For discussion **FCR(2011-12)56**
on 9 December 2011

ITEM FOR FINANCE COMMITTEE

CAPITAL WORKS RESERVE FUND
HEAD 710 – COMPUTERISATION
Immigration Department
New Subhead "New Information Technology Infrastructure of the Immigration Department"

Members are invited to approve a new commitment of $862,202,000 for the implementation of a new information technology infrastructure and acquisition of data centre services for the Immigration Department.

PROBLEM

The Immigration Department (ImmD) needs to develop a new information technology infrastructure (ITI) and expand the capacity of its data centres. The purpose is to upkeep ImmD's service quality and enhance its handling capacity to cope with the substantially growing service demands and a number of new initiatives in coming years.

PROPOSAL

2. The Director of Immigration, with the support of the Secretary for Security and the Government Chief Information Officer, proposes to create a new commitment of $862,202,000 to implement a new ITI and acquire related data centre services for ImmD.

JUSTIFICATION

3. Since the 1980s, ImmD has been strategically adopting information technology (IT) to support its day-to-day operations. With the first two Information Systems Strategies (ISSs), i.e. ISS-1 introduced in 1991 and ISS-2 in 1999, all the IT systems in ImmD have been providing reliable and effective service to the public with a high degree of system serviceability and data security.

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4. The use of IT is critical for ImmD in coping with the dynamic business environment with growing service demands from our seven million-plus population and much increased volume of visitors from all over the world. To illustrate, the passenger traffic handled by ImmD increased by 70% from 142 million in 2000 to 241 million in 2010. The number of visa applications processed also increased significantly from 123 300 to 270 700 over the same period, an increase of 120%.

5. The existing ITI maintains and processes a vast volume of data and sustains the day-to-day business of ImmD through the mainframe system, numerous midrange servers and an internal network installed in the 1980s and 1990s supporting all major immigration computer systems/applications[1]. The existing ITI connects some 40 immigration locations throughout the territory including the ImmD Headquarters (HQs), all the boundary control points (BCPs), branch offices and registries to ImmD's two data centres, namely the Data Centre (DC) at HQs for day-to-day processing, and the Resilience Centre (RC) in the North District Government Offices for backup support of mission-critical services in case the DC at HQs goes down. This backup support is currently supplemented by a disaster recovery service for the mainframe at the Tsuen Wan Government Offices.

6. However, the existing ITI is becoming outdated and is due for replacement in view of its limited serviceable lifespan. In particular, the mainframe system of the existing ITI is becoming obsolete. Since the supply of products and services for the mainframe system are very limited in the market, it will no longer be cost effective to maintain the mainframe system. The outdated systems also prohibited ImmD from leveraging on the latest IT, especially in handling ad hoc and sudden increases in service requirements.

7. To address the above problems and map out ImmD's Information Systems Strategy for the next decade, ImmD completed the third ISS (ISS-3) review in September 2010. The review has confirmed that the existing ITI should be revamped to meet ImmD's long-term business needs, enhance the capability for future growth and harness improvement opportunities. A revamped ITI will enable ImmD to re-engineer and re-organise its existing IT application systems to meet anticipated increases in business needs and requirements.

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[1] The major computer applications include the Application and Investigation Easy System, Entry/Exit Processing and Records System, Automated Passenger and Vehicle Clearance Systems, Electronic Passport System and Smart Identity Card System, as well as various other systems for enhancing office efficiency (such as Government Office Automation, Confidential Mail System and achieving specific business functions (such as iPermit System) and Electronic Services System).

8. Owing to the increase in the volume of data brought about by continuous growth in service demands and new projects under planning (e.g. new BCPs and introduction of new IT projects under ISS-3), there is an imminent need for expanding ImmD's existing data centre capacity. Furthermore, as the proposed new ITI and other planned new IT projects are being developed, ImmD has to ensure uninterrupted services to the public through the smooth migration to the new system.

9. ImmD has considered the option of expanding the existing DC at HQs and RC in the North District Government Offices. However, *in situ* expansion is not possible due to physical constraints such as supply of electricity. ImmD has also explored the option of utilising Government-owned data centre facilities or purchasing the facilities directly from the market. However, there are no such facilities available within the Government in the near future. There are no readily available data centre facilities for direct purchase in the market either. In view of the above, the procurement of data centre services from external service providers is the optimal solution.

DETAILS OF THE PROPOSAL

Architectural Design of the New ITI

10. The proposed new ITI will leverage on the latest technological advancement (e.g. cloud computing technology, service-oriented architecture framework, etc.). The key components and technologies of the new ITI are as follows -

(a) a more scalable and embracing open system platform;

(b) contemporary IT technological advancements including cloud computing and virtualization technologies;

(c) a new application system architecture by adopting Service-Oriented Architecture Framework;

(d) a new network infrastructure with a robust and highly secured 3-tier architectural design linking HQs, branch offices, BCPs and the data centres;

(e) a centralized data storage and backup solution using advanced data encryption and multi-tiered storage technology;

(f) a new enterprise system management solution enhancing the monitoring and management of ImmD's overall IT environment; and

(g) …..

(g) strengthened security infrastructure such as the reprovisioning of the existing "air-gap" device by a more secured "double-firewall" to safeguard the isolated network.

Expansion of Data Centre Capacity

Procurement of data centre services

11. To continue with the DC and RC services after they have reached their design capacities before 2014, and to expand the data centre capacity to cope with anticipated increase in service demands by then, it is necessary to acquire the services of two data centres that are commensurate with the DC and RC from external service providers from 2013-14 to 2019-20. The main data centre will accommodate the new system and the other is essential for backup purpose in disastrous situations, e.g. power outage, fire, etc.

12. The data centre services to be acquired will cover the data centre facilities specifically designed to house the IT equipment, such as the provision of electricity supply with resilience supports of uninterruptible power supply/emergency generator, cooling facility to control heat dissipation of equipment racks, fire protection control, physical security management and monitoring, floor loading for heavy equipment, etc.

13. In the long-term, ImmD will need to develop another permanent data centre[2] by 2018 to address the evolving and operational needs of ImmD's mission critical services after the expiry of the service contracts. Tentatively, ImmD plans to relocate the systems residing in the additional data centres under the proposed service contracts to the future permanent data centres by June 2019 and cease the respective service contracts, subject to the availability of suitable location for the additional permanent data centre. ImmD is exploring options for the establishment of the additional permanent data centre with due consideration to the prevailing data centre practices and premises available within the Government and in the market. We will consult the Legislative Council (LegCo) on the proposal in due course.

Security measures

14. ImmD will strictly comply with the relevant Government security regulations and requirements. A closed network will be set up and ImmD will deploy its own computer equipment and in-house staff to manage the IT systems round-the-clock. Data transmission to and from the data centres will be encrypted.

/Security …..

[2] The DC at HQs will remain one of the permanent data centres.

Security risk assessment and audit will also be conducted periodically so as to ensure the security level of the data centres and the operations of the IT systems are in strict compliance with the Government's prevailing IT security policies and guidelines for IT systems running in commercial data centres.

Benefits

15. It is anticipated that the proposed new ITI will provide a strong and robust infrastructure to enable ImmD to achieve the following benefits -

(a) to sustain ImmD's existing operations and provide room for expansion to cater for additional workload arising from new business needs (e.g. opening of new BCPs) from 2014 onwards as well as supporting IT initiatives from ISS-3;

(b) to speed up ImmD's response time to ad hoc operational and business needs, as opposed to the current practice where ImmD can only deploy new application functions requiring extra computing resources after procurement and installation;

(c) to minimize service interruption and reduce system recovery time because resources can be flexibly deployed at times of system failures (such as hardware problem) or even disastrous situation (such as power failure in a data centre), thereby improving the resilience of the business operations;

(d) to facilitate future expansion of IT systems through a building block approach which allows hardware to be added block by block to the 'pooled' resources. This will be more flexible and cost-effective than the current option of total replacement when the hardware reaches its capacity limit;

(e) to enable efficient reprovisioning of existing IT projects under the ISS-3 programmes in the next few years through a standardised application development environment under the new ITI. For instance, some business functions that are common among application systems will only be developed once in the form of common services and be used readily by the respective systems. This will help reduce the effort and time for application development, integration, testing and maintenance; and

(f) to provide up-to-date data encryption and backup technology which will enhance data access performance and protection.

/**Cost** …..

Cost Savings/Avoidance

16. We estimate that the implementation of the proposed new ITI will bring about the following cost avoidance and realisable savings -

(a) cost avoidance of $647,950,000, including -

(i) non-recurrent cost of $67,760,000 that would otherwise be incurred for procuring two new sets of mainframe systems for production and disaster recovery purposes to replace the existing ITI;

(ii) non-recurrent cost of $580,190,000 that would otherwise be incurred for replacing obsolete hardware and software items and related data centre services in order to sustain operation of existing ITI;

(b) cost avoidance of $15,342,000 per annum from 2014-15 onwards, being the additional recurrent cost that would otherwise be incurred for the maintenance of two new sets of mainframe systems mentioned in item (a)(i) above; and

(c) realisable savings of $11,418,000 in 2014-15 increasing to $15,380,000 from 2019-20 onwards. The savings include the maintenance cost of the existing mainframe system to be phased out; the maintenance costs of other obsolete components of existing ITI as well as the recurrent staff cost incurred for supporting the existing ITI.

17. A cost and benefit analysis of the implementation of the proposal is at Enclosure.

Encl.

FINANCIAL IMPLICATIONS

Non-recurrent Expenditure

18. We estimate that the implementation of the proposal will require a non-recurrent expenditure of $862,202,000, including $410,462,000 for the new ITI and $451,740,000 for the procurement of data centre services, over a eight-year period from 2012-13 to 2019-20, with breakdown as follows -

/**2012-13** …..

	2012-13 $'000	2013-14 $'000	2014-15 $'000	2015-16 $'000	2016-17 $'000	2017-18 $'000	2018-19 $'000	2019-20 $'000	Total $'000
(a) Hardware[3]	-	116,516	10,498	30,016	4,192	4,192	18,862	1,048	185,324
(b) Software	-	46,806	1,366	2,458	190	190	1,600	48	52,658
(c) Communication network	-	2,147	2,292	2,174	2,138	2,138	2,138	535	13,562
(d) Implementation services	-	35,361	63,483	2,631	-	-	-	-	101,475
(e) Contract staff	-	9,236	4,300	-	-	-	-	-	13,536
(f) Site preparation	-	2,000	2,343	1,000	-	-	-	-	5,343
(g) Consumables	-	1,249	-	-	-	-	-	-	1,249
(h) Contingency	-	21,332	8,428	3,828	652	652	2,260	163	37,315
Sub-total	-	234,647	92,710	42,107	7,172	7,172	24,860	1,794	410,462
(i) Data centre service	6,586	39,252	56,264	63,663	68,695	72,464	76,087	7,719	390,730
(j) Data centre relocation	-	-	-	-	-	-	6,770	13,173	19,943
(k) Contingency	659	3,925	5,626	6,366	6,870	7,246	8,286	2,089	41,067
Sub-total	7,245	43,177	61,890	70,029	75,565	79,710	91,143	22,981	451,740
Total	**7,245**	**277,824**	**154,600**	**112,136**	**82,737**	**86,882**	**116,003**	**24,775**	**862,202**

19. As regards paragraph 18(a), the estimated expenditure of $185,324,000 is for purchasing computer hardware, including servers, storage system, network equipment, backup and recovery equipment.

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[3] To be housed at the data centres.

20. As regards paragraph 18(b), the estimated expenditure of $52,658,000 is for purchasing computer software, including operating systems, database management software, virtualisation software, service-oriented architecture software, enterprise system management software, backup and recovery software.

21. As regards paragraph 18(c), the estimated expenditure of $13,562,000 is for acquisition of communication network and related services for connecting the IT component and equipment in various offices/locations.

22. As regards paragraph 18(d), the estimated expenditure of $101,475,000 is for acquiring implementation services from external service providers including system analysis and design, development and installation of the new ITI.

23. As regards paragraph 18(e), the estimated expenditure of $13,536,000 is for hiring contract IT staff to support in-house project management team for project implementation including the migration of mainframe system.

24. As regards paragraph 18(f), the estimated expenditure of $5,343,000 is for site preparation and cabling works for the DC at HQs and the two additional data centres.

25. As regards paragraph 18(g), the estimated expenditure of $1,249,000 is for the acquisition of start-up consumables, including the backup media.

26. As regards paragraph 18(h), the estimated expenditure of $37,315,000 represents a 10% contingency on the items set out in paragraphs 18(a) to (g).

27. As regards paragraph 18(i), the estimated expenditure of $390,730,000 is for acquiring data centre services for the two additional data centres from external service providers which include the provision of data centre facilities such as uninterruptible power supply/emergency generator, fire protection system, computer room air conditioning system.

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28. As regards paragraph 18(j), the estimated expenditure of $19,943,000 is for relocating the IT systems in one of the additional data centres back to the permanent DC at HQs.

29. As regards paragraph 18(k), the estimated expenditure of $41,067,000 represents a 10% contingency on the items set out in paragraphs 18(i) and (j).

Other Non-recurrent Expenditure

30. The proposed implementation of the new ITI will require a project team for project management, procurement of hardware, software and services, site preparation, installation support, security risk assessment and audit, system/user acceptance tests and implementation support. Besides, the two additional data centres will be operated by ImmD's own staff for security reason. This will entail a non-recurrent staff cost of $70,691,000 from 2012-13 to 2019-20, as follows -

	2012-13	**2013-14**	**2014-15**	**2015-16**	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**Total**
	$'000	**$'000**	**$'000**	**$'000**	**$'000**	**$'000**	**$'000**	**$'000**	**$'000**
Staff cost	11,532	19,037	10,579	7,162	7,162	7,162	7,162	895	70,691

31. The staff cost represents a total of 162 man-months of immigration service grade staff and 1 431 man-months of IT professional grade staff.

Recurrent Expenditure

32. We estimate that the additional recurrent expenditure arising from the project will be $45,903,000 per annum from 2017-18 onwards. Such requirements will be reflected in the Estimates of the relevant years, with the breakdown as follows –

	2013-14	2014-15	2015-16	2016-17	2017-18 and onwards
	$'000	**$'000**	**$'000**	**$'000**	**$'000**
(a) Hardware maintenance	-	16,593	21,365	22,881	27,429
(b) Software maintenance and support	-	8,967	10,757	10,846	11,113
(c) Communication network	2,046	5,293	5,498	6,112	6,112
(d) Consumables	-	1,249	1,249	1,249	1,249
Total	**2,046**	**32,102**	**38,869**	**41,088**	**45,903**

33. As regards paragraph 32(a), the estimated annual expenditure of $27,429,000 is for hardware maintenance to support the system.

34. As regards paragraph 32(b), the estimated annual expenditure of $11,113,000 is for software maintenance and software licence fees to support the system.

35. As regards paragraph 32(c), the estimated annual expenditure of $6,112,000 is for communication network rental charges.

36. As regards paragraph 32(d), the estimated annual expenditure of $1,249,000 is for acquisition of consumables such as backup media.

37. A recurrent staff cost of $6,113,208 for one Systems Manager, four Analyst/Programmer I and three Analyst/Programmer II posts will be incurred, which will be partly offset by the realisable staff savings under paragraph 16(c), for on-going system support, administration and maintenance for the new ITI from 2014-15 onwards.

/IMPLEMENTATION …..

IMPLEMENTATION PLAN

38. We plan to implement the proposed project according to the following schedule –

	Activity	Target completion date
(a)	Procurement of hardware, software and services	December 2012
(b)	Commencement of additional data centre services to accommodate and develop the new ITI, and upgrade other IT application systems	early 2013
(c)	System analysis, design, implementation and mainframe migration	March 2014
(d)	User acceptance test and rollout	June 2014
(e)	Migration of ImmD's new ITI and other application systems to the permanent data centre (being planned) and DC at HQs	June 2019

PUBLIC CONSULTATION

39. We consulted the LegCo Panel on Security on 7 November 2011. Members supported the proposal and its submission to the Finance Committee for funding approval.

BACKGROUND

40. ImmD formulated its ISS-1 in 1991, followed by ISS-2 in 1999. Since then, its IT application systems have been supporting various business areas, such as immigration control (e.g. e-Channels), personal documentation (e.g. e-Passport and Smart Identity Card System) as well as visa control and enforcement (e.g. Application and Investigation Easy System).

41. After the full implementation of the ISS-2 programmes, ImmD commissioned external consultants to conduct the ISS-3 review, which was completed in September 2010. The ISS-3 blueprint encompasses eight strategic IT in a structured programme from 2012-13 to 2018-19. The ITI project is the first project through which a solid foundation would be built for other ISS-3 projects to rest on. The eight ISS-3 projects are:

(i) …..

(i) Next Generation ITI;

(ii) Immigration Control System (ICONS);

(iii) Visa Automation System;

(iv) Assistance to Hong Kong Unit, Births, Deaths & Marriage, Right Of Abode Decision Support System;

(v) Next Generation Electronic Passport System;

(vi) Next Generation Smart Identity Card System;

(vii) Enforcement Case Processing System; and

(viii) Human Resources Management System.

42. Given that the eight ISS-3 projects are inter-related and essential to ImmD's mission-critical operations, it is of paramount importance that they are implemented in full so as to achieve synergy and ensure the continuity of ImmD's services. Implementation of ISS-3 would generate department-wide service improvement opportunities including further extension of self-service immigration clearance at control points.

43. Feasibility studies will be conducted for all ISS-3 projects which are complex, of a large scale, and will require deployment of new technologies and a high degree of system integration. The studies will identify the business needs and technical options, formulate the implementation plan and provide an analysis on the costs and benefits.

44. To date, the feasibility study for the ITI project has been completed while the feasibility study for ICONS is underway. Since the ITI project is the cornerstone for all ISS-3 projects to ride on, ImmD recommends proceeding with the ITI project first in view of its overarching importance.

45. ImmD plans to conduct, as appropriate, the feasibility studies for the other ISS-3 projects from 2012 to 2014. We will separately consult LegCo on these plans with further details in due course.

Security Bureau
December 2011

Cost and Benefit Analysis of the New Information Technology Infrastructure

	Cashflow ($'000)								
	2012-13	**2013-14**	**2014-15**	**2015-16**	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**Total**
Cost									
Non-recurrent									
Expenditure	7,245	277,824	154,600	112,136	82,737	86,882	116,003	24,775	862,202
Staff cost	11,532	19,037	10,579	7,162	7,162	7,162	7,162	895	70,691
Sub-total	18,777	296,861	165,179	119,298	89,899	94,044	123,165	25,670	932,893
Recurrent									
Expenditure	-	2,046	32,102	38,869	41,088	45,903	45,903	45,903	251,814
Staff cost	-	-	4,585	6,113	6,113	6,113	6,113	6,113	35,150
Sub-total	-	2,046	36,687	44,982	47,201	52,016	52,016	52,016	286,964
Total Cost	**18,777**	**298,907**	**201,866**	**164,280**	**137,100**	**146,060**	**175,181**	**77,686**	**1,219,857**
Savings									
Non-recurrent									
Cost avoidance	6,090	139,846	239,814	47,270	49,450	51,740	54,150	59,590	647,950
Sub-total	6,090	139,846	239,814	47,270	49,450	51,740	54,150	59,590	647,950
Recurrent									
Cost avoidance	-	-	15,342	15,342	15,342	15,342	15,342	15,342	92,052
Realisable savings	-	-	11,418	11,418	11,418	11,418	11,418	15,380	72,470
Sub-total	-	-	26,760	26,760	26,760	26,760	26,760	30,722	164,522
Total savings	**6,090**	**139,846**	**266,574**	**74,030**	**76,210**	**78,500**	**80,910**	**90,312**	**812,472**
Net savings	**-12,687**	**-159,061**	**64,708**	**-90,250**	**-60,890**	**-67,560**	**-94,271**	**12,626**	**-407,385**
Net cumulative savings	**-12,687**	**-171,748**	**-107,040**	**-197,290**	**-258,180**	**-325,740**	**-420,011**	**-407,385**	
