#### For discussion on 19 December 2018

# Legislative Council Panel on Home Affairs

# **Development of Smart Library System**

# Purpose

This paper seeks Members' support for the proposal to develop a Smart Library System for the Hong Kong Public Libraries (HKPL).

# Background

2. The Leisure and Cultural Services Department (LCSD) manages a network of 70 static libraries and 12 mobile libraries serving over 100 service stops, with the support of two major library information technology (IT) systems, namely the Next Generation Integrated Library System (NGILS) and Multimedia Information System (MMIS). Launched in 2011, the NGILS is an integrated library administration system that supports the core functions of the HKPL. In 2017, the NGILS processed over 50 million loans and renewal of library materials, and facilitated the management of 4.5 million registered patrons, a comprehensive collection of over 13.1 million printed books and 1.8 million non-printed materials. The MMIS was first launched in 2001 and later upgraded in 2013 as a digital library system that currently provides access to 64 subscribed e-databases, more than 280 000 e-books and over 6 million pages of digitised items including old newspapers.

# Problem

3. With the rapid advancement of technology, the NGILS and MMIS will have reached the end of their serviceable life by 2021, when technical support for the obsolete hardware or software would not be available in the market and the scope for further enhancement is either not feasible or limited. Failure to redevelop the system in a timely manner would jeopardise the operation, efficiency and sustainability of library services.

4. The LCSD commissioned a feasibility study (FS) in 2017 to review holistically the existing library services and IT systems, to identify areas for enhancement, and to explore wider application of innovation and technology. Findings of the FS confirmed the need to develop a new "Smart Library System" commensurate with the rapid technological advancement and changing community needs of Hong Kong and in furtherance of the HKPL's mission to support the development of Hong Kong as a knowledge-based community and a Smart City. The new system should also address the following problems and limitations of the existing operation and system –

# (a) Compartmentalised platforms for different types of library materials and e-book services

Overseas experiences of major metropolitan library systems show an evolving user pattern and increasing usage of electronic library services. However, the HKPL currently operates different and separate platforms and systems for searching and accessing different types of library materials such as physical books, digitised materials, e-books and journals. Furthermore, e-book services are currently provided through different service providers using different platforms, access procedures and interfaces. The compartmentalised approach renders it difficult, inconvenient and confusing for library patrons to understand, search, access and use the e-books and library collection;

#### (b) Lack of data analytics capability for service improvement

The HKPL has limited capability in data analysis for service improvement because some library operations are performed either through separate systems/channels or through manual procedures. Data from such operations cannot be captured and analysed in a holistic manner, thereby impeding the planning and development of customer-oriented services or promotion of reading in a Smart City;

# (c) Increasing public demand for delivery of library services through mobile channels

With the overwhelming popularity of mobile devices in Hong Kong, library patrons are expecting more library services to be delivered through mobile devices in line with the international trend. Whilst on-going enhancement has been made to the existing mobile app "My Library" launched in 2014, it is necessary to further strengthen the HKPL's services by taking advantage of latest mobile technology in the context of the development of Hong Kong as a Smart City;

#### (d) Increasing demand for extension of library opening hours

Under the existing system and mode of operation, a significant amount of manpower resources would be necessary to address the increasing demand for extending library service hours; and

# (e) Limitations for supporting acquisition, maintenance and withdrawal of library materials

The NGILS, as a commercial-off-the-shelf product, cannot fully support the effective and efficient management of library collections including the procurement, maintenance, withdrawal and logistics arrangement of library materials given the huge volume of materials and the extensive library network. Besides, some of the processes rely on manual operation or compartmentalised systems. All these render it difficult for the HKPL to make informed and holistic decisions on the procurement, distribution and management of library stocks.

# Proposal

5. The LCSD proposes the development of a new Smart Library System (the new system) to enhance the quality, cost-effectiveness and customer friendliness of the facilities and services of the HKPL in promoting city-wide reading culture and supporting Hong Kong's development as a Smart City. The new system will replace the existing two major systems, i.e. the NGILS and MMIS, with wider use of information and communications technology and self-service facilities enabled with Radio Frequency Identification (RFID) technology. The proposed new system will cover four different aspects, namely physical library and material management; e-Library and e-Delivery services; internal operations and support; and the wider development of Hong Kong as a Smart City. The new system will adopt cloud technology which allows flexibility and scalability for future growth.

# New Features and Benefits

6. Apart from enhancing the functions of existing systems, the proposed system will introduce new features and bring about the following benefits –

# Physical library and management of library materials

# (a) <u>Full application of RFID technology for all libraries</u>

RFID-enabled equipment (e.g. self-charging terminals, book drops and sorters, etc.) can further increase patrons' satisfaction with a better self-service experience, and streamline the workflow of processing returned materials. The RFID technology also allows borrowing of library materials inside the library by using patrons' own mobile devices, where patrons could check out items instantly with simple taps complementary to RFID-enabled self-charging terminals. Besides, the RFID-enabled central sorter can automate the handling of cross-branch return of library materials and shorten the time for delivering returned books to libraries of origin by at least two working days from currently four working days. Apart from reducing

manpower for sorting returned items, it will make items available on-shelf in the libraries more quickly, thus enhancing the availability of popular items for circulation;

#### (b) <u>Introduction of more user-friendly self-service facilities</u>

Smart multi-functional self-service kiosks will be provided to cover a wide array of library services including patron registration, facility booking, activity enrolment, printing, payment and catalogue searching. Smart lockers or dispensers will also be installed for patrons to pick up their reserved items, rendering it unnecessary for them to queue up for such services. Library counters and other facilities will also be redesigned and reconfigured not only to free up space for creating a more comfortable reading environment, but also to improve the operational efficiency and service quality of the HKPL. "User experience design" will be adopted to improve patrons' experience and satisfaction on the development of self-service;

# (c) <u>Facilities for persons with disabilities (PWD)</u>

Assistive computer hardware and software will also be provided in libraries to facilitate access to the rich content of the HKPL's collections by both the elderly and the visually impaired. These include video magnifiers, Cantonese and English screen readers, refreshable braille display devices and Chinese input software customised for the visually impaired;

#### (d) <u>Feasibility for extension of library opening hours</u>

The adoption of innovation and new technology supported by user-friendly facilities such as RFID-enabled multi-functional self-service kiosks will enable the HKPL to explore the extension of library hours in a more cost-effective way;

#### e-Library and e-Delivery services

#### (e) <u>e-delivery of libraries services</u>

The new system will provide a single platform, via web portal and mobile app, for all forms of library resources (e.g. physical books, e-books, digitised images and audios/videos, and e-journal, etc.) using a single, unified and customer-friendly user interface. The new system will also allow popular external search engines to display relevant HKPL items in their search results, and help patrons locate the library materials and services of the HKPL they are looking for in a more efficient manner;

#### (f) <u>Delivery of library services via mobile app</u>

The new mobile app will provide one-stop access to all kinds of library

services, including borrowing of physical books, reading of e-books, access to digitised and electronic resources, patron registrations, reservation of computer facilities, enrolment of library activities and payment, etc. Hence, users can enjoy library services and resources within their touch at any place and time;

# (g) <u>Promotion of reading</u>

The new system will provide a platform for easy registration of library patrons and members of reading programmes. It will also promote reading of e-books, sharing of reviews, information and experience of reading in a coherent manner. The new system will also provide personalised recommendations of books and library programmes based on reading interests and habits of patrons. To better preserve and promote locally published books, an online platform will also be developed for management of related information on local publishing market in Hong Kong, with a view to supporting the promotion of local literary arts and publishing;

#### (h) <u>Preservation and promotion of cultural and historical documentary heritage</u>

The new system will integrate the existing content of the MMIS, Hong Kong Memory Portal and other digital contents into a single web-based digital repository for the collection, preservation and dissemination of the cultural and historical documentary heritage of Hong Kong. It will provide geospatial and timeline tools, and content search over images functions that allow the integration of disparate sources with visualisation on maps, and facilitate users' study and analysis of the complexity of the past in a geographical context;

#### Internal operations and support

(i) <u>Collection development and management</u>

Through the use of data analytics technique and business intelligence tools, the new system would facilitate the collection and analysis of data on patrons' profile, usage, reading habits and interest. Such data will provide a solid foundation for the HKPL to adopt a data-driven and evidence-based approach in the planning, procurement, maintenance, promotion and development of library collections and services to meet the changing needs and interest of patrons; and

# Wider development of Hong Kong as a Smart City

#### (j) <u>Cross-sectoral benefits</u>

The new system will support digital payment and e-ID which enable patrons to access e-services more conveniently. Business intelligence and related

analytical tools will be introduced in the new system to facilitate the collection and provision of big data in connection with reading habits of the public, distribution and usage pattern of library services, preference of patrons, supply and demand of different library materials, etc. The system can work with the Office of the Government Chief Information Officer's Big Data Analytics Platform to share and collect data regularly from external systems across departments (e.g. Census and Statistics Department (C&SD)) for building of analytics models for further processing. More data could be captured, processed and shared as Public Sector Information for use by both public and private sectors for analysis, research and innovative application.

# **Implementation Plan**

7. Subject to the funding approval of the Finance Committee (FC), a tendering exercise for the new system will be carried out as soon as possible and the contract is expected to be awarded by the end of 2020. The new system will be implemented by phases with an aim to launch all the core functions of the proposed system by mid-2023. The implementation of RFID would start from late 2021 at individual branches, while full implementation at all libraries together with the remaining functions is to be rolled out by 2024. A tentative implementation schedule is at **Annex I**.

8. Prior to the launch of the Smart Library System, the LCSD will provide the public with timely information about the new system through different channels. The LCSD will arrange staff and customer service ambassadors to station at libraries to advise the public (including the elderly) on how to use the multi-functional self-service kiosks and other equipment.

# **Financial Implications**

# Capital expenditure

9. The implementation of the new system will incur a total capital expenditure of \$877.3 million from 2019-20 to 2024-25. Details are at <u>Annex II</u>.

#### Other non-recurrent expenditure

10. In addition, the implementation of the new system will require a project team for project management, tendering, system analysis and design, site preparation, quality assurance, acceptance testing, implementation control, etc. The team will entail a non-recurrent staff cost of \$55.6 million from 2019-20 to 2024-25.

# Recurrent expenditure

11. The new system will require an indicative annual recurrent expenditure of \$121.3 million from 2025-26 onwards. The cost breakdown of recurrent expenditure is at <u>Annex III</u>. Taking into account the offsetting effect of realisable savings of \$54.5 million per annum, there will be a net additional recurrent cost of \$66.8 million per annum. Besides, an additional staff requirement of \$4.5 million will also be entailed to supplement the current pool of system maintenance resources in supporting the new system.

# Savings and cost avoidance

12. The new system will bring about an annual savings of \$144.1 million from its full implementation in 2025-26 onwards. The breakdown of the recurrent savings is as follows:

- (a) Realisable recurrent savings of \$54.5 million per annum, comprising \$11.7 million due to operational efficiency after full implementation of RFID-enabled and self-service facilities, and \$42.8 million for system maintenance and contract staff costs of the existing systems;
- (b) Notional savings of \$11.6 million per annum achieved through streamlined business processes and shortened time for the logistics arrangement for delivering returned books to libraries of origin; and
- (c) Cost avoidance of \$78 million per annum achieved through the provision of RFID-enabled library facilities (e.g. unstaffed mini-libraries and pop-up libraries) in lieu of setting up traditional small libraries.

13. The new system will also bring about a non-recurrent cost avoidance of \$473 million as replacement of existing systems using barcode technology and delivery of multi-media content on traditional media formats are no longer required.

# **Public Consultation**

14. In planning for the development of the new system, the LCSD commissioned a FS in 2017 and conducted extensive consultations with members of the Public Library Advisory Committee  $(PLAC)^1$  and other stakeholders. The PLAC welcomed and supported the proposed system. Moreover, the LCSD also conducted surveys and meetings with the public and internal staff members to gauge

<sup>&</sup>lt;sup>1</sup> The PLAC is set up to advise the Government on the overall development strategy of the HKPL. Members are appointed by the Secretary for Home Affairs and comprise professionals, academics, community personalities and government representatives. The terms of reference and membership of the PLAC are at https://www.hkpl.gov.hk/en/about-us/intro/plac/committee.html.

their feedbacks and views on the requirements and expectations of future library systems and services. The LCSD has taken into account the feedback of the above-mentioned stakeholders in designing the proposed new system and briefed key district personalities on the proposal.

# Way Forward

15. We plan to seek funding approval of the FC in Q1 of 2019 for development of the new system.

# **Advice Sought**

16. Members are invited to comment on the proposed new system.

Home Affairs Bureau Leisure and Cultural Services Department December 2018

#### Annex I

# Tentative Implementation Schedule for the Smart Library System

# Activity

# **Target Timing**

(a)	Tender preparation	April 2019 – September 2	2019
(b)	Tendering and award of contract	October 2019 – December 2	2020
(c)	System analysis and design of core library functions	January 2021 – September 2	2021
(d)	System development of core library functions	October 2021 – September 2	2022
(e)	<ul> <li>Launch of core library functions</li> <li>Digital Resources Management</li> <li>Integrated Library System (with RFID enabled in all libraries)</li> </ul>	December 2 June 2	2022 2023
(f)	<ul> <li>Launch of other RFID-enabled</li> <li>equipment</li> <li>Other ancillary RFID-enabled</li> <li>equipment including book drops,</li> <li>dispensers / e-lockers completely</li> <li>deployed to all branch libraries</li> </ul>	March 2	2024
(g)	Launch of remaining library functions such as Business Intelligence System	December 2	2024

# Non-recurrent Expenditure for Implementation of the Smart Library System (in \$'000)

	Item	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	Total
(a)	Hardware			5,777	127,350	122,522	63,828	319,477
(b)	Software			9,357	45,591	25,235	1,461	81,644
(c)	Communication network			15,756	15,756			31,512
(d)	Implementation services				96,207	96,207	48,105	240,519
(e)	Contract staff	2,871	3,827	12,896	12,896	12,896	12,896	58,282
(f)	Site preparation			2,400				2,400
(g)	Miscellaneous (training, consumables, etc.)			61,310	800	1,600		63,710
(h)	Contingency	287	383	10,750	29,860	25,846	12,629	79,755
	Total	3,158	4,210	118,246	328,460	284,306	138,919	877,299

#### Note:

- Item (a): comprises hardware required for implementation of the new system. The hardware includes servers, storage and backup equipment and other client-side equipment including RFID-enabled self-service equipment, reservation dispensers, e-lockers, etc.
- Item (b): comprises system software for servers, database, endpoint protection/management, data backup, system and network monitoring, etc.
- Item (c): comprises network equipment at data centres and libraries, and network security equipment.

- Item (d): comprises implementation and support services from service providers. Main implementation activities include system analysis and design, application development, system installation and configuration, infrastructure implementation at data centres and libraries, enhancement of other systems interfacing with the new system, production rollout and nursing, etc.
- Item (e): comprises engagement of services of contract IT professional staff to supplement the in-house project management team on development of application, infrastructure, and enhancement of other systems interfacing with the new system.
- Item (f): comprises setup of site preparation (e.g. cabling works) at over 70 branch libraries.
- Item (g): comprises miscellaneous costs, such as services for privacy impact analysis, security risk assessment and audit, RFID tags for existing library items and backup tapes, etc.
- Item (h): represents about 10% of the costs required for items set out in Items (a) to (g).

# Annual Recurrent Expenditure for the Smart Library System (in \$'000)

Item	Total
(a) Hardware and software maintenance	64,859
(b) Communication network	11,035
(c) System maintenance	33,425
(d) Contract staff	10,433
(e) Miscellaneous (consumables, etc.)	1,500
Total	121,252

#### Note:

Item (a):	comprises hardware and software maintenance required for supporting the new system.
Item (b):	comprises data line services and maintenance services for network equipment at data centres and libraries, and network security equipment.
Item (c):	comprises maintenance and support services from service providers for the new system.
Item (d):	comprises engagement of services of contract IT professional staff to supplement the in-house maintenance team on maintenance of application, infrastructure, and enhancement of the new system.
Item (e):	comprises miscellaneous costs such as RFID tags for new library items.