

# How Public Libraries Are Keeping Pace with the Times: Core Services of Libraries in Informational World Cities

**Abstract:** In a survey of 31 informational world cities, we investigate the state of the art public library core services. For this study, we applied the core service catalog developed by Mainka et al. (2013), counted the services offered by the libraries and compared findings with the results from 2013, allowing us to calculate a score for each library and rank them accordingly. An overall improvement of the range of services was observed, with North American libraries taking the top three positions in the ranking. To get a clearer picture of the challenges facing libraries today, personal interviews were also conducted with (chief) librarians, especially concerning developments such as maker spaces, increasing demand for information literacy instruction and the changing role of physical library space. The results presented in this paper highlight best practice examples of library services in prototypical cities of the knowledge society.

## Introduction

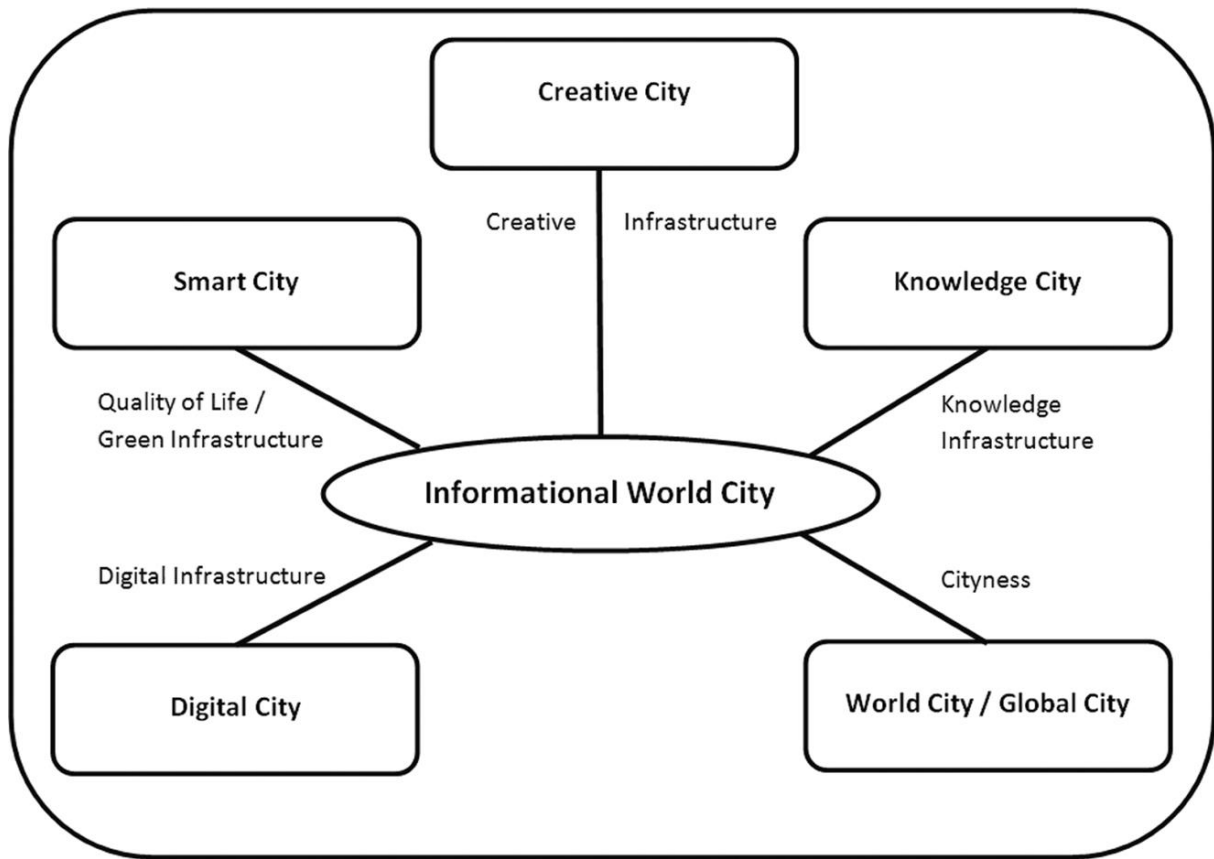
The rise of the knowledge society has brought along a new type of city prototypical of this culture, informational cities. The theory of informational cities is based on research by Castells (1989), Stock (2011) and Yigitcanlar (2010); in addition to the “spaces of place” their leading factor is the “spaces of flow,” specifically flows of information, capital and power (Castells 1989; Stock 2011). In the knowledge society, the innovation of information and communication technology has allowed humans to transform information into knowledge and vice versa in real time through diverse technologies (Stock 2011). This has, in turn, transformed how information is produced and consumed and changed the way in which libraries are acknowledged and used today (Hyysalo et al. 2014). In the face of these changes various questions arise: how do libraries meet these new needs? Are there best practice examples of library services?

Public libraries inhabit a special role within the cognitive infrastructure of informational cities and are a vital part of the city’s soft location factors. Nowadays, public libraries offer space for learning,

working and socializing (Mainka et al. 2013). Based on a study conducted by Mainka et al. (2013), we investigated the services provided by public libraries to show how the range of these services has changed in the meantime, including the special service of disseminating information literacy through seminars or related material as an important aspect of the knowledge society. To round out the picture, we interviewed chief librarians and library staff about the recent developments of physical library space. Following on from these interviews, creation and face-to-face activities have been identified as a recent development within public libraries which will be scrutinized in the investigation as well.

### **Informational world cities**

An informational world city is a complex construct that cannot be attributed exclusively to one facet (Figure 1). It combines aspects of different city types. On the one hand, it inherits aspects of a world city, which is indicated by its degree of cityness, as defined by Friedmann (1995), Sassen (2001) or Taylor (2004), rather than population size. On the other hand, it is also characterized by its creative and knowledge infrastructure, reflecting the growing importance of the creative class (Florida 2005; Landry 2000) rooted in the importance of creative and knowledge capital as a factor for economic success (Florida 2003; Ergazakis, Metaxiotis and Psarras 2004). Hence, an informational city is deeply linked to the emergence of the knowledge society (Mainka et al. 2013). Drawing from smart city research, an informational city also focusses on the city as “green” space and an overall high quality of life (Hollands 2008; Shapiro 2006). Finally, information and communication technology infrastructure grows more important, similar to what has been found for digital cities (Yigitcanlar and Han 2010). By this measure, digital cities are also called “ubiquitous cities” (Hwang 2009).



**Figure 1:** Infrastructures of an informational world city (Source: Mainka et al. 2013, p. 296).

The set of investigated cities is based on the selection of Mainka et al. (2013). That selection was determined by two conditions: firstly, a city had to be referred to as a world city in the literature. Secondly, the given city had to be mentioned at least once as an example of a digital, smart, knowledge or creative city. The full list of all investigated cities is provided in the chapter “Methods.”

Informational world cities become alive through information literate citizens who utilize modern information and communication technology to access, use, create and share knowledge. Through the information flow between individuals, communities and organizations, the sharing and developing of ideas and innovation is stimulated (Stock 2011; Webster 2006). The term “information literacy” summarizes the necessary competencies to master information and communication technologies as well as the “reflective discovery of information, the understanding of how information is produced and valued, and the use of information in creating new knowledge and participating ethically in communities of learning” (Association of College & Research Libraries [ACRL] 2015). It is an essential skill set for every individual living in the knowledge society (Lloyd 2003; International Federation of Library Associations and Institutions [IFLA] 2015) and it is therefore critical that knowledge institutions, among them public libraries at the forefront, provide citizens with access to

information as well as information literacy education. This will establish a culture of lifelong learning and of knowledge sharing (Mainka and Khveshchanka, 2012; Henkel 2015).

## **Public libraries and informational world cities**

Public libraries have a special role in the knowledge society and are confronted with various tasks. Thorhaug (2010) develops three visions for public libraries in knowledge societies:

1. The focus shifts from the sole lending of materials to providing access to learning rooms, meeting areas and stages for artists.
2. Public libraries operate a digital library. This service offers commercial information as well as web 2.0 services.
3. The library functions as a partner and connects different people, institutions and companies.

As one might already derive from these three visions, the spaces in public libraries can be split into physical and digital spaces (Adkins and Bala 2014; Boyce and Boyce 1995; Freeman and Hovde 2003), analogous to the spaces in informational cities (Castells, 1989). Public libraries are also known as “knowledge hubs” in informational world cities (Ergazakis, Ergazakis, Metaxiotis and Charalabidis 2009; Mainka & Khveshchanka, 2012), as they provide access to high-quality knowledge (Hayes 2004). This access is also achieved by using information technology and offering their patrons internet access as well gathering educated people and fostering collaboration among them (Miao 2002).

Apart from their role as knowledge hubs, public libraries also support the different infrastructures in informational world cities. The basis for the digital or ubiquitous city is internet access for all residents (Mainka et al. 2013). By providing Wi-Fi in their buildings and even lending technology to access the internet elsewhere, public libraries are a great support for the digital city. In informational cities, knowledge can be accessed from everywhere (Linde and Stock 2011), which is a basic condition of a solid knowledge infrastructure.

Furthermore, public libraries impart information literacy and provide relevant information. Thus, they transform their patrons into “smart” users (Gust von Loh and Stock 2013). In addition, the reuse of offered materials by the patrons contributes to environmental sustainability (Mackenzie 2000) and through these means public libraries support smart cities (Mackenzie 2000). Many public libraries have taken up the task to teach their patrons information literacy, so they can work efficiently with the information offered (Hayes 2004).

In addition, public libraries are an important part of an informational city’s creative infrastructure (Florida 2005; Landry 2000; Stock 2011). Beginning with the library’s physical building as part of the “architainment” of the urban space (Stock 2011), it shapes the city’s image (Skot-Hansen,

Hvenegaard and Jochumsen 2013). Furthermore, a library offers leisure activities with the focus on cultural activities (Skot-Hansen et al. 2013). As a public space, it also provides meeting places and is able to transform the urban space into an attractive environment (Skot-Hansen et al. 2013), fostering the creativity of its patrons by providing courses and workshops for creative skills on the one hand, as well as offering creative rooms and technology on the other (Detez, Harvey, Irfan, Murphy and Savic, 2014).

## **Digital Space**

The digital space is a significant part of the library's services and offers many opportunities for both its patrons and the library itself. As the digital space gains more and more importance, the classic physical space (i.e. bookshelves) becomes less significant. With digital services, it is no longer necessary to visit the library to receive information while at the same time offering more people the opportunity to access the library's materials (Michnick 2015). The staff have many more possibilities to reach out to patrons, but this can also result in more time-consuming work for librarians. Staff have to gather and eventually preprocess materials and information at the patron's request (Michnick 2015).

There are various definitions for digital libraries (Allard 2002; Borgman 1999; Levy 2000; Meyyappan, Chowdhury and Foo 2000), but for the most part they have two aspects in common: the first describes the digital library as a collection created on behalf of its users (Borgman 1999), while second sees it as an institution or service, created and run by librarians (Borgman 1999; Levy 2000). Beyond databases and retrieval systems, digital libraries hold richer content and more advanced functionalities (Thong, Hong and Tam 2004). As digital libraries are generally accessible over the internet (Arms 2000; Thong et al. 2004), users have a great amount of information at their disposal, which can be searched quickly (Arms 2000). This strengthens the library's value for a society (Arms 2000) and can even make the library *ubiquitous* if the only limiting factor for accessing materials is access to the internet (Li 2006). Furthermore, the maintenance of a digital collection is more inexpensive than storing the same amount of material in a physical space, because digital storage becomes ever cheaper while duplicating and sharing digital documents is easy (Arms 2000; Lesk 2005). The acquired physical storage can be repurposed to preserve the library's physical attractiveness (Mittrowann,2011).

## **Physical Space**

Physical libraries inhabit a special role in informational world cities as a public space for the creative and knowledge society (Florida 2003; Landry 2000; Stock 2011), belonging to a city's "soft" location factors. Hence, its role within the city's infrastructure is difficult to be measured by "hard" facts. The economic value, for instance, can, to some degree, be investigated by the willingness to pay for this

service by its costumers (Aabø 2005; Hummel 1990; Ko, Shim, Pyo, Chang and Chung 2012). Furthermore, public libraries, if attractive, can act as “place maker” and help to (re)vitalize a neighborhood (Skot-Hansen et al. 2013). They may also (re)vitalize the community to engage with library or city projects or, nowadays, create something in so-called “maker spaces.”

As main physical spaces, Mainka et al. (2013) have identified “children’s spaces,” “modular working spaces,” “meeting spaces” and “learning spaces” as the most common versions, plus the offer of food and drinks as well as attractive spaces as magnet factors. Furthermore, the necessary technology should be implemented at those spaces to meet the needs of the community. As services of physical libraries in the 21st century, the use of RFID, possibility of interlibrary loans and access to free Wi-Fi have been mentioned. Not every citizen, however, is familiar with modern technology and knows how to find relevant and useful information. Here, the library’s role as facilitator of information literacy skills, not only through physical infrastructure but also seminars and workshops, should be emphasized again (Julien and Hoffmann 2008). The rise of maker spaces needs to be incorporated also, often equipped with new technology such as 3D printers. However, libraries are not limited to merely providing technological tools, but are rather referred to as creative spaces which allow the users to create, use and share media (Noh 2016).

## **Maker Spaces**

A relatively new service offered by an increasing number of libraries are the so-called maker spaces. Maker spaces are equipped with various materials, machines and technologies in order to enable creative activities (Noh 2016) which can foster creativity, collaboration and interactive learning among their patrons (Moorefield-Lang 2014). Maker spaces encourage their users to practice hands-on learning and peer-to-peer training (Britton, 2012) which allow patrons to also practice the creation of knowledge, in addition to the traditional sole mode of knowledge consumption (Fisher 2012). As creativity becomes a factor of growing importance in knowledge societies, libraries can support individual and national development by installing maker spaces for their patrons (Noh 2016). A recent study has shown that the regular use of maker spaces can increase the overall creative thinking abilities of their users, as well as other related skills (Noh 2016). However, it is currently still difficult to identify common trends and needs with regard to the new modes of use of the physical library space, as well as determine what is truly important and should be adapted by libraries (Georgy 2012). Nevertheless, libraries are changing before our eyes to inhabit the role of being a space for face-to-face meeting instead of merely a book repository. Accordingly, in the following, we will investigate this development with reference to informational world cities and their public libraries.

## Methods

In the following section, we describe the aspects of libraries in information cities under investigation.

Our basic research questions are the following:

1. What services do public libraries in informational world cities offer and how did the range of services change in comparison to 2012?
2. How do public libraries adapt to the changing culture of creation and face-to-face activities?
3. Do public libraries promote information literacy among their patrons and what are current challenges in this area?

The research method combines literature review with empirical data gathered through online information on websites, field studies and interviews. Analogous to the distinction between the physical and digital spaces of libraries, we investigated the range of physical and digital services separately. Adding to the study conducted in 2012 (Mainka et al. 2013), we included maker spaces in our investigation. The final list of analyzed services is as follows:

### 1. Digital library

- Presence of a website in the country's official language and English
- Web OPAC
- E-resources (e-books, e-journals, digital images, audio books, music, e-magazines, videos, newspapers, bibliographic databases and other e-resources)
- Digitization of the library's physical material
- Access to the e-resources free of charge for patrons
- Guides to the digital library (video guides, seminars, text documents, FAQs)
- Digital reference services (e-mail, SMS, web forms, Skype)
- Use of social media (blogs, Facebook, Twitter/Sina Weibo, Flickr/Instagram, YouTube)
- Apps

### 2. Physical library

- Building as architectural landmark
- Spaces for learning, working, meeting, creating and spaces for children
- Wi-Fi
- RFID
- Possibility to return borrowed materials at any location
- Courses for teaching information literacy
- Food and beverages in the library building
- Marketing measures

In order to gather information on the offered services, we analyzed the libraries' websites in the course of an intellectual content analysis. If there was information missing about certain aspects, we contacted the library via e-mail. After gathering information, we calculated the percentage of libraries which provide the respective services. We only counted the presence of a service, not the extent or usage of the service.

After this analysis, we assigned every library a score based on the services provided and ranked the libraries accordingly. The maximum achievable score for each library was 150 points in total, 75 for both its digital and physical spaces. The possible score for each service represents its defined importance. A detailed overview of the scoring system can be found in Appendix I.

The investigation was conducted on 31 public libraries in specific informational world cities in the time period of June 15<sup>th</sup> to July 14<sup>th</sup> 2015. The choice of cities is based on Mainka et al. (2013) with cities selected if mentioned firstly as a world city and secondly as a knowledge, creative, digital or smart city in the literature. A full list of the 31 cities is presented in re 2.



	World / Global City	Knowledge City	Creative City	Digital City	Smart City
1. Amsterdam (The Netherlands)	✓	✓	✓	✓	✓
2. Barcelona (Spain)	✓	✓	✓	✓	✓
3. Beijing (China)	✓	✓	✓	✓	✓
4. Berlin (Germany)	✓	✓	✓	✗	✓
5. Boston (U.S.A.)	✓	✓	✓	✓	✓
6. Chicago (U.S.A.)	✓	✓	✓	✓	✗
7. Dubai (U.A.E.)	✓	✓	✓	✓	✓
8. Frankfurt (Germany)	✓	✓	✗	✗	✓
9. Helsinki (Finland)	✓	✓	✓	✓	✓
10. Hong Kong (China, SAR)	✓	✓	✓	✓	✓
11. Kuala Lumpur (Malaysia)	✓	✓	✓	✗	✗
12. London (United Kingdom)	✓	✓	✓	✓	✗
13. Los Angeles (U.S.A.)	✓	✓	✓	✓	✗
14. Melbourne (Australia)	✓	✓	✓	✓	✓
15. Milan (Italy)	✓	✓	✓	✓	✗
16. Montreal (Canada)	✓	✓	✓	✓	✓
17. Munich (Germany)	✓	✓	✓	✗	✗
18. New York (U.S.A.)	✓	✓	✓	✓	✗
19. Paris (France)	✓	✓	✓	✗	✗
20. San Francisco (U.S.A.)	✓	✓	✓	✗	✓
21. Sao Paulo (Brazil)	✓	✓	✓	✗	✗
22. Seoul (South Korea)	✓	✓	✓	✓	✓
23. Shanghai (China)	✓	✓	✓	✓	✓
24. Shenzhen (China)	✓	✓	✗	✓	✗
25. Singapore	✓	✓	✓	✓	✓
26. Stockholm (Sweden)	✓	✓	✓	✗	✓
27. Sydney (Australia)	✓	✓	✓	✓	✓
28. Tokyo (Japan)	✓	✓	✗	✓	✗
29. Toronto (Canada)	✓	✗	✓	✓	✓
30. Vancouver (Canada)	✓	✓	✓	✗	✓
31. Vienna (Austria)	✓	✓	✓	✓	✓

**Figure 2:** Informational world cities (Checkmark stands for “applicable,” cross for “not applicable”) (Source: Mainka et al. 2013, p. 297).

In the following, the analyzed services are further described.

### Services in the digital library

A library needs a website to reach out to as many people as possible. The website should also be the access point for using the web OPAC and be available in the country's official language as well as English, as it is the global *lingua franca* (Mainka and Khveshchanka 2012; Mainka et al. 2013). Through a web OPAC, the user has access to the various resources offered by the library. These resources are crucial for a digital library and at the core of what the users are looking for. Since different information needs are satisfied by different forms of resources (Arms 2000), the investigation included e-books, e-journals, digital images, audio books, music, e-magazines, videos, newspapers, bibliographic databases and, in some circumstances, other formats. Beyond that, we also investigated whether the library makes efforts to digitize its physical collection. Digitization is especially helpful as rare and valuable physical documents can be made available for many people. Another measure to increase the outreach of a library is to provide resources free of charge for the library's members, so we also investigated this aspect. To facilitate the use of the digital library services, guides should be made available to the users (Thong, Hong and Tam 2004). These guides may take various forms and we therefore looked for guides in the form of video guides, seminars, text documents, FAQs and other resources.

Reference services can facilitate finding relevant information further. Arms (2000) believes reference services are among the core services which should be provided by a digital library. Patrons using the digital library are possibly located far away from the library itself and cannot visit it, which makes digital reference services even more relevant (Lesk 2005; Mainka and Khveshchanka 2012). The digital reference services investigated were e-mail, SMS, web forms, chat or instant messaging and Skype. Skype was chosen instead of telephone services to emphasize the digital character of this service (Mainka et al., 2013); as a video conferencing tool Skype can also be seen as a more sophisticated medium of communication than the traditional phone, as gestures and facial expressions can be seen by all participants (Barnhart and Pierce 2011).

The use of social media and web 2.0 technologies provides libraries with a quick, informal and inexpensive way to communicate with its patrons (Anttiroiko and Savolainen 2011; Harris and Lessick 2007). A library can use such channels to publish information about opening hours, news and events as well as immediately reach out to its patrons (Parkes and Walton 2010). It was therefore investigated whether libraries use blogs, Facebook, Twitter (or Sina Weibo in China), Flickr, Instagram, YouTube or other social media channels.

The last aspect we investigated was the use of apps by the library. Apps are a valuable way to further reach out to the library's patrons, as mobile devices have become commonplace (Murray 2010). They can be used as mobile OPACs for searching or for user management and provide an immediate mode of communication. Another possible application of apps is to provide details and further information on physical documents by means of *augmented reality* (Barnhart and Pierce 2011).

By doing so, the physical and digital space can be combined and provide the patron with enriched information.

## **Services in the physical library**

The physical library is used in various ways. People come here to learn, meet with other people and spend their leisure time (Aabø and Audunson 2012). To rate the physical library, we investigated different aspects of it, which will be described in the following section.

Firstly, a physical library should be functional and meet the users' needs, while the building itself should inspire and motivate people (McDonald 2006). It should fascinate its visitors and be a part of the city's overall archtainment (Mainka et al. 2013). In accordance with the variety of users and their needs, the range of provided spaces should also be diverse (McDonald 2006). A library should provide quiet learning and working spaces as well as meeting spaces for collaboration among the patrons (Detez et al. 2014). Another important space is that for children in order to introduce them to and familiarize them with using a library (Franz 2011). For the purpose of fostering creativity among patrons, a physical library should also provide the aforementioned maker spaces.

In terms of technological infrastructure, we analyzed whether wireless internet access is provided, as a growing number of people prefer to use their own devices rather than computers provided by libraries. Therefore, Wi-Fi can greatly improve the experience of those users (Detez et al. 2014), who should also be able to return their borrowed materials at any branch in the city (Mainka et al. 2013). RFID can be used for that purpose, as well as for automatically sorting and protecting the materials against theft, for instance (Singh, Brar and Fong 2006), which was therefore also investigated.

As the demand for highly qualified knowledge workers grows (Hayes 2004), information literacy becomes an increasingly vital skill. The need for knowledge of how to efficiently use information in times of ever-growing amounts of such adds to the demand for information literacy (Homann 2003). As a consequence, we analyzed whether libraries offer relevant courses, for instance to promote information literacy. The quality of the patrons' stay and library's overall attraction can be further improved by providing a place within the site to purchase food and beverages (Cannell 2007; Franz 2011; Mittrowann 2011); accordingly, this aspect was also added to the investigation. The final aspect of the physical space is the library's marketing, for example special events and initiatives to attract people.

## **Interviews and field study**

For the interviews, we chose to conduct expert interviews, which are recommended to get an orientation in a new field (Flick 2009). The interviews were related to the question whether libraries

are places for face-to-face meetings and if they offer maker spaces. This field of investigation can be considered as rather new as at present only a small number of examples refer to libraries having a vibrant community which interacts in their buildings. The common interpretation of libraries is as a quiet space of learning and reading. In the 21<sup>st</sup> century the needs of the community have changed, with libraries hence following suit to meet the needs of their users (Hysalo 2014). Their strategies to meet these needs were investigated through the expert interviews. The approach was to arrange an interview in each of the 31 cities personally or by phone. Unfortunately, a personal interview could not be arranged in all cities and not all could be visited, with Appendix II providing a list of the public libraries that were investigated and their respective cities. Further listed is whether we arranged a personal interview with a librarian and were able to gain first-hand experience by visiting the library ourselves.

First-hand experience can provide further insights, especially about the physical library. This method is based on field studies in ethnography and anthropology (Lichtman 2013). It includes mainly the observation and participation of a given research field (Malinowski 1922). Ethnographical field studies are further used to investigate smaller communities such as a neighborhood or employees of a specific company (Fischer 2003). The field research may show the topic of investigation from different points of view, e.g. communities or authorities (Geertz 1983). In our case, we focused on the authority perspective – librarians and chief librarians are the experts that were interviewed. By visiting the libraries, we were also able to consider additional aspects which are difficult or impossible to determine merely by inspecting a website, for instance the atmosphere, attractiveness of spaces and access to technology.

Another round of interviews was undertaken to specifically investigate information literacy and education in libraries. Again, librarians were interviewed personally, but this time anonymously and with the goal of gaining further insight into current practices of information literacy instruction in public and academic libraries. The general questions of the interviews were connected to librarians' expectations regarding information literacy instruction as well as current developments and challenges. Semi-structured interviews were conducted with the help of a questionnaire and some results will be presented here to gain further insight with regard to the services of libraries in informational world cities. More information on the questionnaire and its results were published separately (Henkel 2015; Henkel and Stock 2016). Up until now, this type of interview has been conducted in informational world cities of Canada, Montréal, Toronto and Vancouver, as well as in those recognized in the United States of America, Boston, Chicago, Los Angeles, New York and San Francisco. It should be noted that a personal interview could not be arranged in the public library of all cities; Appendix II provides a list of the public and academic libraries which were investigated.

Furthermore, we spoke to instruction librarians and groups of up to six librarians in charge of education and training.

In total, 54 libraries around the globe were investigated. For the service investigation, the main or largest central library was chosen. In some cases, a central or main library could not be identified and instead the public library closest to or located in the city center was used (in most cases the main public library is located there also). For example, in Beijing, São Paulo and Seoul two libraries located in the city center were chosen as a sample; Appendix II provides a detailed list of the names and web references of these libraries. We interviewed 29 librarians or chief librarians from 21 diverse public libraries and respectively diverse cities, while also personally visited 31 public libraries. In addition, personal visits and interviews were conducted in 13 academic libraries in North America.

## **Limitations**

The results presented in this investigation are subject to several limitations. First and foremost, the chosen libraries are located in informational World Cities, meaning that possible best practice examples located in other regions were not considered. The presented case studies and examples of projects are limited to those which have been mentioned by the interviewed experts, identified through own experience or described in other publications. The investigation of a library's digital and physical services was limited to information available on websites, the response by librarians through email or personal interviews and experience of the authors. Therefore, services added after the personal visit of the authors which have not been published online were not counted. As such, the results are only able to present a snapshot of the current library landscape.

It should be noted that no website was available for the Shenzhen public library, meaning that we only analyzed the remaining 30 libraries' websites. Finally, upon recommendation, we decided to remove the data for the London Library from our analysis, since it is not considered to be a public library and might not be comparable to other libraries we visited.

## **Results and Discussion**

In the following section, we will present our results and a ranking based on the assigned points as well as changes in the ranking compared to investigated libraries in 2012. First of all, no investigated library narrowed its range of services in comparison to 2013.

### **Digital public library**

All online accessible libraries have a web OPAC and website, of which 83% are also offered in English in addition to the official local language, which represents a slight increase compared to the value in 2012. The range of e-resources is depicted in Figure 3, with e-books the most widely adopted resource with 93% of the libraries offering such, followed by e-journals with a 79% adoption rate. In contrast, videos with 52% and digital images with 55% still are the least provided resources. 79% of the libraries do not charge their patrons for use of the digital library, a total increase of one library compared to 2012, while about 72% digitize parts of their collections, three more than 2012. It is notable that all investigated North American public libraries provide their patrons with all of the mentioned e-resources. Furthermore, some also provide additional resources such as online courses, while also worth mentioning is the public library of Melbourne, *Melbourne Library Service*, which has expanded their range of provided e-resources since the last study and now covers 100% of the resources listed.

The number of guides is still low compared to the amount of e-resources provided, shown in Figure 4. Compared to 2012, they have remained largely the same, except for the number of FAQs, which has risen from five to 14; with this increase, FAQs superseded text documents as the most adopted form of guides, while 79% of the libraries offer at least one guide to the digital library. Worth mentioning is the *Los Angeles Public Library*, where one can make an appointment with a librarian who then explains and facilitates the use of the digital library.

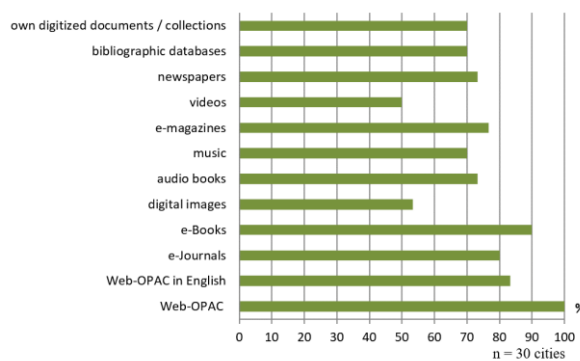
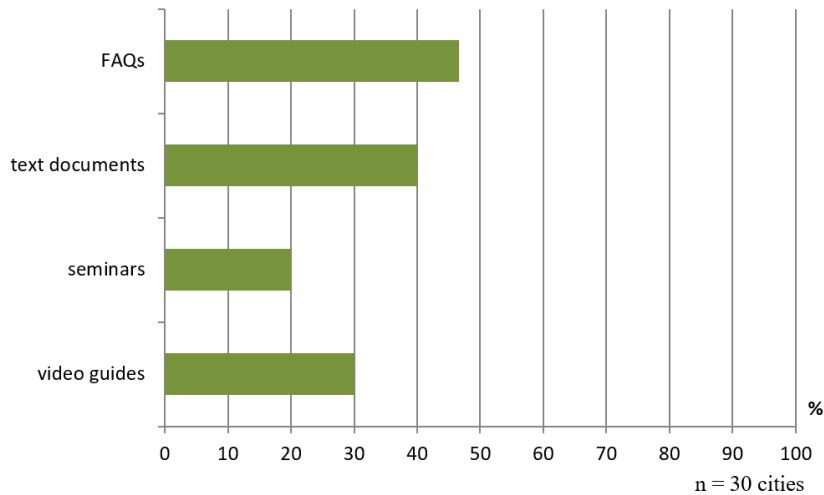


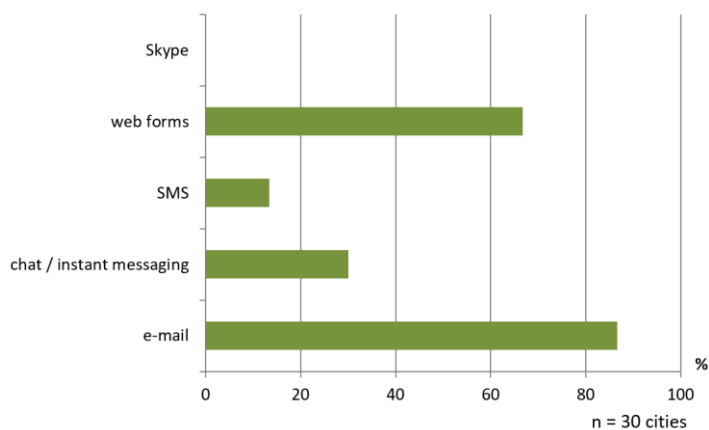
Figure 3: E-resources in informational world cities'

public libraries.



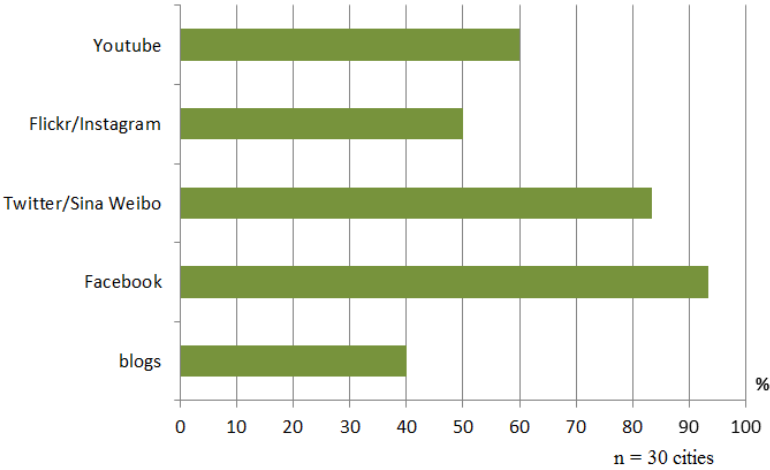
**Figure 4:** Guides in informational world cities' public libraries.

Figure 5 shows the number of supplied forms of reference services across all libraries. All surveyed libraries collectively offered at least one digital reference service, but Skype is still nowhere to be found among the range of reference services. Reference by e-mail still represents the most popular form, offered by 86% of the libraries, followed by web forms with 69%, instant messaging with 31% and reference via SMS with 14%. The *Los Angeles Public Library* and the *New York Public Library* are worth mentioning in this context as both offer all of the investigated reference services, except for Skype. Nowadays, software using artificial intelligence is conceivable as another form of reference service (Rubin, Chen and Thorimbert 2010). Therefore, libraries may also be able to offer reference services via chatbots instead of personal online communication in the near future. The example of Skype is showing that video chatting may become obsolete as a reference service.



**Figure 5:** Digital reference services in informational world cities' public libraries.

Every investigated library uses social media for various purposes, seen with the numbers in Figure 6. The most widespread social media channel is Facebook, used by 93% of libraries, closely followed by Twitter or Sina Weibo, respectively, with 83%. An overall strong increase can be noted in the sector of social media; compared to 2013, the number of libraries using YouTube has almost doubled to 62%, while Facebook is used by an additional six libraries since 2012. Only the spread of Flickr remains low, it being the least used channel, only by a third of the libraries, which may be due to the declining visits of the photo sharing platform overall. Currently, the competitor Instagram is more popular; according to the top 500 registered domains, Instagram is ranked 7<sup>th</sup> and Flickr 27<sup>th</sup> in March 2017 (Moz n.d.). A slightly higher number of libraries are using Instagram to share photos and connect with their patrons, resulting in 52% of all libraries using one or both for the distribution of images. The biggest leap in social media usage was made by the *Los Angeles Public Library*, which in 2012 did not use a single social media channel. Since then, it has added all services under consideration except for Flickr to its repertoire; the library instead provides an Instagram channel. The usage of apps in all libraries remained mostly the same, with one additional library offering an app. Overall, half of the libraries provide apps, which are mostly used for user management and searching the OPAC.



**Figure 6:** Applications of social media in informational world cities’ public libraries.



## Physical library

The number of library buildings deemed an architectural landmark remains high with 97%. The *Vancouver Public Library* should be emphasized at this point, as it also illustrates the aspect of a smart city by planting greenery on its roof (Figure 7).

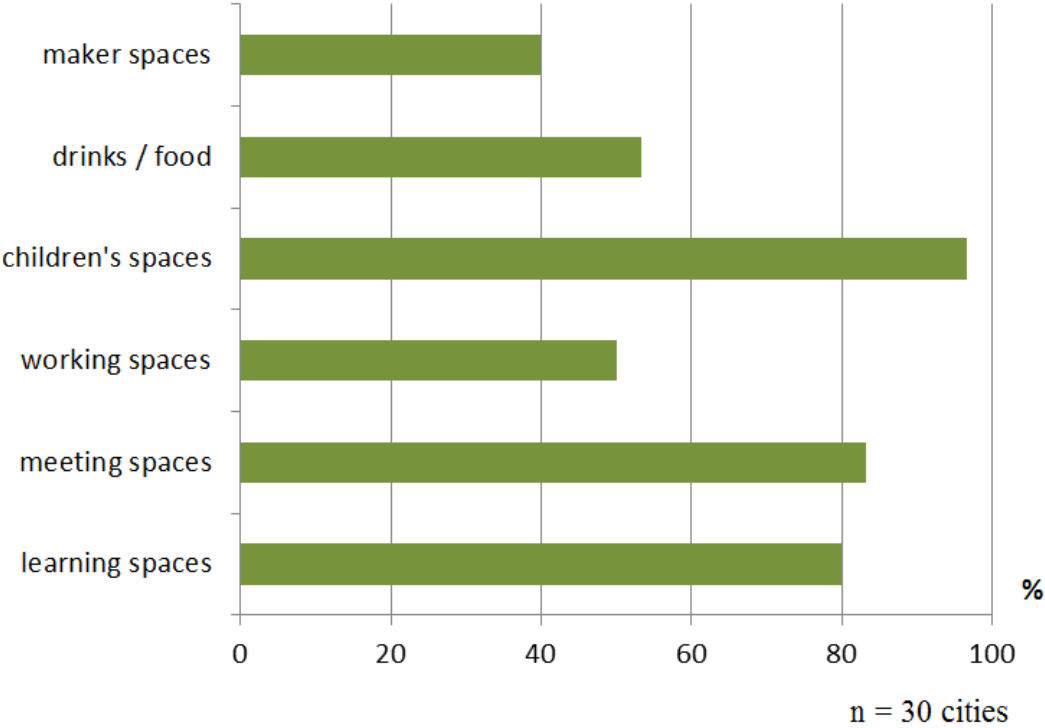


**Figure 7:** Building of the Vancouver Public Library (Photo: Agnes Mainka).

In terms of provided spaces, a high number of libraries offer spaces for children (97%), with the complete numbers seen in Figure 8. The number of modular workspaces increased by three, though they remain the least adopted spaces. The numbers of the other spaces also slightly increased, such as more than half of the libraries which offer a cafeteria selling food and beverages. Libraries providing all mentioned spaces are the *Openbare Bibliotheek Amsterdam*, the *Capital Library Beijing*, the *Hong Kong Public Library* and the *Bibliothèques publiques de Montréal*.

The previously mentioned maker spaces are provided by 41% of the libraries. An honorable mention in this context should go to the *Helsinki City Library*; apart from computers with a variety of creative software, they also supply their patrons with 3D printers, camcorders, instruments and

recording studios. This supply is further extended by staff specifically supporting the patrons in using the materials and technologies. In North American libraries the presence of maker spaces is also frequent, where they are often reserved for children and teenagers who can spend their leisure time here and receive support, such as in doing their homework.

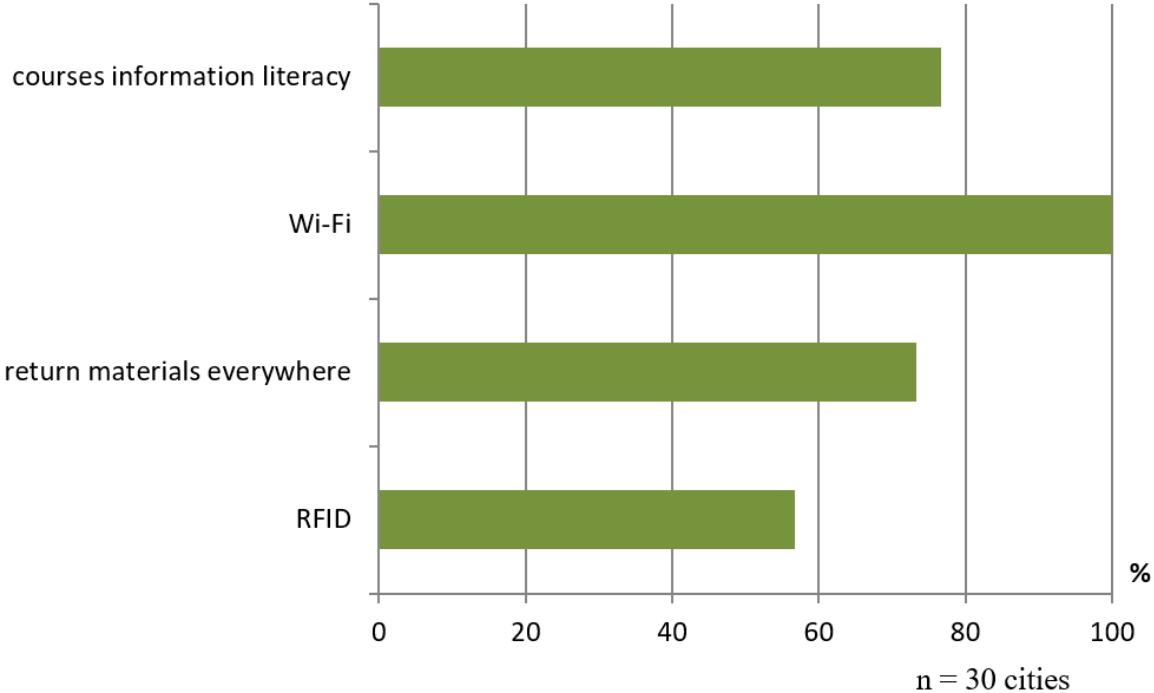


**Figure 8:** Physical spaces in informational world cities’ public libraries.

Figure 9 shows additional services in the physical library. Wi-Fi is widely spread almost all libraries offering it. Taking into account that Singapore provides Wi-Fi throughout the whole city and the library therefore does not provide this service itself, it can still be stated that Wi-Fi is available in 100% of the libraries. RFID is used by 17 out of 29 libraries, a number which did not change in comparison to 2012. The number of libraries offering a return of borrowed materials in all branches increased by one library to a total of 22.

In the realm of marketing, we found a large variety of ways in which libraries advertise their services, of which we want to mention a few. Social inclusion still plays a crucial role within library services and hence a good example of “bringing the library to the people” can be observed at the *Münchener Stadtbibliothek*, which operates buses that roam the city and function as mobile libraries. Another example is the library of Vienna, which visits people at home who cannot come to the library and provides them with library services.

Technology is also in the scope of additional services and marketing. The *New York Public Library*, for example, lends portable Wi-Fi hotspots so patrons with limited internet access can use the internet from their home, free of charge.



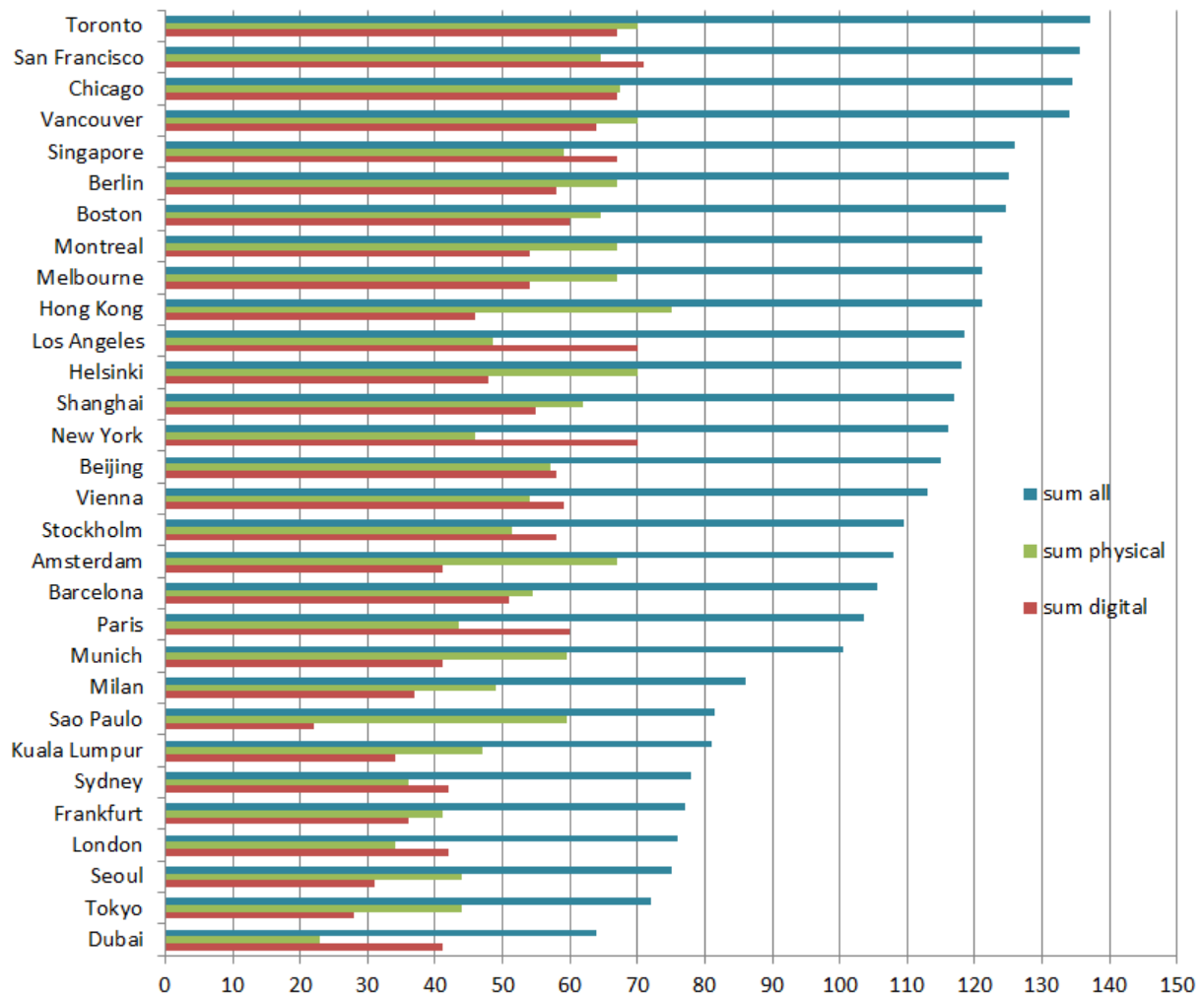
**Figure 9:** Additional services of informational world cities’ public libraries.

### Ranking

In this section we will show our ranking based on the assigned points and changes in the ranking compared to the investigated libraries in 2012 by Mainka et al. (2013). Figure 10 displays the ranking and points



every library scored for the physical and digital library aspects respectively.



**Figure 10:** Ranking of public libraries in informational world cities with regard to the core services.

The first four ranks are taken by North American libraries, Toronto (1<sup>st</sup>), San Francisco (2<sup>nd</sup>), Chicago (3<sup>rd</sup>) and Vancouver (4<sup>th</sup>). Their scores are also quite close together, while the difference between the fourth and the fifth rank is significantly larger.

Table 1 shows the changes in rank compared to the ranking by Mainka et al. (2013). The biggest positive change in the ranking is enjoyed by the *Zentral- und Landesbibliothek Berlin*, which climbed up 12 ranks and is now at position six. Dubai stays at the bottom of this ranking, due to it lacking a culture of introducing public libraries.

**Table 1:** Changes in the public library ranking

Rank	City	Change 2013 - 2016
1	<b>Toronto</b>	+5
2	<b>San Francisco</b>	+2
3	<b>Chicago</b>	0
4	<b>Vancouver</b>	-3
5	<b>Singapore</b>	+2
6	<b>Berlin</b>	+12
7	<b>Boston</b>	+3
8	<b>Montreal</b>	-5
9	<b>Melbourne</b>	+10
10	<b>Hong Kong</b>	+7
11	<b>Helsinki</b>	+4
12	<b>Los Angeles</b>	+4
13	<b>Shanghai</b>	-9
14	<b>New York</b>	-4
15	<b>Beijing</b>	-2
16	<b>Vienna</b>	-8
17	<b>Stockholm</b>	+5
18	<b>Amsterdam</b>	+2
19	<b>Barcelona</b>	-7
20	<b>Paris</b>	-6
21	<b>Munich</b>	0
22	<b>Milan</b>	+2
23	<b>Sao Paulo</b>	0
24	<b>Kuala Lumpur</b>	0
25	<b>Sydney</b>	+4
26	<b>Frankfurt</b>	+2
27	<b>London</b>	+4
28	<b>Seoul</b>	-2
29	<b>Tokyo</b>	-2
30	<b>Dubai</b>	0

#### *Maker Spaces and Face-to-Face Activities*

In addition to the binary investigation concerning the existence of certain public library services, we also conducted interviews on the use of physical libraries as space for community activities. This focused on the question of whether we can identify a real trend, on a global scale, towards a more engaging use of the physical library space.

As already demonstrated in Figure 8, the physical space is not only dedicated to learning and reading. For example, the building of the public library in Amsterdam offers space for diverse activities. In Figure 11 from left to right, we can see the open learning and working spaces, music floor and in-house radio station. The chief librarian Hans van Velzen (personal communication, January 22 2014) from the Amsterdam public library explained the benefits of using the library space to host the local radio station as follows:

“During the day we have the local radio and during the evening ... national radio. It is also interesting for us. So we give them the floor and they rent it ... They organize the programs and the programs are also interesting for us because they [invite] politicians, artists, and authors. And everything is connected to the library for our purposes, with the content of the library. So we can combine it. And all of the visitors of the library can go to the radio. So there is everyday something happening in the library. ... I cannot organize everything. So it is good to work together with other people.”



**Figure 11:** Amsterdam public library physical space (Photos: Agnes Mainka).

Opening up the space for other users to host their own projects was also the intention behind the maker space at the Chicago Public Library. Start-ups and talented people from the community are invited to rent cheap office space at the library building and, in return, they have to give something back to the community, such as classes on how to use 3D printers. Figure 12 shows how the maker space at the Chicago Public Library has been used for 3D printing courses.



**Figure 12:** Maker space at Chicago public library (photos: Agnes Mainka).

Another library using new technologies and also offering courses by experts is the Toronto Public Library (Elizabeth Glass, personal communication, March 10 2014): it encourages, among other projects, users to write and illustrate their own books. Elsewhere, the San Francisco Public Library is even planning to open a new space for youngsters to record music in the main building (Cathy Danelo, personal communication, September 17 2013). Face-to-face activities and creation at libraries are not only restricted to new technology, as interactive learning and creation can be embedded in diverse manners. Libraries are also used as open space for community interaction such as debates and readings by authors, during which members of society can get in touch with artists and scientists personally (Sabine Homilius, personal communication, November 4 2013; Anke Büttner and Peter Becker, personal communication, April 28 2014). Elsewhere, public libraries are also used as community space in which citizens may meet for activities such as knitting, as in the case of the Los Angeles Public Library (Linda Rudell-Bets, personal communication, September 9 2013).

Furthermore, library space may be used to foster entrepreneurs in the city. One example is the Vancouver Public Library which, according to chief librarian Sandra Sing (personal communication, April 28 2014), will offer library space for diverse purposes:

“We will be creating an ‘inspiration lab’ or ‘digital media lab’ that will also be flexible to allow for different types of entrepreneurial activity within the creative sector. For example, if there is a local resident with an idea and wants to pitch it to someone remotely then we will have the room and the infrastructure that they can go in and engage in a Skype session in a closed quiet space.”

As libraries are public institutions, they often have to struggle with funding. In Vienna, for example, the public libraries additionally struggle with a scarcity of physical space. Their library branches are not able to actively reach all citizens (Markus Feigl, personal communication, January 29 2014) and they are therefore concentrating on attracting diverse user groups, for instance early readers (children at school up to the age of 10) and pupils in their final years of school (16 to 18 years).

Another topic librarians were questioned on was whether their libraries are reducing the number of books physically present on their shelves. In Vienna, for example, this has been the stated goal of the chief librarian, but the introduction of this new vision of a library that offers more space for the community and less for printed materials needs to be communicated with caution (Markus Feigl, personal communication, January 29 2014). There are many people who have a very strong emotional connection with books as a physical medium and cutting down the number of books in the library can

therefore result in protests by the community if citizens feel overlooked. In many Chinese cities such as Shanghai, Shenzhen, Hong Kong or Beijing, printed books appear to enjoy continued importance for the population. Libraries are therefore used foremost by students to prepare their homework or learn for exams quietly, while bookstores are frequently used by Chinese citizens to read books at the store instead of buying them.

All interviewed librarians stress that it is important to, at the very least, enable access to information through technological equipment and Wi-Fi. For example, in Los Angeles the Wi-Fi access in front of the library building is available even when the library is closed (Linda Rudell-Bets, personal communication, September 9 2013). Nowadays, no library is built for quiet working and reading only, if indeed it ever was. From the librarians' perspective, the library should be a place that encourages users to exchange ideas and discuss topics, even about topics as diverse as poetry or politics: "More people are recognizing the potential of the library as public space beyond study and beyond kind of recreational uses" (Sandra Sing, personal communication, April 28 2014). Nevertheless, public libraries are a public service not only tailored to the needs of the knowledge society but also assisting people who cannot afford technology or do not know how to use it. The library is an important place to mediate information literacy skills within society at large.

Of course, the location of a library is important. As mentioned in the literature, libraries are sometimes used to revitalize urban space (Skot-Hansen et al. 2013), but they may also be placed within an already vital space to reach more citizens. For example, shopping malls have been built in Singapore branches of public libraries, such as the Serangoon Public Library or the Library@Orchard. Proximity to a shopping mall was also mentioned by Vienna's chief librarian as a positive effect while a branch library was established at the top of a shopping center in Berlin. However, in contrast to the other examples, this library was not easy to access, with visitors required to enter the parking deck to reach its entrance.

Creativity, engagement and co-creation may also impact the development process of library services. To introduce an innovation process that allows users to participate in decision-making is referred to as open innovation. The term open innovation (sometimes also called design thinking) describes the free flow of information and innovative ideas between different stakeholders, information flowing from inside to outside of a firm and vice versa (Chesbrough 2003). In particular, the main change from closed to open innovation is that external ideas become as important as those internal. If we compare the model of open innovation with the development of modern libraries, a similar change in behavior can be observed in some cases. Innovation in public libraries was traditionally limited to the input of library leadership (Georgy 2012) whereas nowadays libraries are making efforts to be more open to the voices and ideas of their customers (Mainka et al. 2016). Public



libraries as part of informational world cities are inheriting their smart character, involving all stakeholders in the city in decision-making processes (Schaffers et al. 2011) and becoming “collaborative innovation platforms” (Tukiainen, Leminen and Westerlund 2015). The development of cities towards being platforms of open innovation is focused on open government initiatives (Harrison, Burke, Cook, Cresswell and Hrdinová, 2011) and may also include libraries as public service. Open innovation on the city level has, for the most part to date, been introduced as a case study or in another experimental context (Mainka et al. 2016); accordingly, these implementations are referred to as living laboratories (living labs) (Tukiainen et al., 2015). Due to the fluid nature of the field, it is important to highlight best practice examples and enable benchmarks of open innovation within the context of public libraries. This will enhance the implementation of further frameworks and cases and may help open innovation to become the standard development process of public libraries. Open innovation should therefore not be limited to the collaborative decision process in terms of building a new library. It can also be used as an agile tool in library service development.

Following on from the work of Delica and Elbeshausen (2013), public libraries do not have to overcome high obstacles in introducing open innovation. As a public service the library necessarily has to adjust its service to the community needs, by design. In addition, public libraries are used by customers with diverse backgrounds which may positively influence the innovation process of the community (Georgy 2012). The problem is that in many cases librarians, especially in small or medium size libraries, are only marginally versed in innovation management, while larger libraries are more likely to adapt open innovation. However, Henkel, Ilhan, Mainka and Stock (2018) show that open innovation has already been utilized in not only large-scale but also small projects at some libraries, such as to modify existing library services. According to Georgy (2012), the following advantages and risks have to be considered while introducing open innovation in public libraries:

**Table 2:** Advantages and risks of open innovation in the context of public libraries according to Georgy (2012).

Advantages	Risks
Using the experience and knowledge of the customers	High coordination effort by the library
Increase market acceptance of new products / services	Ignorance (knowledge) of the external innovators
Improving the image	Innovations of the external innovators based on their own benefit only

More personalized service	Lack of involvement of the external innovators (quantitative)
Early awareness of new market trends	Lack of engagement of the external innovators
Increase consumption of the entire range of services	Lack of project and time management of the external innovators
Increase customer loyalty	Loss of know-how, for example for competitors
Reduction of development costs	
Reduction of acquisition costs	

**Information literacy, the digital library, and the physical library**

During the interviews, we found that all librarians understood the value of information literacy and information literacy instruction. Most librarians put their highest expectations into assisting patrons in locating and using the required information. Some interviewees indicated, however, that catering to people’s everyday needs, such as helping them how to use a mobile phone or computer, has to sometimes be prioritized over formal information literacy instruction. Even though academic libraries work on promoting information literacy skills among students and staff, public librarians have to be aware of their responsibility towards the rest of the community:

“People who do not attend postsecondary educational institutions, which typically are mandated to provide at least a minimum level of IL skills training for students, have few places to turn for training in this increasingly important skill set. If citizens are to participate fully in the digital age, in order to efficiently access, effectively evaluate, and appropriately use information to inform their decision making in all aspects of their lives, then these citizens require training in IL skills.” (Julien and Hoffman 2008, p. 39)

In the knowledge society, all citizens require information literacy skills to participate. That is why all public libraries have to recognize their duty to teach information literacy skills to those who are not being provided any information literacy instruction or assistance otherwise.

There are many ways for a library to assist patrons and promote information literacy among citizens of the knowledge society. In the digital library, subject guides, online courses, educational materials and other resources will not only promote information literacy but also teach patrons many other competencies and skills. By offering and enabling e-learning, librarians “offer more choices that suit learners’ flexibility, provide stimulus, reinforcement and instant feedback, foster interaction, and stimulate understanding and the recall of information” (Wang and Hwang 2004, p. 408). This allows libraries to extend their services and adapt to the developments of the digital age.

In the interviews, the trend of e-learning in libraries was described as a growing area and an important instructional tool of the future. Interviewees mostly highlighted the advantages of online services, such as the possibility to learn at one's own pace and at home. Librarians felt that they were able to offer more content online as there is no limit due to space, time or personnel while in the digital library patrons not willing or able to visit the physical library can be reached. Apart from the "cost-effectiveness" of new media and technologies, Reeves (1998, 4) also praised their "many other advantages in terms of repeatability, transportability, and increased equity of access". Many libraries were already offering e-learning courses or online materials, for example electronic subject guides, online (video) tutorials, subject courses, webinars or even online programs to earn a high school diploma. Online elements were also used to support other instruction services, get feedback or as a backup. Some libraries stated that they include information about external online sources on their websites for patrons looking for particular content the library is not offering. Other libraries reported currently moving in that direction or having just started with e-learning. Some who had not made the transition to e-services yet felt "behind the curve" or "behind the time" and were planning to do this in the future, while others preferred to stay cautious and see how it works at other libraries, so as to then adopt successful implementations.

Julien and Genuis (2011, 108) also found that "the focus, tools and methods of teaching [in libraries]" are being influenced by "the impact of changing technology." While library instruction is heading in the direction of e-learning and new technology, librarians are not only blessed by the advantages of new technologies but also feel challenged by high expectations and "the sheer size of the information universe and its complexity" (Julien and Genuis 2011, 108). New technologies are placing "increased demands on teachers' own information literacy skills, their ability to facilitate learning, their capacity to teach critical thinking and inquiry, their determination to empower students to be responsible for their own learning, and their own technological skills" (Goldfarb 1999, 114). The readiness to embrace technological change and continuous learning will be of great benefit for the modern librarian, for information literacy instruction online and offline, as well as assistance at the reference desk. Nevertheless, patrons need to acquire at least basic computer literacy skills to be able to access the desired contents. Public librarians claimed to spend a lot of their time on offering courses for or assisting with tablets, e-books, using e-mail and similar. More recently, patrons also want to learn how to use their camera or manage apps on tablets, while many libraries lend out devices as well. For some librarians, information technology can be a way to promote the resources of the library (e.g. promotion of e-books instead of just e-readers). While some librarians told us they wanted to give more tech support in the future to enable patrons to use their e-content, others wanted to focus on tools and content more than on the devices itself.

On the other side, the physical library was considered to be very important and described as the space where information literacy is still taught most frequently. It is here that face-to-face instruction in the form of workshops and classes as well as assistance at the reference desk take place. The “human aspect” is still highly valued at libraries as nowadays public libraries are seen as a place to network and where people come to talk to someone in person. Librarians value the opportunity to form a relationship with the patrons and show them they are welcome at their library. Public librarians stated that senior citizens and children especially need such face-to-face interaction, in courses or activities such as “story time” in the physical library. On the one hand, librarians from public libraries felt that senior citizens in particular, who may not have any or much experience with the use of a computer and the internet, could visit the library to learn how to use a mouse and set up an email account. Furthermore, while there are many other possibilities for citizens who know how to use a computer and access the internet, there is nowhere else to go for rudimentary computer knowledge and training. On the other hand, when it comes to younger patrons, public libraries also aim to address young citizens and show them what a public library can offer: “We want to create a space for children, where they feel at home, where they want to spend their time in a creative and productive and positive way” (librarian, personal communication, July 2015). It was mentioned that children who come to the library to play might grow into citizens who rely on its services throughout their lives.

To teach information literacy, librarians need rooms for classes and space for patrons to read and work. When asked about the infrastructure of the physical library, librarians told us they need flexible classroom and work space; software has to be up-to-date and, most importantly, reliable, while Wi-Fi and enough power outlets are needed for patrons to work. Librarians reminded us that in some countries, providing free internet access in libraries is of high importance due to internet access for private households being “very expensive.”

Places to work, study or just “hang out” were highly in demand. Teaching classrooms were said to be scarce, as almost all participants complained about the lack of modern equipment and space. Some libraries had no or only one classroom at the time of our visit. “It’s never enough, and not what we want” sums up what many librarians told us, with “Financial issues” and “budget cuts” given as reasons for this condition. A Canadian national survey in 2005 found that only a “minority of respondents” from public libraries had “physical space dedicated to [information literacy] training” available in their institutions (Julien and Breu 2005, 295). Although the number of institutions with this problem seems to have declined (Julien, Tan and Merillat 2013), it is nevertheless still an issue, as indicated by participants of the interviews. Not only is space for instruction necessary in a modern library, but also for recreational activities, social gatherings and other purposes (Weise 2004). Some

librarians, however, responded that “communication and other skills of the librarian are more important than technical infrastructure” or that “technology is not everything.”

Two of the positive examples we had the opportunity to visit during our survey were the Bibliothèque Marc-Favreau in Montréal, Canada, and the Boston Public Library in Boston, MA, United States. The Marc-Favreau Public Library is a state of the art library building with modern, light-filled and comfortable spaces as well as multi-medial facilities. It was designed along the key themes of “family vocation, new technologies, design, and sustainable development” (Bibliothèques Montréal 2016) for library users of all ages; this sets a good example for the physical aspects that a library of the knowledge society should have. The Johnson building of the central library in Boston was currently being renovated at the time of our visit, with the goals being, among others, to “revitalize program spaces,” “improve user services” and “create an inviting first impression” (Boston Public Library 2013). The City of Boston invited library staff as well as the whole library community to share ideas and create a new library place with comfortable, inviting rooms for patrons to read, learn, play and work in.

## **Conclusion**

In this paper, we discussed the importance of libraries in the knowledge society. We asked for the core services of public libraries in informational world cities and how the range of those services has changed in comparison with 2012. In conclusion, the development can be described as positive, as an increase of offered library services was observed. All the investigated public libraries use at least one social media channel to communicate with their patrons, Wi-Fi is available in each of the libraries and digital reference services are available mostly through e-mail and web forms. However, just a few libraries offer their own mobile applications, which could be of advantage considering the increasing use of mobile devices. In addition, the number of available guides is limited, as most public libraries only offer FAQs; instead, the library’s service should include a variety of different guides that help their patrons to access the library. Looking at the physical library space, more modular working spaces should be implemented in the library buildings to be able to adjust the space according to the community’s needs. This would help the library to be flexible and able to adapt to future demands.

Looking at the overall ranking of public library services, libraries located in the US or Canada are positioned at the top end of the 30 informational world cities, defending their top-ranked status from 2012. They are able to reach the highest scores according to the indicators investigated in this study, indicating that they offer the widest variety of services for their patrons. A very positive development can, however, also be identified for Dubai where in 2012 the digital service was rudimentary at best. By the time of our survey, a web OPAC in the national language as well as in

English was available for Dubai Public Library members and online reference services were accessible through email and web form.

The role of the physical library has been a focus of interest in this investigation. With the rise of digital information services, a library building is no longer limited to hosting all kinds of printed materials. To explore this development, we asked librarians in interviews how public libraries adapt to the changing culture of creation and face-to-face activities in their buildings. Many librarians have confirmed a new understanding of the role of public library space as public space used for diverse community activities which serves the needs of individuals to learn, work and, in particular, access information and technology. A public library is a place for cultural activity and exchange, possibly even encouraging creation and entrepreneurship. Accordingly, a very famous example is the Chicago Public Library, which supports start-ups with the necessary infrastructure and, in exchange, sees entrepreneurs give back to the community by offering courses within their field of expertise, such as 3D modelling, to library patrons (personal communication, September 4 2013).

In the 21<sup>st</sup> century, the knowledge society is confronted with diverse challenges in providing access to information. The amount of information available is so vast and the level of technology required to retrieve information changing so quickly that it is becoming increasingly difficult to teach and maintain a high degree of information literacy. Accordingly, we investigated further if public libraries promote information literacy among their patrons and what are current challenges in this area. The findings have been compared to information literacy at academic libraries and only investigated in North American cities, these libraries being ranked at the top in a global comparison and therefore serving a special role as best practice examples. In conclusion, all interviewed librarians are aware of the value of information literacy. However, in public libraries the basic need is not reference services, but rather related to everyday needs such as being able to use a mobile phone and mobile applications. Information literacy is trained in classes in the buildings, on request by the patrons and increasingly through e-learning. Through the latter, libraries are able to reach patrons that do not or cannot come to the library in person and the courses are not subject to spatial or scheduling constraints. Nevertheless, librarians are challenged because of the fast-changing technology. They are promoting electronic devices and e-content, but the face-to-face contact is still of great importance, especially for seniors and children.

Comparing the current result with the investigation of Mainka et al. (2013), public libraries have increased their role as part of the digital, smart, knowledge and creative infrastructure in informational world cities as well as their major role as a soft location factor. In future work, it would be interesting to investigate how the role of public libraries vis-à-vis the digital and physical space will develop and how libraries on a global scale will transfer information literacy skills to their patrons.

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**[Appendix I]**

	Group	Indicator	Weight (Indicator)	Weight (Group)
DIGITAL LIBRARY	Web-OPAC	Web-OPAC	8	13
		Web-OPAC in English	5	
	e-documents	e-journals	1	10
		e-books	1	
		digital images	1	
		audio books	1	
		music	1	
		e-magazines	1	
		videos	1	
		newspapers	1	
		bibliographic databases	1	
		other e-resources	1	
	databases with access to full papers	databases with access to full papers - free of charge?	10	10
	guides	video guide	1	6
		podcast guide	1	
		seminars	1	
		text documents	1	
		FAQ	1	
		other guides	1	
	international access	website in English	10	10
digital reference services	e-mail	2	10	
	chat / instant messaging	2		
	sms	2		
	web form	2		
	skype	2		
social media	blogs	1	6	
	facebook	1		
	twitter	1		
	flickr	1		
	youtube	1		
	other social media	1		
apps	apps	5	5	
own digitizations	own digitized documents / collections	5	5	
PHYSICAL LIBRARY	spaces	learning spaces		8
		meeting spaces		8
		working spaces		8
		children's spaces		8
		maker spaces		8
	use of technology	RFID	2.5	10
		interlibrary loans (borrow anywhere and return anywhere)	2.5	
		wifi	5	
	architectural landmark	architectural landmark		10
	attractiveness of spaces	drinks / food	5	10
		attractiveness of spaces	5	
	information literacy	seminars on information literacy		5
		<b>SUM DIGITAL LIBRARY</b>		<b>75</b>
	<b>SUM PHYSICAL LIBRARY</b>		<b>75</b>	
	<b>SUM ALL</b>		<b>150</b>	



**[Appendix II]**