

ITEM FOR FINANCE COMMITTEE

**CAPITAL WORKS RESERVE FUND
HEAD 710 – COMPUTERISATION
Leisure and Cultural Services Department
New Subhead “Development of Smart Library System”**

Members are invited to approve a new commitment of \$877,299,000 for development of a smart library system.

PROBLEM

The Leisure and Cultural Services Department (LCSD) needs to develop a new Smart Library System (the new system) to replace the existing library systems so as to enhance the quality, cost-effectiveness and customer friendliness of the facilities and services of the Hong Kong Public Libraries (HKPL) in promoting city-wide reading culture and supporting Hong Kong’s development as a smart city.

PROPOSAL

2. The Director of Leisure and Cultural Services, with the support of the Secretary for Home Affairs and the Government Chief Information Officer, proposes to create a new commitment of \$877,299,000 for the development of the new system.

JUSTIFICATION

Ageing of the existing systems and other constraints

3. The LCSD manages its static libraries and mobile libraries with the support of two major library information technology (IT) systems, namely the Next Generation Integrated Library System (NGILS) and Multimedia Information System (MMIS). The NGILS is an integrated library administration system that

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supports the core functions of the HKPL, such as circulation control, acquisition, cataloguing and collection management of library materials, as well as searching of library resources, etc. The MMIS serves as a digital library system that provides access to subscribed e-databases, e-books and digitised items including old newspapers.

4. With the rapid advancement of technology, the NGILS and MMIS will reach the end of their serviceable life by 2021 when technical support for the obsolete hardware or software will no longer be available in the market and the scope for further enhancement is either not feasible or limited. Failure to redevelop the systems in a timely manner would jeopardise the operation, efficiency and sustainability of library services.

5. The LCSD commissioned a feasibility study 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 study confirmed the need to develop the new system commensurate with the rapid technological advancement and changing community needs of Hong Kong and to further 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 systems –

(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. This 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 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 culture.

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- (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 them 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 leveraging the latest mobile technology in the context of developing 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.

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

As a commercial-off-the-shelf product, the NGILS cannot fully support the effective and efficient management of library collections including the procurement, maintenance, withdrawal and logistic 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.

Proposed new system and anticipated benefits

6. The LCSD proposes the development of 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 new system will cover four different aspects, namely physical library and material management; e-Library and e-Delivery services; internal operations and support; and wider adoption of smart city solutions. The new system will also adopt cloud technology which allows agility, flexibility and scalability for future growth.

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

Physical library and management of library materials

(a) Full application of RFID technology for all libraries

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) Introduction of more user-friendly self-service facilities

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) Facilities for Persons with Disabilities

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.

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(d) *Feasibility for extension of library opening hours*

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) *e-delivery of libraries services*

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, audios/videos, e-journals, 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) *Delivery of library services via mobile app*

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 registration, reservation of computer facilities, enrolment of library activities, making payment, etc. Hence, users can enjoy library services and resources within their touch at any place and time.

(g) *Promotion of reading culture*

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.

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(h) *Preservation and promotion of cultural and historical documentary heritage*

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) *Collection Development and Management*

Through the use of data analytics technique and business intelligence tools, the new system will 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.

Wider adoption of smart city solutions

(j) *Cross-sectoral benefits*

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 new system can work with the Government's Big Data Analytics Platform to share and collect data regularly from external systems across departments (e.g. Census and Statistics Department) for building analytics models for further processing. More data could be captured, processed and released as open data under the Public Sector Information portal for use by both public and private sectors for analysis, research and innovative application, such as usage patterns of readers by districts, as well as real time data on the availability of computer workstations at libraries, etc.

FINANCIAL IMPLICATIONS**Capital expenditure**

8. It is estimated that the implementation of the new system will incur a total capital expenditure of \$877,299,000 from 2019-20 to 2024-25. The breakdown and estimated cash flow are as follows –

Item	(\$'000)						
	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	Total
(a) Hardware and software	-	-	15,134	172,941	147,757	65,289	401,121
(b) Communication network	-	-	15,756	15,756	-	-	31,512
(c) Implementation services	-	-	-	96,207	96,207	48,105	240,519
(d) Contract staff	2,871	3,827	12,896	12,896	12,896	12,896	58,282
(e) Site preparation	-	-	2,400	-	-	-	2,400
(f) Miscellaneous	-	-	61,310	800	1,600	-	63,710
(g) 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

9. In paragraph 8(a) above, the estimated expenditure of \$401,121,000 is for acquisition of computer hardware and software, such as servers, storage, government cloud resources, backup equipment, client-side equipment including RFID-enabled self-service equipment, reservation dispensers, e-lockers, etc., and system software for servers, database, endpoint protection/management, data backup and network monitoring, etc.

10. In paragraph 8(b) above, the estimated expenditure of \$31,512,000 is for acquisition of network equipment at data centres and libraries, and network security equipment.

11. In paragraph 8(c) above, the estimated expenditure of \$240,519,000 is for acquisition of implementation and support services from service providers. Main implementation activities will 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.

12. In paragraph 8(d) above, the estimated expenditure of \$58,282,000 is for 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.

13. In paragraph 8(e) above, the estimated expenditure of \$2,400,000 is for site preparation (e.g. cabling works) at over 70 branch libraries.

14. In paragraph 8(f) above, the estimated expenditure of \$63,710,000 is for acquisition of services for privacy impact assessment, security risk assessment and audit, RFID tags for existing library items and backup tapes, etc.

15. In paragraph 8(g) above, the estimate of \$79,755,000 represents 10% contingency on the cost items set out in paragraphs 8(a) to 8(f).

Other non-recurrent expenditure

16. 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 and implementation control, etc. This will entail a total staff cost of \$58,056,000 from 2019-20 to 2024-25.

Recurrent expenditure

17. The proposed system will entail an indicative annual recurrent expenditure of \$8,376,000 in 2022-23, increasing to \$121,252,000 from 2025-26 onwards. This expenditure covers hardware and software maintenance (including government cloud service charges), communication network, on-going support services, contract staff and consumables, as follows –

		(\$'000)			
	Item	2022-23	2023-24	2024-25	2025-26 onwards
(a)	Hardware and software maintenance	3,019	32,607	56,789	64,859
(b)	Communication network	5,357	10,714	10,714	11,035
(c)	On-going support services	-	12,507	25,014	33,425
(d)	Contract staff	-	-	-	10,433
(e)	Consumables	-	-	-	1,500
	Total	8,376	55,828	92,517	121,252

18. The new system will require a net additional recurrent cost of \$66,712,000 per annum after offsetting realisable savings of \$54,540,000 per annum (mentioned in paragraph 19(a) below) from 2025-26 onwards. Besides, an additional annual staff requirement of \$4,761,000 will also be entailed to supplement the current pool of system maintenance resources in supporting the new system.

Savings and cost avoidance

19. It is estimated that the implementation of the proposal will achieve the following savings and cost avoidance upon decommissioning of the existing systems and full implementation of the new system by phases –

- (a) realisable recurrent savings of \$54,540,000 per annum, comprising \$11,720,000 due to the efficiency gain after the full implementation of RFID-enabled and self-service facilities, and \$42,820,000 for system maintenance and contract staff costs of the existing NGILS, MMIS and other systems;
- (b) notional recurrent savings of \$11,896,000 per annum achieved through streamlined business processes and shortened time for the logistic arrangement for delivering returned books to libraries of origin;
- (c) recurrent cost avoidance of \$78,000,000 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; and
- (d) a one-off cost avoidance of \$473,034,000 as replacement of the existing systems using barcode technology and delivery of multi-media content on traditional media formats will no longer be required.

Encl. 20. A cost and benefit analysis for the new system is at Enclosure.

IMPLEMENTATION PLAN

21. Subject to funding approval of the Finance Committee, 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 in phases with an aim of launching all the core functions by mid-2023. The implementation of RFID will start from late 2021 in individual branches, while full implementation in all libraries together with remaining functions will be rolled out by 2024.

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	Activity	Target Completion Date
(a)	Tender preparation	September 2019
(b)	Tendering and award of contract	December 2020
(c)	System analysis and design of core library functions	September 2021
(d)	System development of core library functions	September 2022
(e)	Launch of core library functions	
	- Digital Resources Management	December 2022
	- Integrated Library System (with RFID enabled in all libraries)	June 2023
(f)	Launch of other RFID-enabled equipment	March 2024
	- Other ancillary RFID-enabled equipment including book drops, dispensers, e-lockers in all branch libraries	
(g)	Launch of remaining library functions such as Business Intelligence System	December 2024

22. Prior to the launch of the new 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.

PUBLIC CONSULTATION

23. In planning the development of the new system, the LCSD engaged a consultant to conduct a feasibility study in 2017, during which the stakeholders' views were sought and taken into account. The Public Library Advisory

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Committee (PLAC)^{Note} was also consulted in November 2017, February and June 2018 and it supported the implementation of the new system. In addition, the LCSD also conducted surveys and meetings with the public from time to time to gauge their feedbacks and views on requirements and expectations of future library systems and services. The LCSD has taken into account the feedback of the above-mentioned stakeholders in planning the new system and briefed key district personalities on the proposal.

24. We consulted the Legislative Council Panel on Home Affairs (the Panel) on 19 December 2018. Members were generally supportive of the proposal. Some members considered there would be a need to further enhance the library services. The LCSD will take into account the feedback of the Panel in adopting innovation and technology to enhance the quality, cost-effectiveness and customer friendliness of the facilities and services of public libraries.

BACKGROUND

25. At present, HKPL's network comprises 70 static libraries and 12 mobile libraries serving over 100 service stops. Launched in 2011, the NGILS processed over 50 million loans and renewal of library materials in 2017, 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, first launched in 2001 and later upgraded as a digital library system in 2013, currently provides access to 64 subscribed e-databases, more than 280 000 e-books and over 6 million pages of digitised items.

Home Affairs Bureau
Leisure and Cultural Services Department
February 2019

^{Note} 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>.

Cost and Benefit Analysis for the Development of Smart Library System

Item	(\$'000)												
	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	Total
1. Non-Recurrent													
Expenditure	3,158	4,210	118,246	328,460	284,306	138,919	-	-	-	-	-	-	877,299
Staff Cost	9,676	9,676	9,676	9,676	9,676	9,676	-	-	-	-	-	-	58,056
Total Non-Recurrent Cost	12,834	13,886	127,922	338,136	293,982	148,595	-	-	-	-	-	-	935,355
2. Recurrent													
Expenditure	-	-	-	8,376	55,828	92,517	121,252	121,252	121,252	121,252	121,252	121,252	884,233
Staff Cost	-	-	-	-	-	-	4,761	4,761	4,761	4,761	4,761	4,761	28,566
Total Recurrent Cost	-	-	-	8,376	55,828	92,517	126,013	126,013	126,013	126,013	126,013	126,013	912,799
Total Non-Recurrent and Recurrent Cost (A)	12,834	13,886	127,922	346,512	349,810	241,112	126,013	126,013	126,013	126,013	126,013	126,013	1,848,154
3. Savings													
Realisable Savings ^{Note 1}	-	-	-	1,005	2,375	54,540	54,540	54,540	54,540	54,540	54,540	54,540	385,160
Notional Savings ^{Note 2}	-	-	-	655	2,793	8,014	11,896	11,896	11,896	11,896	11,896	11,896	82,838
Cost Avoidance ^{Note 3}	-	-	-	-	15,520	535,514	78,000	78,000	78,000	78,000	78,000	78,000	1,019,034
Total Savings (B)	-	-	-	1,660	20,688	598,068	144,436	144,436	144,436	144,436	144,436	144,436	1,487,032
Net Savings (C) = (B) – (A)	(12,834)	(13,886)	(127,922)	(344,852)	(329,122)	356,956	18,423	18,423	18,423	18,423	18,423	18,423	(361,122)
Net Cumulative Savings	(12,834)	(26,720)	(154,642)	(499,494)	(828,616)	(471,660)	(453,237)	(434,814)	(416,391)	(397,968)	(379,545)	(361,122)	

Notes –

1. This comprises the efficiency gain from the full implementation of Radio Frequency Identification technology-enabled and self-services facilities, as well as the maintenance and support costs of the existing Next Generation Integrated Library System, Multimedia Information System and other systems.
2. This will be achieved through streamlined business processes and shortened time for returning books to libraries of origin.
3. This represents the one-off cost for replacing the existing systems using barcode technology and delivering multi-media content on traditional media formats, and the annual cost of setting up additional small libraries of traditional setup which could be avoided with the implementation of the proposed system.
