For discussion **FCR(2018-19)9**
on 4 May 2018

ITEM FOR FINANCE COMMITTEE

CAPITAL WORKS RESERVE FUND
HEAD 710 – COMPUTERISATION
Office of the Government Chief Information Officer
New Subhead "Electronic Identity (eID)"
New Subhead "Digital Transformation for Agile Delivery of e-Government Services"

Members are invited to approve the creation of two new commitments under Capital Works Reserve Fund Head 710 – Computerisation for implementing the following two key smart city infrastructure projects –

(a) a commitment of $112,000,000 for implementing a one-stop online system for the provision of electronic identity; and

(b) a commitment of $533,303,000 for implementing the next generation government cloud infrastructure and big data analytics platform to support agile delivery of e-Government services.

PROBLEM

To support the development of smart city, we need to enable Hong Kong residents to access various government and commercial e-services in a simple, convenient and secure manner and provide the necessary digital infrastructure to expedite the development and delivery of digital/electronic government services and improve government operation efficiency.

/PROPOSAL …..

PROPOSAL

2. The Government Chief Information Officer, with the support of the Secretary for Innovation and Technology, proposes to create the following new commitments for taking forward two smart city key infrastructure projects –

(a) a commitment of $112,000,000 for setting up a one-stop online system for providing electronic identity (eID) free to all local residents; and

(b) a commitment of $533,303,000 for establishing the next generation government cloud (GovCloud) and a big data analytics platform in support of agile delivery of e-Government services.

Both systems are expected to be launched by 2020.

JUSTIFICATIONS

eID

Facilitating Public and Commercial e-Services

3. Currently, government, public bodies and private companies in providing electronic/online services use different systems to verify users' identity, such as username and password, secure token, SMS, etc. Members of the public very often face the inconvenience of managing different groups of usernames and passwords or carrying multiple secure tokens.

4. We propose to set up a one-stop online eID system, as a key digital infrastructure for smart city development, to provide an eID for all Hong Kong residents, allowing them to use a single digital identity and authentication to conduct government and commercial transactions online. It will foster the development of a new economic service model that emphasises direct interface with residents and consumers. eID will be provided free for all Hong Kong residents for use on a voluntary basis.

5. The proposed eID could functionally be regarded as a common key for digital identity authentication. It enables members of the public to log in and access various government and commercial e-services in a simple, convenient and secure manner. In addition to logging in online accounts of the Government and public/private organisations, eID will support digital signing with legal backing under the Electronic Transactions Ordinance (Cap. 553) for handling contracts, statutory documents and procedures, important commercial transactions, etc.

/6. …..

6. For e-Government services, eID can be connected to different public services. For example, it can be used to submit online applications for services like licence renewal, booking of venues, making appointments and signing documents, and by way of a unified identity authentication, facilitate the development of cross-departmental or institutional e-services and streamline processes. Our long-term goal is to make it mandatory for all government departments and even public organisations to support the use of eID, with a view to developing more convenient and innovative e-government services.

7. We will also actively promote eID to public bodies and commercial organisations, and explore further application and development of eID in different electronic and online services, including facilitating financial institutions to perform the "Know-Your-Customer" procedure. In the course of system development, we will provide Application Programming Interfaces (API) to e-service providers including government bureaux and departments (B/Ds) and public/private organisations. When designing the eID system, we will adopt open architecture and modular design to allow flexibility for system upgrade and future expansion.

Privacy Protection and System Security

8. Convenience aside, eID will provide better protection for personal privacy. Users can authorise the eID authentication platform to retrieve specified personal data for verification and digital signing as well as for pre-filling online forms or updating addresses. This obviates the need to fill in the same information and submit the same documents when making different applications, and enables residents to go through the online procedures in an expeditious yet secure manner. In addition, at present, when residents provide bank statements or other similar statements for identity verification or proof of address, they may unnecessarily reveal excessive information such as transaction records, account balance, etc. With the use of eID, the applicants' personal data can be better protected as they themselves would determine the information to be disclosed.

9. We will adopt security standards that are internationally recognised, such as Public Key Infrastructure for digital signing, Fast Identity Online for protection of personal identity on mobile devices, Advanced Encryption Standard for data encryption, etc. The eID system will use the personal data collected during user registration only for user administration purpose. Data transmitted during user registration will be encrypted. After registration, the "digital key" will not carry any personal data in the user authentication process. The use of eID will, therefore, not entail any privacy risks. Besides using passwords, the eID system will also

allow use of biometric features provided by individual smart phones/devices, such as fingerprint and facial recognition, etc. Such biometric information however will not be uploaded to the eID backend system. We will consult the Office of the Privacy Commissioner for Personal Data and relevant government departments to ensure that the procedures are in line with the relevant requirements.

10. The development of the proposed eID system will adopt industry-wide open standards for functions including user registration, authentication, digital signature and user support. The system will also provide mobile applications and API for use by various B/Ds and public/private organisations. The Office of the Government Chief Information Officer (OGCIO) will develop and operate the eID system. Its core data, including personal data collected during registration for user administration purpose, will be stored in government data centre facilities.

Expected Benefits

11. We anticipate that the eID project will facilitate the development of innovative e-services and enhance Hong Kong's competitiveness. The overall benefits to society as a whole include facilitating residents to use online services to deal with daily routines and savings on cost and time for government departments and commercial organisations, especially small and medium enterprises, in handling user authentication and development of new online services. As mentioned in paragraph 6 above, the availability of eID will also help promote the development of cross-departmental or institutional e-services, and streamline business processes through the unified identity verification, etc.

12. Having regard to the technology development trend and the public habit of using smartphones, the registration and use of eID could be conveniently and expeditiously done through mobile applications and other application platforms on the Internet.

<u>Next Generation GovCloud and Big Data Analytics Platform</u>

13. At the same time, we need to modernise the government cloud infrastructures and system development technologies for expediting the development and delivery of digital government services. Government operation efficiency and city management will be further enhanced through the adoption of big data analytics and artificial intelligence (AI) technologies.

/14. …..

14. To support the development of digital government, we need to reform the existing cloud infrastructure and adopt new application system development technologies as well as related standards and frameworks. Through implementing the next generation GovCloud and big data analytics platform, B/Ds can expedite the development and delivery of digital government services.

15. Apart from implementing the secure and reliable "private cloud" services, we will also make use of "public cloud" services which are highly flexible and elastic, and in compliance with security requirements. The new platform will provide the following central services –

	Central Service	**Details**
(a)	Infrastructure as a Service:	This includes servers, storage, network resources, cloud management platform and related services for operation, maintenance and support
(b)	Platform as a Service:	This includes system software, application servers, database management system software and related services for operation, maintenance and support
(c)	Application Architecture:	This refers to agile development technologies, including central application programming interface management, containerisation, continuous integration and continuous delivery technologies, etc.

16. The proposed big data analytics platform will run on the next generation GovCloud. Through resources sharing, we aim to facilitate the implementation of more big data analytics projects, for example on weather, transport, environment, etc. with the adoption of big data analytics and AI technologies. This will help enhance the operation efficiency of the Government and provide more efficient and reliable public services.

Expected Benefits

17. The implementation of the next generation GovCloud and big data analytics platform can bring about the following benefits –

/(a) …..

(a) *Better cost-effectiveness* – B/Ds can adopt the next generation GovCloud and big data analytics platform to support different types of digital government services and develop big data analytics applications. Without the new GovCloud platform, B/Ds would have to deploy or procure cloud services individually, thereby incurring a higher overall cost due to lack of economies of scale.

(b) *Time and cost savings* – The next generation GovCloud and big data analytics platform can support different types of digital government services. In addition, the existing central cloud systems (including the GovCloud, the Central Computer Centre virtualised infrastructure and the E-Government infrastructure services) will also be upgraded and consolidated to the next generation GovCloud. This not only curtails the maintenance and upgrade costs of individual systems, but also brings about greater economies of scale. Furthermore, as the next generation GovCloud will adopt hybrid cloud technologies for use by B/Ds according to their actual needs, the time for procuring and installing the required resources can also be reduced substantially. In conjunction with the new application architecture for agile development, the new platform can help B/Ds reduce the development time of information technology (IT) systems by at least 20% and the development and maintenance costs also by about 20%.

Besides, the technology adopted for big data analytics systems is more complex than that for general IT systems while the demand for storage space and computing power is much greater. By running the big data analytics platform on the next generation GovCloud, the flexibility and agility of cloud services can be fully leveraged in deploying computer resources to assist B/Ds in expediting the conduct of big data analytics.

(c) *Enhanced agility in meeting dynamic demand and supporting the development of smart government* – Adopting a hybrid cloud design, the next generation GovCloud is made up of "In-house Private Cloud", "Outsourced Private Cloud", and "Public Clouds" with certain level of security features. It can be duly expanded on its system hosting capacity to meet the growing demand of the public for digital public services. It also renders 24-hour monitoring and support services so that B/Ds can provide digital government services more timely and efficiently, meeting the development needs of smart government.

(d) *Facilitating open data* – The "Digital Highway" of the big data analytics platform will facilitate B/Ds in releasing real-time data (e.g. city data collected from smart lampposts) on the "data.gov.hk" portal.

/(e) …..

(e) *Promoting innovation and technology development* – We will adopt relevant procurement arrangements, including the outsourcing approach, to implement the next generation GovCloud with a new application architecture and the big data analytics platform. This will foster collaboration and create synergy in the local industry at different levels and in different spheres, and benefit various IT professional and service areas, including project management, IT system integration, data analytics and AI.

Cost Savings/Avoidance

18. We estimate that the implementation of the proposed next generation GovCloud platform will bring about cost avoidance, increasing progressively from 2021-22 and reaching $14,887,000 per annum in 2024-25, including savings on recurrent expenditure for system maintenance with the use of new application system architecture and provision of central API services.

19. In addition, we anticipate that there will be a one-off cost avoidance of about $572,957,000 from 2019-20 to 2024-25, including upgrade costs of the individual infrastructures as well as the use of a new application system architecture and big data analytics platform, central API service and central disaster recovery service, etc., which would save the costs of B/Ds to develop related systems on their own. A cost and benefit analysis for the proposed next generation GovCloud and big data analytics platform is at Enclosure.

Encl.

FINANCIAL IMPLICATIONS

<u>eID</u>

Non-recurrent Expenditure

20. The proposed eID system will incur an estimated one-off total expenditure of $112,000,000 from 2018-19 to 2020-21. The indicative cost breakdown and estimated cash flow requirements by financial years are as follows –

/(a) …..

		2018-19 $'000	2019-20 $'000	2020-21 $'000	Total $'000
(a)	Hardware	-	3,820	15,280	**19,100**
(b)	Software	-	6,120	24,480	**30,600**
(c)	System Implementation Services	2,100	6,380	25,520	**34,000**
(d)	Contract Staff	7,000	7,680	1,920	**16,600**
(e)	Site Preparation	-	500	-	**500**
	Sub-total	**9,100**	**24,500**	**67,200**	**100,800**
(f)	Contingency	-	-	11,200	**11,200**
	Total	**9,100**	**24,500**	**78,400**	**112,000**

21. On paragraph 20(a) above, the estimate of $19,100,000 is for procuring computer hardware, including servers, Storage Area Network, network equipment, etc.

22. On paragraph 20(b) above, the estimate of $30,600,000 is for procuring computer software, including operating system for servers, database, monitoring and backup software, eID application software, etc.

23. On paragraph 20(c) above, the estimate of $34,000,000 is for procuring system implementation services, including system analysis and design, development, testing, installation, and performing independent third party assessments of information security risks and privacy impact.

24. On paragraph 20(d) above, the estimate of $16,600,000 is for hiring contract IT staff who have relevant technical skills and experience to assist in project implementation.

25. On paragraph 20(e) above, the estimate of $500,000 is for site preparation, including network setup, electrical and mechanical works, etc.

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26. On paragraph 20(f) above, the estimate of $11,200,000 represents an approximate 10% contingency on the total cost.

Recurrent Expenditure

27. We estimate that the recurrent expenditure arising from the project will be $38,200,000 per annum from 2021-22 onwards for OGCIO to operate, maintain and support the eID system and related infrastructure and e-Government services. Relevant provisions will be included and reflected in the annual estimates of OGCIO in the relevant financial years to meet the requirement.

28. After the rollout of the eID system, we will review the service and operational arrangement of the Hong Kong Post Certification Authority within one year, including the feasibility of providing all digital certificates by the private market. Recurrent expenditure after 2022-23 will be adjusted in accordance with the new arrangement after the review.

Next Generation GovCloud and Big Data Analytics Platform

Non-recurrent Expenditure

29. The proposed next generation GovCloud and big data analytics platform will incur an estimated one-off total expenditure of $533,303,000 from 2018-19 to 2024-25. The indicative cost breakdown and estimated cash flow requirements by financial years are as follows –

	2018-19 $'000	2019-20 $'000	2020-21 $'000	2021-22 $'000	2022-23 $'000	2023-24 $'000	2024-25 $'000	Total $'000
(a) Hardware	-	89,800	82,800	30,100	7,100	7,400	7,600	**224,800**
(b) Software	-	36,000	33,600	12,100	2,800	2,800	2,900	**90,200**
(c) Implementation Services	1,600	43,700	30,500	7,700	-	-	-	**83,500**
(d) Contract Staff	15,800	23,500	10,000	10,500	7,800	8,000	8,200	**83,800**
(e) Others	-	-	500	500	500	500	600	**2,600**
Sub-total	**17,400**	**193,000**	**157,400**	**60,900**	**18,200**	**18,700**	**19,300**	**484,900**
(f) Contingency							48,403	**48,403**
Total	**17,400**	**193,000**	**157,400**	**60,900**	**18,200**	**18,700**	**67,703**	**533,303**

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30. On paragraph 29(a) above, the estimate of $224,800,000 is for procuring computer hardware, including servers, storage and backup equipment, network equipment, system security equipment, as well as the hardware for the big data analytics platform, including graphics processing unit, "Digital Highway", etc.

31. On paragraph 29(b) above, the estimate of $90,200,000 is for procuring computer software, including virtualisation software, centralised cloud management platform, system security software, API management software, agile development tools, and software for the big data analytics platform including big data analytics tools, AI cognitive tools, etc.

32. On paragraph 29(c) above, the estimate of $83,500,000 is for engaging service providers to build the next generation GovCloud, big data analytics platform, and performing independent third party assessments of information security risks and privacy impact, etc.

33. On paragraph 29(d) above, the estimate of $83,800,000 is for hiring contract IT staff who have relevant technical skills and experience to assist in implementing, deploying, managing and supporting the next generation GovCloud and big data analytics platform, and providing consulting service to all B/Ds.

34. On paragraph 29(e) above, the estimate of $2,600,000 is for other expenditures, including rentals of telecommunication lines, etc.

35. On paragraph 29(f) above, the estimate of $48,403,000 represents an approximate 10% contingency on the total cost.

Recurrent Expenditure

36. We estimate that no additional recurrent expenditure will be required for operating the next generation GovCloud and big data analytics platform over the period from 2018-19 to 2024-25 and beyond. As mentioned in paragraph 18 above, there will be savings, in terms of cost avoidance (reaching around $14,887,000 per annum in 2024-25), in recurrent expenditure for B/D's system maintenance with the use of new application system architecture and provision of central API services. With the continuous development of smart city, B/Ds will have more digital government services which require the use of the next generation GovCloud and big data analytics platform. The benefits resulting from economies of scale would increase and the cost avoidance by B/Ds in using this platform would be sufficient to maintain its operations.

/**IMPLEMENTATION** …..

IMPLEMENTATION PLAN

37. The estimated schedules for the implementation of the above two projects are as follows –

		eID	**Next Generation GovCloud and Big Data Analytics Platform**
(a)	Funding approval from the Finance Committee (FC) of the Legislative Council (LegCo)	2nd Quarter 2018	2nd Quarter 2018
(b)	Tender	3rd Quarter 2018	3rd Quarter 2018
(c)	System Rollout	mid-2020	3rd Quarter 2020

PUBLIC CONSULTATION

38. We briefed the LegCo Panel on Information Technology and Broadcasting on the above proposals on 12 March 2018. Members supported the submission of the proposals to FC for funding approval.

39. We issued a Request for Information on the eID project on 14 March 2018 to invite submissions from relevant sectors and professional bodies to explore the technical solutions and the potential application and development of eID for various e-services. We have received 24 submissions from the industry and interested parties.

BACKGROUND

40. The Chief Executive announced in the 2017 Policy Address to embark on three key smart city infrastructure projects, including –

(a) to provide an "eID" for all Hong Kong residents so that everybody can use a single digital identity and authentication to conduct government and commercial transactions online. This will foster the development of a new economic service model that emphasizes direct interface with residents and consumers. It will also provide a key digital infrastructure for smart city development; and

/(b) …..

(b) to reform the development technology of e-Government systems and build a big data analytics platform to support the adoption of cloud services and new information technology by government departments, thus enhancing operation efficiency and cyber security.

41. We published the *Smart City Blueprint for Hong Kong* (the *Blueprint*) on 15 December 2017, outlining the vision and mission to build Hong Kong into a world-class smart city. The *Blueprint* maps out development plans in the next five years, providing a clear and specific direction for smart city development in Hong Kong. The above two key infrastructure projects are smart city initiatives under the Blueprint.

Innovation and Technology Bureau
Office of the Government Chief Information Officer
April 2018

Enclosure to FCR(2018-19)9

Cost and Benefit Analysis for the Implementation of the Proposed Next Generation GovCloud and Big Data Analytics Platform

	Cash Flow ($ '000)							
	2018-19	**2019-20**	**2020-21**	**2021-22**	**2022-23**	**2023-24**	**2024-25**	**Total**
Cost								
Non-recurrent								
- Expenditure	17,400	193,000	157,400	60,900	18,200	18,700	67,703	533,303
- Staff Cost	12,606	12,606	1,454	1,454	1,454	1,454	1,454	32,482
Sub-total	30,006	205,606	158,854	62,354	19,654	20,154	69,157	565,785
Recurrent *	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total cost	**30,006**	**205,606**	**158,854**	**62,354**	**19,654**	**20,154**	**69,157**	**565,785**
Savings								
Non-recurrent								
- Cost Avoidance		2,532	12,999	360,190	63,880	65,614	67,742	572,957
Recurrent								
- Cost Avoidance				5,733	8,387	8,387	14,887	37,394
Total savings		**2,532**	**12,999**	**365,923**	**72,267**	**74,001**	**82,629**	**610,351**
Net savings	**(30,006)**	**(203,074)**	**(145,855)**	**303,569**	**52,613**	**53,847**	**13,472**	**44,566**
Net cumulative savings	**(30,006)**	**(233,080)**	**(378,935)**	**(75,366)**	**(22,753)**	**31,094**	**44,566**	

* As mentioned in paragraph 36 of this paper, we estimate that no additional recurrent expenditure will be required for operating the proposed next generation GovCloud and big data analytics platform over the period from 2018-19 to 2024-25 and beyond.
