ITEM FOR FINANCE COMMITTEE

CAPITAL WORKS RESERVE FUND
HEAD 710 – COMPUTERISATION
Government Secretariat: Food and Health Bureau (Health Branch)
Subhead A074XV Development of A Territory-Wide Electronic Health Record Sharing System

> Members are invited to approve an increase in the commitment for the Electronic Health Record Programme by $422,192,000 from $702,000,000 to $1,124,192,000 for implementing the second stage of the Programme.

PROBLEM

Stage Two development of the Electronic Health Record Sharing System (eHRSS) is due to commence.

PROPOSAL

2.   Stage One of eHRSS was launched on 13 March 2016. The Secretary for Food and Health, with the support of the Government Chief Information Officer, proposes to increase the approved commitment for the Electronic Health Record (eHR) Programme by $422,192,000 from $702,000,000 to $1,124,192,000 for implementing the second stage of the programme (from 2017-18 to 2021-22). Stage 2 development seeks to accomplish the three major targets below –

(a)   broaden the scope of data sharing and develop the technical capability for sharing of radiological images and Chinese Medicine (CM) information;

/(b) …..

(b)   enhance patient's choice over the scope of data sharing and to facilitate patient access to the system; and

(c)   improve and enhance the core functionalities and security/privacy protection.

JUSTIFICATION

eHR and eHRSS

3.   eHR refers to a record in electronic format containing health-related data of an individual (referred to as "patient" hereafter though eHR is not confined to record of sickness). Such data may encompass –

(a)   personal particulars for identification and contact (e.g. name, identification, date of birth and contacts);

(b)   health data (e.g. weight, height, blood type, vaccination records and drug allergies); and

(c)   medical data (e.g. diagnosis, prescriptions, laboratory test results, radiological images and hospital discharge summaries).

4.   An eHRSS is an information infrastructure which would enable healthcare providers (HCPs) in both the public and private sectors, with informed consent of the patient and proper authorization, to view and share the same set of eHR of a patient. In technical terms, the major components of the sharing arrangement under eHRSS involve standalone electronic medical/patient record (eMR/ePR) systems, which are information systems deployed by individual HCPs for storing their patients' records for their own healthcare purposes, and a central electronic platform inter-connectable with those eMR/ePR systems to facilitate sharing of eHR amongst the HCPs.

eHR Programme of Hong Kong

5.   The Government put forward the development of eHRSS as one of the healthcare reform proposals for public consultation in 2008. The proposal received general support from the community. The Government's plan was to develop eHRSS in two stages. A Steering Committee on eHR Sharing has been formed to steer the project (membership at Enclosure).

Encl.

/**Stage** …..

Stage One eHR Programme

Targets

6.   In July 2009, the Finance Committee (FC) approved the capital funding commitment of $702 million (LC Paper No. FCR(2009-10)37) for Stage One eHR Programme. Since then, we have successfully developed the eHR sharing platform core infrastructure, the CMS Adaptation modules[1] and CMS On-ramp application[2], as well as the standardisation and interfacing component. All existing public and private hospitals are connected to the sharing platform to date. Moreover, we drafted the eHRSS Bill having regard to the outcome of a public consultation in 2011-12 on the legal, privacy and security framework on eHR sharing. The Bill, together with committee stage amendments proposed by the Administration, was passed by the Legislative Council on 13 July 2015. The eHRSS Ordinance (Cap. 625) came into operation on 2 December 2015 and the Commissioner for the Electronic Health Record was appointed on the same date. The eHRSS was launched on 13 March 2016 to process applications for registration from HCPs and members of the public.

Concepts and Principles

7.   The design of the legal, privacy and security framework of the eHRSS has incorporated the following concepts and principles –

(i)   ***Voluntary participation:*** A patient may join eHRSS voluntarily by giving an express and informed consent. He/she may give additional consent to individual HCPs to authorize them to share his/her data. The consents can be withdrawn any time.

(ii)   ***Pre-defined sharable scope*** [3] ***:*** Only the eHR falling within the pre-defined scope would be shared.

(iii)   ***Access of eHR on 'need-to-know' principle:*** Only a HCP providing healthcare to a patient and with the need to know his/her eHR for such purpose may access the eHR.

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[1]   CMS Adaptation modules are modules developed with a view to facilitating private hospitals to connect to and interface with the eHRSS.

[2]   CMS On-ramp is a clinical management software with sharing capability developed under the eHR Programme. It is a turn-key system readily usable by private clinics.

[3]   Sharable scope of data being shared include: Personal Identification and Demographic Data (including name, date of birth and identity document number…etc.); Adverse Drug Reactions and Allergies; Diagnosis, Procedures & Medication; Summary of Episodes and Encounters With Healthcare Providers (i.e. summary of appointments/bookings); Clinical Note Summary (i.e. Discharge Summary); Birth and Immunisation Records; Laboratory and Radiology Results; Other Investigation Results; Referral Between Providers.

(iv)   ***Dedicated legislation to protect patient privacy and system security:*** An eHRSS-specific legislation (the eHRSS Ordinance) is in place to regulate the collection, sharing, use and safekeeping of data shared via eHRSS.

(v)   ***Uses of eHR:*** The primary use is to improve healthcare delivery. There are provisions under the eHRSS Ordinance governing the use of eHR for research/statistics, disease surveillance and purposes permitted by other laws.

(vi)   ***Versatility and technology-neutrality of system:*** This caters for future advancement in health IT and the need to provide new functionalities.

(vii)   ***Role of Government:*** The Government takes the lead and invests public money into system development and operation of eHRSS.

Progress After Launch

8.   With the launch of Stage One of the eHRSS, health data in appropriate electronic format within the sharable scope contributed by public and private HCPs could start to be shared on the eHRSS platform in accordance with the new working model developed. Patients of the previous pilot Public-Private Interface-Electronic Patient Record Sharing Pilot Project one-way sharing scheme are being invited to join eHRSS[4]. We initiated campaigns to recruit new healthcare recipients at various public and private hospitals, clinics and elderly homes. As of mid-March 2017, over 430 000 patients have registered to join eHRSS. As for HCPs, besides Department of Health and Hospital Authority (HA), 11 private hospitals and over 1 200 other organisations have registered in eHRSS. Over 37 000 accounts have been opened for healthcare professionals working in these organisations, including over 2 000 private doctors.

9.   It is understandable that some HCPs need time to make technical and administrative enhancements to adapt to the use of a new system. The Government has been providing support to participating HCPs, including private hospitals, elderly homes and clinics, to facilitate their adjustments. We have been offering them clinical application modules (CMS Adaption) and clinic software (CMS On-ramp) developed by the eHR Office and facilitating health IT vendors to

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[4]   As of 12 March 2016, there were around 400 000 registered patients and 2 600 private medical practitioners in the programme and the programme would continue to run using the eHRSS platform for a period after the launch before it is terminated.

upgrade their clinical software products in the industry. The other support offered include promulgation of data standardisation and advice on data mapping to facilitate data sharing between HCPs in eHRSS. Our objective is to enable all participating HCPs to become inter-connectable with eHRSS and capable of sharing data in the sharable scope within a reasonable time frame.

Stage Two eHR Programme

10. With Stage One eHRSS operating smoothly, it is necessary to commence Stage Two development in a timely manner to further increase the adoption of the eHRSS among HCPs and the public as well as to further enhance its functionalities in supporting healthcare delivery. Details of our three major targets are set out in the ensuing paragraphs.

Target (a): To Broaden the Scope of Data Sharing and Develop the Technical Capability for Sharing of Radiological Images and CM Information

11. The scope of data sharing will be reviewed and expanded during Stage Two. We will initiate further **Data Standardisation**[5] exercises on existing and new data categories to facilitate data sharing e.g. radiological images, CM information, personal life-style habits and care and treatment plan.

Radiological Images

12. At present, there is sharing of radiological images of a limited scale among HCPs under a Radiology Image Sharing Pilot project (the pilot project) launched in 2009. Meanwhile, radiological investigation reports (without images) have already been included in the sharable scope of the current Stage One eHRSS. Given the demand for **sharing of Radiological Images in eHRSS** as revealed in the surveys and other feedbacks of HCPs and patients, we propose to include this in the project scope of Stage Two eHRSS development. We envisage that sharing of visualized radiological investigation results will better support collaborative care among HCPs and improve continuity of patient care. We will address the technical challenges and optimal solutions will be sorted out. The pilot project will be continued on a limited scale while Stage Two of eHRSS is being developed.

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[5] Data standardization is essential for accurate interpretation of the data by fellow HCPs and storage in eHRSS.

CM Information

13. At present, information technology is not extensively used among CM HCPs to support their operations. Some are deploying IT systems mainly for billing and patient administration purposes. For others, the systems used by them are often not adopting standardised terminologies nor capable of data sharing at any large scale.

14. Given the interest previously expressed by the Legislative Council Panel on Health Services (the Panel), the Bills Committee on the eHRSS Bill and the community, we have included **sharing of CM information** in the project scope for Stage Two eHRSS development. The tasks will include continued standardisation of Chinese medical terms and herbal medicine terminology as well as promoting computerisation of health records in the CM sector. We will assess the readiness and receptiveness of the sector and devise an optimal approach through pilots to share CM information on eHRSS.

Target (b): To Enhance Patient's Choice over the Scope of Data Sharing and To Facilitate Patient Access to the System

Sharing Restriction Feature(s)

15. We intend to develop some form of **Sharing Restriction Feature(s)** to enhance patient's choice over scope of data sharing during Stage Two. In this regard, stakeholders have previously expressed diverse views on imposing extra sharing restriction over selected data of eHR. We have therefore undertaken to conduct during Stage Two of the eHR Programme a study on additional access control for sensitive data. We will conduct the study along a positive direction, with a view to developing and implementing some forms of new device or arrangement so as to provide patients with additional choices over disclosure of their health data. The risks and concerns over the implications on privacy protection, quality of healthcare delivery, patient safety, risk to healthcare professionals and practical difficulties in classifying sensitive health data need to be addressed. The study will examine various possible options with respect to overseas experience, merits and risks, and technical and operational feasibilities.

Patient Portal

16. Stage One of eHRSS was designed primarily for use by HCPs when providing healthcare to patients. During previous public consultation, some patients expressed their wish to access the eHRSS themselves via a **"Patient Portal"** for various purposes (e.g. view their own eHR, update personal details,

manage their eHR registration). We have undertaken to conduct a study on the development of a Patient Portal in Stage Two of eHRSS. The study will review relevant overseas experience and merits and risks, propose possible functionalities, and examine feasibilities. We see the need to strike the balance among convenience of access, risk of misinterpretation of data by patients in the absence of professional medical advice and additional security risks due to access through a more open Patient Portal.

17.   We envisage that the portal to be developed would enable patients' access to some key health data (e.g. medications and drug allergy) to help them better understand their health conditions. New function will also be developed to facilitate patients' management of their eHRSS registration and related matters (e.g. managing "sharing consent" given to individual HCPs), Data Access Requests or Data Correction Requests, and the means to receive notifications from eHRSS, etc.

Target (c): To Improve and Enhance the Core Functionalities and Security/Privacy Protection

18.   The existing system features of the eHRSS will be enhanced in the light of technological advancement. New functionalities will be developed (e.g. support for more and higher display resolution choices, record viewing and searching options). With the experience of Stage One system operation, we will further improve existing functions in CMS adaptation modules and CMS on-ramp application for better adoption in private hospitals and clinics. More sophisticated access control of data in eHRSS will be enabled. Further improvement of the security protection of the system will be tested and implemented to support mobile access to information.

HA as Technical Agency

19.   The eHRSS is a very special IT system. Its development requires heavy input of clinical expertise not readily possessed by IT vendors in the private sector. Fine technical details, which may appear to be trivial from the IT perspective, may well have material implication on the clinical usability of the eHRSS and impact on patient safety.

20.   The CMS of HA is the largest integrated eMR/ePR system in Hong Kong and probably one of the most successful of its kind in terms of coverage, functionalities and complexity. The HA is the largest HCP in Hong Kong and possesses rich experience and expertise in the development and

operation of its CMS. The HA was therefore engaged as the technical agency for the development of the Stage One eHRSS. Upon the successful launch of the Stage One system, HA has also assumed the responsibility of providing ongoing support to the operation of the system. In view of the complexity of the Stage Two project and the large amount of patient data involved, it is prudent for the Government to continue to engage HA to perform the critical development tasks of Stage Two programme.

21.   Although HA has served as the technical agency for the Stage One eHR programme, HA has also sourced a substantial portion of the development work from the private sector. The implementation of the project has been providing business opportunities for the private sector including small and medium enterprises. As at today, more than half of the eHR Development Programme capital expenditure has been incurred in purchasing hardware and software, procuring IT operational services (such as network services), hiring contractors and supplementary IT contract staff, and outsourcing certain work assignments to the private IT sector. We anticipate that appropriate storage, security, system monitoring and authentication solutions will be procured during Stage Two from the market.

22.   As regards the clinical management systems used by individual HCPs, the Government's policy is to maintain a level playing field and provide facilitation for these systems to connect to the eHRSS. Similar approach will continue to be adopted during Stage Two of eHRSS. We will continue to provide information on data sharing standards, interface specifications and interoperability requirements for eHRSS connection. IT vendors/HCPs are welcome to approach us to discuss the connectivity of their systems to the eHRSS.

Building Block Approach and Stakeholder Engagement

23.   In the development of Stage One of eHRSS, we have adopted the building block approach. We have managed to break down the eHRSS into smaller components, develop modules under each component step-by-step with pilots as necessary, involve user feedback in designing and developing modules, gradually extend proven modules with add-on scope and functionalities, and bring together modules to build the components that support the sharing system. Such a strategy has proven to work well and would avoid the risk associated with big-bang approach. We will therefore continue to adopt the same approach in Stage Two eHRSS development.

24. During Stage One development of eHRSS, we placed strong emphasis on ensuring the final product will meet end-user expectations. We have studied existing local and overseas clinical practices, conducted user acceptance tests and proactively engaged stakeholders for suggestions via the Steering Committee and its working groups as well as briefings and seminars. As regards the general public, we have launched various publicity measures to promote eHRSS and its benefits to the community. This approach will be maintained in the years to come. The aforementioned participation rates of HCPs and patients to date reflect that we have secured general support to the new system.

ANTICIPATED BENEFITS

25. Successful eHR development will deliver a host of benefits. The intangible benefits will bring about financial values, albeit non-measurable, in terms of the economic values of having a healthier population and a reduction on the costs of secondary and tertiary care[6] because of more effective and early treatment.

26. The sharing system's benefits will be further enhanced by the deliverables of Stage Two. Upon completion of Stage Two, the sharable scope of data will be expanded to cover more complex but useful information. Efficiency of healthcare decision, treatment and quality of care are expected to improve. The new functional features to be developed will help patients themselves to access their health information and to exercise additional choices for disclosure of their health data. Patients will be better equipped to understand their health status, to work closely with their HCPs and to manage their health problems. Trust between patients and their HCPs will be further improved with transparency and sharing of information in the appropriate context that is mutually understood and agreed.

27. As for the healthcare system as a whole, the Stage Two development of eHRSS will further promote Public-Private Partnership and provide more options for patients through collaborative caring model between public and private healthcare sectors. This is in line with the Government's direction in healthcare reform.

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6   Primary care is a patient's first point of contact with the healthcare system. It is provided by different healthcare professionals including doctors, dentists, CM practitioners, nurses, allied health professionals, etc. Secondary care and tertiary care mainly include specialist and hospital services.

FINANCIAL IMPLICATIONS

Non-recurrent Expenditure

28.   The development of the eHRSS requires substantial investment in the public sector. The Government has funded the capital cost for the development of the Stage One eHR sharing infrastructure, as well as its operation and maintenance.

29.   As regards Stage Two eHR programme, we estimate that about $422 million of non-recurrent expenditure will be required, and the breakdown with cash flows is set out below. Since we will adopt the building block approach as explained in paragraph 23 above, the actual work programme and cash flow may have to be adjusted during the course of development.

	eHR Components	2017-18 $'000	2018-19 $'000	2019-20 $'000	2020-21 $'000	2021-22 $'000	Total $'000
(a)	To Broaden the Scope of Data Sharing and Develop the Technical Capability for Sharing of Radiological Images and CM Information	39,090	54,220	60,600	83,540	42,240	279,690
(b)	To Enhance Patient's Choice over the Scope of Data Sharing and To Facilitate Patient Access to the System	13,090	17,710	26,360	15,140	6,280	78,580
(c)	To Improve and Enhance the Core Functionalities and Security/Privacy Protection	14,270	15,510	11,770	11,130	11,242	63,922
	Total	66,450	87,440	98,730	109,810	59,762	422,192

30.   The breakdown of cost estimates by key expenditure items is as follows –

		2017-18 $'000	2018-19 $'000	2019-20 $'000	2020-21 $'000	2021-22 $'000	Total $'000
(a)	Computer hardware	1,310	2,250	2,180	17,510	20	23,270
(b)	Computer software	170	400	2,320	7,040	10	9,940
(c)	Costs for project development team	22,430	30,760	33,390	32,300	28,280	147,160
(d)	Professional and Consultancy Services	38,500	46,660	42,430	44,920	26,510	199,020
(e)	Communication line and equipment/Data centre services	680	2,230	13,070	2,490	450	18,920
(f)	Training/ Administrative and office expenses	3,310	5,090	5,310	5,530	4,480	23,720
(g)	Miscellaneous	50	50	30	20	12	162
	Total	66,450	87,440	98,730	109,810	59,762	422,192

31.   As regards paragraph 30(a), the estimate of $23,270,000 is for the procurement of computer hardware and equipment, including computer servers, storage, workstations, end-user tools and other information processing equipment.

32.   As regards paragraph 30(b), the estimate of $9,940,000 is for the procurement of computer software, including operating system software, database licence, application development software and end-user software.

33.   As regards paragraph 30(c), the estimate of $147,160,000 is for the staff costs of the dedicated eHR teams in HA for the development and

implementation of Stage Two functions. These eHR teams include IT staff, health informatics staff as well as administrative staff. The size of the eHR teams is estimated based on the anticipated scope of individual sub-projects, complexity of work and effort in IT development and coordination.

34.   As regards paragraph 30(d), the estimate of $199,020,000 is for the procurement of agency services, professional and consultancy services to complement eHR teams for the Stage 2 eHR system development, implementation and quality assurance. The scope of services required is estimated based on the anticipated scope of work and components in individual sub-projects that are appropriate for outsourcing and procurement of services.

35.   As regards paragraph 30(e), the estimate of $18,920,000 is for the procurement of network equipment and installation of communication lines as well as the costs for data centres.

36.   As regards paragraph 30(f), the estimate of $23,720,000 is for providing accommodation for the project development teams as well as providing training to healthcare professionals, IT vendors/staff from private healthcare sectors and HA staff. The training covers standardisation, data security and privacy and other technical areas.

37.   As regards paragraph 30(g), the estimate of $162,000 represents the costs of miscellaneous items such as start-up consumable, e.g. backup tapes.

38.   There is no directly comparable health IT system in Hong Kong. The CMS of HA is managing a similar scale of patient records. However, it involved a relatively simpler architecture as it is deployed entirely for internal users within HA. On the other hand, the eHRSS has to handle multitude of HCPs, and thus the system called for a much more robust security including authentication and access control, and much more flexible architecture that can interconnect with many systems.

39.   Stage One eHRSS required $702 million for developing the basic infrastructure for health record sharing. Stage Two of eHRSS is going to develop new functionalities and more sophisticated sharing control of access to health data in eHRSS, sharing of more complex health data, in particular CM and Radiological Image data and allowing patient access their health data in meaningful ways. The $422 million estimate is considered reasonable.

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Recurrent Expenditure

40.   The operation and ongoing maintenance and support of a more sophisticated Stage Two eHRSS with added new features and functionalities would likely incur new recurrent expenditure for the necessary staff costs, hardware and software maintenance, etc. Our present estimate is that around $15 million may be incurred initially in 2020-21, which may increase to a full-year requirement of around $50 million by 2022-23. These estimates will be refined nearer the time in the light of the complexity of the new features and functionalities developed, pace of project development, review of support to be required over time, technology advancement and market changes.

IMPLEMENTATION PLAN

41.   Subject to Members' support and capital funding approval, the proposed implementation timeframe of the component-projects of Stage Two eHRSS development is as follows –

Component-projects	Start	End
New Data Standards	Q2 2017	Q1 2022
Radiology Image Sharing	Q4 2017	Q3 2021
CM Information System On-Ramp	Q4 2017	Q4 2021
Sharing Restriction	Q4 2017	Q2 2020
Patient Portal	Q4 2017	Q4 2021
Access Control	Q3 2017	Q2 2019
CMS Extension Enhancements	Q3 2017	Q2 2020
Security and Functional Enhancement	Q4 2017	Q1 2022

PUBLIC CONSULTATION

42.   The Government put forward the development of eHRSS as one of the healthcare reform proposals for public consultation in 2008. The proposal received general support from the community. We consulted the Panel on the proposal for Stage Two development of eHRSS on 16 January 2017. Members were supportive of the proposal and noted that we would seek funding approval from FC.

/**BACKGROUND** …..

BACKGROUND

43.   The Chief Executive has stated in the 2007-08 Policy Address and 2008-09 Policy Agenda that a territory-wide eHR will be developed to support healthcare reform and to provide essential infrastructure for the healthcare system. The Government's plan was to develop eHRSS in two stages. Stage One eHRSS was launched on 13 March 2016 to process applications for registration from HCPs and members of the public.

Food and Health Bureau
March 2017

**Steering Committee on Electronic Health Record Sharing
Membership List (as at March 2017)**

<u>Chairman</u> –

Permanent Secretary for Food and Health (Health)

<u>Members</u> –

Representatives of –

- Hong Kong Academy of Medicine
- Hong Kong Dental Association
- Hong Kong Medical Association
- Hong Kong Private Hospitals Association
- Hong Kong Public Doctors' Association
- Alliance for Renal Patients Mutual Help Association
- Care For Your Heart
- Hong Kong Alliance of Patients' Organizations Limited

Dr CHOW Yat
Dr LAU Ho-lim
Mr LEE Wai-kwong, Sunny
Mr LEUNG Kin-man, Michael
Prof. MENG Mei-ling, Helen
Mr POON Yan-wing, Lawrence
Dr WONG Chun-por
Prof. Maurice YAP

Representatives of –

- Food and Health Bureau
- Department of Health
- Hospital Authority
- Office of the Government Chief Information Officer