resource for documents from or about Singapore and the region; it is part of the National Library and is located on seven levels in the National Library building. The users may browse through more than six hundred thousand books and non-print materials. Additionally, they will find access to databases, a document delivery service, reprography, microfilm, other audiovisual media, and professional reference assistance. In contrast to NLB’s public libraries, the reference library primarily addresses users with information needs concerning research or education. The reference library runs a call center, called Reference Point (Chaudhry and Jeanne 2004). Reference Point is a local hotline for information (especially about Singapore) and provides reference services via e-mail.

Singapore Memory Project

The Singapore Memory Project is a nationwide initiative “to enable the cultural and intellectual memory of Singapore to be collected, organized, preserved and promoted for research and discovery” (Chellapandi, Han, and Boon 2010). The project gets its documents through crowdsourcing: “Personal memories are crowdsourced from the public on a national scale in both physical and digital formats. SMP is interested in acquiring all personal memories that relate to Singapore, be they past or present memories, and whether they are contributed by citizens

or non-Singaporeans” (Tang 2013, 5). Additionally, the knowledge representation via tagging is also crowd-sourced, as users may describe retrieved resources with self-created tags (Figure 3). In 2018, more than one million memories (i.e. Singapore-related stories, images, videos, or drawings) had been added by citizens and (in some cases) by the National Archives themselves. However, as Cheng

(2018) notes, not all Singaporeans really contribute to the project. The initial target of five million memories is far away. Following Gonzaga (2019), the archival project is an indicator for certain nostalgia, epitomized by the longing of life in the *kampong*, the (now non-existent) traditional Malay village in Singapore’s early days, and the nowadays lost *kampong* spirit.

Sentosa Monorail

612 views



 Report Abuse

ADDED BY
Singapore Memory

MEMORY OF
Sentosa

The Sentosa Monorail built in 1982 was the main mode of transport around the island with 7 monorail stations. The cabins were non air-conditioned, and guests could feel the breeze and occasional leaves brushing against the cabin walls. The Sentosa Monorail was replaced by the Sentosa Express in 2005.

 Email  Tweet 

monorail

+ Add a tag

x Remove tag

sentosa

Figure 3: Crowdsourcing Singapore-related memories and also crowdsourcing their knowledge representation: The Singapore Memory Project.

(Source: <https://www.singaporememory.sg/>).

Collections of the National Archives and Oral History Interviews

Founded in the year 1968, the National Archives of Singapore (NAS) is an institution under the umbrella of NLB since 2013. The archive collects Singapore-related video and sound recordings, government records, maps, photographs, posters, speeches, and private records. The NAS digitizes their collections of audio and video documents in order to foster their (online) use (Phang and Soh 2017). One of NAS' tasks is to conduct oral history interviews. The archive offers a remarkable collection of such interviews, presenting Singapore's history, politics, trade, and culture from the individual perspectives of the interviewees. All in all, the National Archives have collected about 23,000 hours of recordings with personal recollections from more than 4,100 people. About 17,000 hours of interviews are available online; all others are only accessible in the National Archives' building. As only a quarter of all audio or video clips are transcribed, volunteers help to contribute to the Citizen Archivist Project by transcribing speech to written text. If available, the transcript will be made available to the user as a (non-printable) e-book.

Other Services

Arisen from the project Flickr SNAP (Singapore National Album of Pictures), *PictureSG* is a collection of photographs and artworks on Singapore. It includes complete collections as, for instance, from Lee Kip Lin (about 18,000 photographs) or from the Singapore Children's Playhouse (1,500 images). *Singapore Infopedia* is a collection of articles on Singapore, its history, culture, people, and events, edited by reference librarians of NLB. *NewspaperSG* is a historically oriented bibliographical database of articles published in Singaporean newspapers such as "The Straits Times," "The Singapore Free Press and Mercantile Adviser" (published between 1884 and 1942), "The Business Times," and "Malayan Tribune." Only articles from selected sources and between 1831 and 2009 can be read online from home. As all twenty-four million documents are stored on microfilm, the facsimile of all newspaper articles is available on reels at the Lee Kong Chian Reference Library. *MusicSG* is a digital archive of music composed by Singaporeans (Loh 2014); it covers all musical genres. For all music pieces, there are thirty second previews, lyrics (insofar applicable), and metadata. For copyrighted

material, the full form of the music piece is only available onsite in one of the libraries. There are lots of other services such as, for instance, *PublicationSG*, a catalog of Singapore-related material on NLB, or *BookSG*, an online collection of digitized books (including rare and historical imprints) on Singapore and Southeast Asia.

READ! Singapore

Besides activities of school libraries, there are further projects to improve the literacy of all Singaporeans. Bearing in mind that Singapore has an excellent education system leading to top scores in, for instance, the Program for International Student Assessment (PISA), for *READ! Singapore* "reading" means a culture of dealing with fiction among Singaporeans. There is a long tradition of NLB to engage people for reading, e.g. the *Readers for Life* strategy with specialized initiatives for preschoolers (kidsREAD) and older children (Young Read! Singapore). Presented in Singapore's official languages (i.e. English, Chinese, Malay, and Tamil), *READ!* Singapore features book discussions, meet-the-author sessions, book clubs, writing workshops, storytelling sessions, and book-derived workshops. Additionally, there are specialized programs to foster reading competency especially for students (Read@School) and the elderly (Luyt et al. 2011).

Digital Literacy Instruction

In June 2018, Singapore published the Digital Government Blueprint stating to aim for 90 to 95 % of government transactions to go digital by 2023. This phase of government digitalization is in line with Singapore's vision of a Smart Nation. But for Singapore to become a Smart Nation, the citizens have to go along with the realization of this vision; a digital government can only function if all citizens truly want and are able to participate. Therefore, Singapore has to prepare its citizens by not only providing access but also equipping them with the skills necessary to utilize digital (government) services and fully participate in this transformed, digital society. Two terms often mentioned in this context are digital readiness and digital inclusion.

In this matter, the Ministry of Communications and Information (MCI) has established the Digital Readiness Workgroup in 2017 to collaborate and formulate

strategies. They launched the Digital Readiness Blueprint to give recommendations on how Singaporeans can become “digitally ready” to build a Smart Nation. Digital readiness is defined as: “a) having access to digital technology, b) having the literacy and know-how to use this technology, and c) being able to participate in and create with this technology” (MCI 2017, 10). The Digital Readiness Workgroup recommends ensuring that all citizens have access to digital technology, the necessary digital skills, and the ability to participate in digital life. Regarding digital skills, they identified a set of basic skills (e.g. internet surfing, e-mails, e-payment, cybersecurity) that should be promoted among citizens but also emphasize the importance to “focus on information and media literacy, to build resilience in an era of online falsehoods” (MCI 2017, 13). Here it should be noted that the Info-communications Media Development Authority of Singapore (IMDA) defines digital literacy as “the ability to use, create and share digital content safely and responsibly” (IMDA 2017a) which includes technological competence, information literacy, and media literacy.

Furthermore, the blueprint stresses the value of the digital by design principle and designing digital government services to be as easy to use as possible, which ensures that all government services support digital inclusion. The goal is for every single citizen to be able to participate. In his speech during the MCI Workplan Seminar 2018, S. Iswaran, Minister for Communications and Information, explained why this is important: “While MCI can do much to create exciting opportunities in the digital economy, it will be meaningful only if all Singaporeans are able to share in this progress... Ultimately, our progress as a nation must be measured not just by our economic achievements, but also by how well we ensure that all Singaporeans are able to partake of the benefits” (MCI 2018, par. 28–29). He also emphasizes the crucial role libraries play in an inclusive digital transformation of Singapore: “Our libraries are social levelers – they provide access to lifelong learning opportunities to keep up with changes in the digital economy and society” (MCI 2018, par. 40). The public libraries of Singapore provide not only access to information but are also perfectly positioned to provide the necessary support and education for using it. And, although they have evolved into “community institutions” meeting many and important community needs, Thompson et al. (2014, 133) state that for a public library “digital literacy and digital inclusion remain at the center of all initiatives.”

Singapore on the one hand identifies “having a digitally literate population” as one of their strengths with regards to building a successful smart nation (SNDGO

2018) but on the other hand admits “a pressing need for greater awareness of media and information literacy skills so that Singaporeans are able to discern, evaluate, and manage information in an increasingly complex digital environment” (MCI 2017). Furthermore, NLB plans to introduce almost six thousand digital readiness and future skills programs over the next five years, to “infuse digital literacy into Singaporeans’ everyday life – to build interest, confidence and capability in digital adoption and creation with tech” (MCI 2018).

Information Literacy Instruction

What is the actual state of information literacy (IL) in Singapore? Mokhtar et al. (2013) and Foo et al. (2014) found there are still problems with the information literacy level of Singaporean people (as elsewhere in the world also). Foo, Majid, and Chang (2017) investigated the information literacy skills of Grade 5 students in Singapore. Out of a maximum of 100, the overall mean score was only 53.39, i.e. a little bit more than half. Girls (mean: 55.38) scored slightly but significantly better than boys (mean: 51.50); students with internet access at home (mean: 53.67) scored significantly better than students without access (mean: 45.81): “Having internet access appeared to be distinctly advantageous for such students as they have more opportunities in engaging in information seeking activities, reading, researching and using information” (Foo, Majid, and Chang 2017, 346). The result for students with internet access, however, is not that high (scores above 60 or 70 are seen as adequate). The authors conclude that “the overall weak score signals a need to reassess all IL-related initiatives” (Foo, Majid, and Chang 2017, 348), be it at Singapore’s schools, its universities and polytechnics, or its libraries.

Information literacy education is one of NLB’s main goals. In recent years, and in tandem with many other initiatives, NLB has established several services and programs to raise awareness and competence among its patrons. As early as 1997, NLB conceptualized an information literacy program (Choh and Munoo 2005) because “information literacy has emerged as a critical skill in the Internet-based knowledge economy” (Narayanan and Munoo 2003, 1). In this same year, Singapore’s Ministry of Education published the Information Literacy Guidelines as well as the Masterplan for ICT in Education. Singapore’s first information literacy program was announced in 2001; the National IT Literacy Programme (NITLP) was launched with the goal to

equip 350,000 Singaporeans with basic computer and internet skills. The National Library Board belonged to the twenty-two Authorised Trainings Centres (ATCs). In September 2002, the Infocomm Development Authority of Singapore (IDA) organized “the Great Singapore Surf.” At this mass IT training event 10,000 citizens attended to learn basic computing and internet skills. After that, during Infocomm Literacy Month, an island-wide training program was available at 13 ATCs.

The Silver Infocomm Initiative was launched in 2007 to promote IT awareness and literacy among seniors. Today, NLB has partnered with IMDA and offers basic computer and internet classes, e-entertainment, and social communication sessions. There is also the Seniors Tech and Read (STAR) program at public libraries in Singapore since 2017 where participants aged 50 and above get one-to-one assistance with library-related technology problems (e.g. using the NLB mobile app) from a volunteer. For other questions, for example using WhatsApp and Facebook on the smartphone, or connecting to a WiFi hotspot, seniors can visit the libraries’ Digital Clinics. Indeed, senior citizens are often mentioned when discussing the digital divide or digital inclusion.

NLB undertook the National Information Literacy Programme S.U.R.E. from 2012 to 2016 “to promote awareness of information literacy among Singaporeans” (Pek and Wang 2019, 1). S.U.R.E. is an acronym for “Source – Understand – Research – Evaluate” and was NLB’s state-wide initiative to foster people’s information literacy: “The mastery of information literacy (IL) skills hence becomes extremely critical to the current generation of information users, as IL capacity affects users’ lifelong competency to reason, to think critically, and to take in varied information from numerous sources to synthesize it for their own needs” (Tan, Pin, and Teo 2014, 2). Goals of this program were, for example, the production of learning resources for teachers and to groom expert information seekers (via S.U.R.E. club activities). Additionally, S.U.R.E. provided guides for NLB services such as NLB e-resources, NLB mobile app, NewspaperSG, or Singapore Infopedia.

Social Media Outreach

In a country where social media is a part of everyone’s daily life, as 96 % of Singaporeans own at least one social media account and spend a daily average of 2 hours 27 minutes on them (C. Lee 2018), NLB utilizes

social media platforms to a great extent. NLB adopted social media from an early stage; the first entry on its blog titled HighBrowseOnline (now inactive), which focused on book reviews, is dated October 22 2005 (Dresel 2012). At the end of 2011 the libraries handled eight blogs, four Facebook sites, one picture platform, and a Twitter account. Some of the former blogs were, for example, Read and Reap, where interesting excerpts of a book are published to start discussions. Y.O! was a blog focused on teenagers, with the themes ranging from music to sports and, of course, reading. The most popular blog, ASK!, provided a platform for people to ask all sorts of questions, for example “how can I get the best airplane seat?” (Dresel 2012).

NLB’s Facebook page, @nlbsg, which publishes the latest news about the NLB, is still active, as well as their Twitter account @nlbsingapore. The libraries at Esplanade and Orchard have active blogs (library@esplanade, library@orchard) and their own Facebook accounts. A blog called Librarian’s Blog dedicated to the younger readers on the website discoverRead provides updates on the latest events for children in the library, tackles social issues like cyberbullying, or gives book recommendations.

Furthermore, the National Library, in addition to their Facebook account @NationalLibrarySG, handles an Instagram account, @nationallibrarysg, and even has its own YouTube channel, launched in April 2017. On the National Library’s YouTube channel one can find 140 (as of October 2018) educational videos teaching how to use academic databases or showing how cross-referencing and citations work, interviews with experts, as well as information on current exhibitions and book collections. On its Instagram page historic pictures of Singapore and information on current exhibitions or books are shared.

The Public Libraries also have their own Facebook page (@publiclibrarysg), Twitter account (@PublicLibrarySG) and Instagram account (@publiclibrarysg), where book recommendations are shared. The Twitter account also focusses on interactions with the readers and encourages them to participate in polls, for example.

The National Archives of Singapore started in 2018 with their own social media pages on Facebook (@NationalArchivesSG) and Instagram (@nationalarchivessg).

The NLB services and programs are also represented on social media. For example, the Singapore Memory Project (irememberSG) has six accounts (Facebook, Twitter, YouTube, Instagram, Pinterest, and a blog). There are also Facebook and Twitter accounts for READ! Singapore and S.U.R.E., as well as a YouTube channel for READ! Singapore.

All in all, NLB puts great emphasis on realizing the digital third places by using social media accounts that are accessible to everyone. The wide range of different social media forms, e.g. Instagram and YouTube (584 videos of NLB, and, as mentioned, an additional 140 videos of the National Library), which are generally more popular with younger users, as well as more traditional services such as Facebook and Twitter, ensures all generations in Singapore can be reached. However, the number of followers of the social media accounts is rather low (Table 2). In comparison to the New York Public Library (NYPL), only the Singapore Memory Project on Facebook has a good score (however, NYPL has, with the population of the New York metropolitan area and – concerning social media – the entire U.S., a much larger user base than NLB in Singapore.) There is still room for improvement for all NLB institutions to reach (much) more people in Singapore via social media.

Table 2: Social media outreach of NLB institutions (as of February 8, 2019).

	Facebook followers	Instagram followers	Twitter followers
NLB	23,347	---	34,500
National Library	48,801	5,083	---
Public Libraries	31,154	12,400	7,998
National Archives	382	144	---
library@esplanade	3,417	---	---
library@orchard	3,284	---	---
irememberSG	237,816	17,600	10,200
For comparison: NYPL	276,345	335,000	2.5 m

Open Innovation, User Participation, and Design Thinking

Open innovation considers both importing external ideas into an institution's knowledge and innovation processes as well as exporting its experiences to others. In library environments, open innovation is often called "design thinking." One crucial aspect of librarian design thinking is the active participation of the library's stakeholders, primarily its users. Henkel et al. (2018b) distinguish between user participation on a large scale (for instance, planning new library buildings) and on a small scale (e.g. slightly modifying an existing library service). In Singapore, small scale user participation for information inflow can be found

in the NLB's crowdsourcing projects. For the Singapore Memory Project citizens may archive all kinds of Singapore-related documents; for MusicSG, composers and musicians can contribute with their own musical artworks. In the Citizen Archivist Project volunteers act as citizen researchers as they transliterate newspapers, transcribe and translate record labels, transcribe audios, describe photographs, and transcribe handwritten documents. NLB cooperates not only with its users, but also with other libraries (e.g. in the ASEAN digital library) and with private companies (for instance, with Singapore Press Holdings for NewspaperSG or with various vendors for eReads).

Concerning successful information outflow, NLB offers data and services for open access, enabling external parties to create innovative applications and mash-ups. This service was first conceptualized based on feedback and interest expressed by information service providers. For Web developers, data are accessible via API.

User participation on a broad scale takes place on large single projects. The library@orchard has been planned with the help of people who worked or lived at Orchard Road (including over 100 in-depth interviews) as well as users (more than 1,000) who attended a prototype exhibition. Additionally, co-creation sessions with identified stakeholders were conducted and the designs were further refined and developed. Before starting the planning of re-opening the Sembawang Public Library, a total of 70 people were interviewed in the library: "The comments received formed the basis of key ideas in the library's design" (Koh, Kang, and Chan 2015, 7). NLB plans to revamp its public libraries progressively and will continue to design the new libraries in a way that is responsive to the community and to the users' needs. With each newly designed library, NLB is going to learn from the experiences from each library in order to improve the design and the services of the next library.

In our informed estimation, design thinking can be very successful, but it requires a lot of training in advance and, above all, a lot of time to understand the users. Additionally, much of the users' time is needed to collaborate with the librarians. Indeed, time is the sticking point, because librarians as well as users have to be able to afford this time. Without sufficient time, the design process can quickly end in an exercise that serves to only justify some old ideas. Furthermore, it takes courage on the part of the management to get involved in new insights and to test out the corresponding suggestions. NLB designs open innovation projects for a win-win situation for all partners, including the NLB itself, organizational partners, and citizens. It is essential for NLB's libraries to ensure "that stakeholders support the library" (Choh 2014, 156).

Conclusion

What lessons did we learn from our case study? What is the answer to our research question? NLB is politically recognized as an essential building block of Singapore's knowledge society and Smart Nation. Singapore's politics and government strongly support NLB through two important pillars, namely (1) the legal pillar (NLB act) and (2) the organizational pillar (NLB's prominent position in the hierarchy of political and governmental institutions). The then Minister for Communication and Information counts the merits of Singapore's libraries – today and in future – as:

- Libraries as exemplars of digital transformation,
- Libraries as community spaces for lifelong learning,
- Libraries as facilitators of digital readiness, and, finally,
- Libraries as anchors of the heritage (Ibrahim 2018).

Singapore's libraries fill physical as well as digital spaces for the acquisition of knowledge, learning, entertainment, community development, and maintenance.

In addition to formal education in schools, NLB provides informal learning spaces for the entire population of Singapore. There is access to knowledge resources from homes or workplaces (via the digital space) and physically onsite in the library buildings. Most of the public libraries are integrated in shopping malls or community centers, which is of great advantage to the users as they may combine shopping and other activities with library visits. Some of NLB's institutions work with social media in order to strengthen their outreach and user participation. NLB's libraries fulfill the tasks of being a third place next to home and work.

We have to highlight that resources of different institutions (National Library, Public Libraries, and – which is exceptional in comparison to other library systems – the National Archives) are combined in one single meta-search engine (OneSearch as well as NLB app). We were able to identify high-class Singapore-related services such as, for instance, the Singapore Memory Project, the Infopedia, NewspaperSG, PictureSG, MusicSG, Oral History Interviews as well as the collections of the national archives. With these projects, the preservation of cultural heritage of Singapore is guaranteed from multiple points of view. NLB's programs try to foster the reading culture among Singaporeans and their digital literacy. In addition to more traditional library services (such as the provision of knowledge sources and spaces) NLB experiments with non-traditional offers such as makerspaces (even for kids) and cooking studios.

Nowadays, open innovation and design thinking are becoming more and more important for the (re-)construction of library services as well as library buildings and their layout. NLB fosters participation and co-creation both on a small scale (user participation via crowdsourcing in single services, e.g. the Singapore Memory Project) as well as on a large scale (co-designing or co-redesigning of entire libraries).

NLB applies smart technologies not only for its users, but for its internal workflows also. For years, the libraries have worked with RFID and recently have introduced shelf-reading robots. To realize OneSearch, NLB banks on automatic named entity recognition and linked data.

We cannot ignore challenges, such as the level of digital readiness of the citizens of Singapore (including information literacy and digital literacy) and the rather low citizen participation in social media and crowdsourcing projects (even the successful Singapore Memory Project could be optimized in terms of added memories and active user participation).

In Table 3, we collected NLB's success factors. Our readers should therefore be able to compare NLB's assets with those of their library system. A necessary condition for every library system is the political support and a broad legal base justifying the library's infrastructure, manpower, services, and programs. A prominent organizational position near the top is very helpful to reach the decision makers face-to-face and to convince politicians and administrators (if they have any doubts) of the merits of a library system in order to push a city or a state

Table 3: NLB's success factors.

Lessons learned: NLB's success factors

Strong political support
Strong legal base
Prominent organizational position in the government
Establishment of physical and digital third places
Ubiquitous offer of knowledge resources (anywhere and anytime)
Location of public libraries in frequently visited places (e.g. shopping malls)
Offer of prestigious services (long-term activities) and programs (short-term activities)
Offer of non-traditional library services (e.g. makerspaces)
Realizing cultural heritage; extensive offer of Singapore-related activities
Fostering of reading habits; instruction of digital literacy
Fostering citizen participation (by social media, design thinking, and cooperation on projects)
Working with elaborated technology; optimizing internal workflows
Making sense of community; being part of the country's national identity

towards a future-oriented knowledge or smart society. A library provides physical and digital spaces, where people meet, discuss, learn, or inform themselves. Concerning the digital space, the library ubiquitously offers knowledge resources anywhere and anytime; concerning the physical space, the library and its branches are located in frequently visited places such as, for instance, shopping malls, while its resources include not only books and other media, but additionally low-tech (say, a culinary studio) and high-tech services (such as makerspaces). If a library has the task to work on cultural heritage, it is worthwhile to integrate as many people and institutions as possible in the projects. Of course, a library may offer courses on anything and everything (where required, in cooperation with schools or adult education centers); however, the main task is digital literacy and information literacy instruction of all stakeholders as such literacies are essential for the citizens', administrations', and companies' survival in a knowledge society and a smart city or Smart Nation. In nearly all cases (even when it comes to the construction of new library buildings) citizen participation is necessary, be it by design thinking, social media interactions, or cooperation on projects. A culminating point of a library system in the public awareness is its stakeholders' estimation of being part of the city's and the state's identity.

With its very large member base, its services and programs, design thinking, and its establishment as a third (physical as well as digital) place, NLB indeed makes sense of community and is a part of Singapore's national identity. What is the role of NLB on Singapore's journeys to knowledge society and Smart Nation? All in all, NLB proves to be an important travelling companion and – even more – a tour guide on these journeys into the twenty-first century society.

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