

ITEM FOR FINANCE COMMITTEE

**CAPITAL WORKS RESERVE FUND
HEAD 710 – COMPUTERISATION
Customs and Excise Department
New Subhead “Smart Customs Information Technology Infrastructure”**

Members are invited to approve the creation of a new commitment of \$315,610,000 for the development of the Smart Customs Information Technology Infrastructure of the Customs and Excise Department.

PROBLEM

The Customs and Excise Department (C&ED) needs to develop the Smart Customs Information Technology Infrastructure (SCITI) so that C&ED can migrate its information technology (IT) infrastructure to cloud, enhance its capability in data analysis, and strengthen its IT security.

PROPOSAL

2. The Commissioner of Customs and Excise, with the support of the Secretary for Security and the Government Chief Information Officer, proposes to create a new commitment of \$315,610,000 for development of SCITI.

JUSTIFICATION

3. In tandem with the “Smart Customs Blueprint”, C&ED completed the Information Systems Strategy Study (ISSS) in 2020, which put up recommendations for C&ED to better utilise IT to achieve digital transformation and make effective use of data in its business. Recommended under ISSS, SCITI provides the necessary foundation for upgrading the existing IT systems, accommodating new IT initiatives and assisting C&ED in meeting existing operational needs and future developments. Specifically, SCITI comprises the development of three major components, namely –

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- (a) cloud infrastructure;
- (b) Customs Big Data Application System (CBDAS); and
- (c) IT security enhancement.

Need for Consolidating Hosting and Maintenance of IT Systems

4. To support a wide range of duties enforced by C&ED, a total of 56 information systems are currently being used to cover the work of the department in different domains. Examples of such information systems include the Customs and Excise Information and Risk Management System (CEIRMS), the Case Processing System (CAPS), the Currency and Bearer Negotiable Instruments Declaration System (CDS) and the Land Boundary System (LBS)^{Note}.

5. At present, each information system in C&ED adopts different standards and uses dedicated hardware and software accordingly. They are also supported by separate maintenance services. Whenever a new system is procured and initialised, the relevant efforts in design and set-up would need to be repeated. Likewise, in the maintenance of the information systems concerned, processes such as configuration, data backup, etc. would be duplicated. In addition, the fact that different information systems are running on different servers has also limited the potential for the systems to share spare server capacity and achieve greater efficiency.

6. To facilitate timely and more efficient development and maintenance of information systems, there is a need for C&ED to develop a cloud infrastructure for consolidating the hosting and maintenance for various information systems. This would allow server resources to be better utilised, maintenance services to be centralised, and capacity to be made available for hosting other information systems of C&ED in the future.

Need for Enhancing C&ED's Data Analytical Capability

7. C&ED currently conducts data analysis to support its law enforcement work with the aid of individual information systems tailored for specific areas of work. Given that the systems concerned have each been built for a dedicated purpose, there is limitation on the scope of and data available in each system and the systems' analytical capabilities.

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^{Note} CEIRMS provides a centralised repository of investigation findings, intelligence and trader information to support C&ED's risk profiling work; CAPS supports the processing of information and documentation regarding intelligence, investigation, prosecution and disposal of seized items in C&ED; CDS receives advance electronic declarations on a large quantity of currency and bearer negotiable instruments which are imported into or exported from Hong Kong through cargo means; and LBS supports customs clearance on vehicles at various land boundary control points.

8. To facilitate macro risk and trend analysis of various customs-related crimes, C&ED currently makes use of the Central Information Repository System (CIRS) which collates structured data generated from various information systems (e.g. information submitted by users to C&ED). However, cross-system analysis under CIRS, which was developed in 2012, faces limitations particularly on conducting interactive and real-time analysis. Moreover, CIRS at present does not support systematic big data analysis covering both structured data among different information systems and unstructured data (e.g. information on the Internet). With the colossal amount of data and the speed of their flow and circulation nowadays, there is a need for C&ED to leverage on the latest technologies, including big data analytics, to enhance its data analytical capability.

9. Meanwhile, the server of CIRS will reach its expected end of service period by end-2024. There will be a higher risk of malfunction and suspension of services due to the unavailability of hardware or maintenance support from product vendors.

10. The above calls for a revamp of CIRS. By building CBDAS as a more sophisticated and centralised data analysis platform, C&ED will be able to more effectively acquire, store, transform, analyse and visualise both structured data from various information systems and unstructured data collected from different sources. This will facilitate a more precise risk assessment, trend prediction and decision making in law enforcement.

Need for Countering Emerging IT Security Risks

11. Information security is an essential part in implementing digital services and must be consistently enhanced to mitigate emerging IT security risks. At present, while C&ED conducts regular reviews on servers and equipment logs, the process is time-consuming, and its effectiveness is often based on the experience of the support staff. This mode of IT security management is also no longer up to present-day standards, particularly in view of the need to guard against inappropriate access to information systems and malicious cyberattacks. At the same time, with the increased use of mobile devices by C&ED's staff, a centralised control platform is crucial to implementing security control measures, and strengthening the overall capacity in safeguarding mobile devices from potential security concerns.

12. There is thus a need for C&ED to enhance its IT security solutions to strengthen the protection of its sensitive data, information systems and the corresponding servers and endpoint equipment, as well as check against cyber threats and mitigate IT security risks, particularly on the use of mobile devices, web browsing, prediction of system abnormal activities and management of access to accounts.

The Proposal and its Expected Benefits

Cloud Infrastructure

13. The proposed cloud infrastructure will be the cornerstone of the long-term development of C&ED's information systems. It will enable C&ED to host its existing and future information systems and to centrally manage server resources in C&ED's premises in accordance with the standards and framework of the Government Cloud Infrastructure Services. The components of the cloud infrastructure include the cloud management and monitoring software, server virtualisation software, server hardware, data storage, backup solution, network equipment as well as the network management and monitoring solution.

14. The proposed cloud infrastructure will also enable better utilisation of IT resources by scaling and sharing computing, storage and network resources among different information systems based on the real-time demand. The processes of IT equipment procurement and systems setup will also be centralised and streamlined through the adoption of cloud infrastructure. Time, efforts and resources required to develop and maintain information systems will be significantly reduced in the future.

CBDAS

15. The proposed CBDAS will be built on the cloud infrastructure referred to in paragraphs 13 to 14 above and cover the following key functions –

- (a) **data acquisition:** providing automated data extraction tools and system interfaces to collect data from various sources, so as to increase the efficiency and broaden the scope of data acquisition;
- (b) **data storage:** establishing a “data lake” as centralised data storage for all data analytics initiatives. This will include a revamped CIRS for storing structured data as well as additional data storage to store unstructured data. The data lake will allow C&ED to store all structured and unstructured data on a single platform, and to conduct large-scale data analysis;
- (c) **data transformation and analysis:** supporting data cleansing, data tagging, data engineering, natural language processing, etc. for transforming raw data into analysable formats, thereby aiding C&ED in conducting in-depth data analysis and risk assessment more effectively; and

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- (d) **data application and visualisation:** the data analytics models will be used by various C&ED's information systems for supporting real-time decision-making in different business aspects, including customs clearance, intelligence analysis and smuggling risk assessment, etc.

16. CBDAS will remarkably enhance the efficiency and quality of data acquisition by C&ED, as well as enable real-time analysis of voluminous data in information systems, thus strengthening C&ED's capability to detect and combat smuggling activities and other customs-related crimes.

IT Security Enhancements

17. The proposed IT security enhancements include the following key features –

- (a) **enterprise mobility management:** centrally managing C&ED's mobile devices for enforcing security measures such as access control, patch application and software deployment. With remote wipe technology, system administrators can remotely erase all the data stored within a mobile device;
- (b) **web isolation:** isolating Internet browsing functions of workstations to ensure that browser-based security exploits during web browsing are contained and isolated, thus preventing damage to the internal network and IT infrastructure of C&ED;
- (c) **security information and event management:** collecting, monitoring and analysing logs and events of different IT equipment. This will enable centralised collection of event information from various hardware devices and systems across C&ED, so as to detect and predict unusual or unauthorised activities and alert administrators to carry out immediate incident response; and
- (d) **account management:** securing the creation, updating, storage, sharing and handling of accounts and passwords across systems on C&ED's premises as well as cloud-based systems and servers.

FINANCIAL IMPLICATIONS

Non-recurrent Expenditure

18. The proposal involves an estimated non-recurrent expenditure of \$315,610,000 over a period of five years from 2022-23 to 2026-27. The breakdown is as follows –

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	2022-23 (\$'000)	2023-24 (\$'000)	2024-25 (\$'000)	2025-26 (\$'000)	2026-27 (\$'000)	Total (\$'000)
(a) Hardware	-	300	103,427	-	-	103,727
(b) Software	-	-	61,578	5,439	3,834	70,851
(c) Communication Network	-	-	37,190	-	-	37,190
(d) Implementation Services	-	2,095	13,237	1,860	15,482	32,674
(e) Contract Staff	2,406	6,878	10,373	11,126	10,082	40,865
(f) Training	-	-	950	-	661	1,611
(g) Contingency	241	927	22,675	1,843	3,006	28,692
Total	2,647	10,200	249,430	20,268	33,065	315,610

19. On paragraph 18(a) above, the estimated expenditure of \$103,727,000 is for acquisition of computer hardware, including servers, storage devices, security appliance, system backup equipment, server racks and monitoring devices.

20. On paragraph 18(b) above, the estimated expenditure of \$70,851,000 is for acquisition of computer software, including cloud management software, operating systems, database management system, application server software, virtualisation software and system monitoring software.

21. On paragraph 18(c) above, the estimated expenditure of \$37,190,000 is for acquisition of communication network, including network routers, switches, firewall, load balancers, network encryptors and network bandwidth services for network connection.

22. On paragraph 18(d) above, the estimated expenditure of \$32,674,000 is for engaging service providers for implementation services. Implementation activities include system analysis and design, security risk assessment and audit, system and application development and testing, system setup, installation, configuration, site preparation, system rollout and nursing, etc.

23. On paragraph 18(e) above, the estimated expenditure of \$40,865,000 is for engagement of service of professional IT contract staff to support the project management team in project planning, monitoring, and conducting system acceptance tests.

24. On paragraph 18(f) above, the estimated expenditure of \$1,611,000 is for providing relevant training services for C&ED staff.

25. On paragraph 18(g) above, the estimated expenditure of \$28,692,000 represents about 10% contingency on the cost items set out in paragraphs 18(a) to (f) above.

Other Non-recurrent Expenditure

26. The system development will require a project team in C&ED for project management, procurement, system analysis and design, site preparation, user acceptance tests and implementation support, etc. It will entail a non-recurrent staff cost of \$29,459,000 from 2022-23 to 2026-27. C&ED will review the staffing requirements as the project progresses.

Recurrent Expenditure

27. The estimated recurrent expenditure for the proposal will be \$50,261,000 from 2027-28 onwards. A breakdown is as follows –

Item	2027-28 onwards (\$'000)
(a) Hardware and Software Maintenance	33,677
(b) Communication Network	6,636
(c) On-going System Support Service	9,948
Total	50,261

28. On paragraph 27(a) above, the estimated annual expenditure of \$33,677,000 is for provision of hardware and software maintenance, and for software licence fees to support the proposed SCITI.

29. On paragraph 27(b) above, the estimated annual expenditure of \$6,636,000 is for provision of network equipment maintenance and for rental of communication lines for the computer network.

30. On paragraph 27(c) above, the estimated annual expenditure of \$9,948,000 is for engagement of service providers for professional IT contract staff and related services to support daily operational work of the proposed SCITI.

31. After offsetting the annual realisable savings of \$6,901,000 (as detailed in paragraph 33(a) below), the proposal will require a net annual recurrent expenditure of \$43,360,000 from 2027-28 onwards.

32. Besides, C&ED will arrange a team for system support and administration. The annual staff costs involved will be \$6,093,000 from 2027-28 onwards. Such requirements will be reviewed nearer the time when the system is commissioned.

Cost Savings

33. It is estimated that the proposal will bring about total annual savings of \$30,560,000 from 2027-28 onwards, comprising –

(a) *Annual realisable savings of \$6,901,000*

The savings being the staff cost for manual effort to support the existing data warehouse will be \$2,149,000. Moreover, the savings in the costs for sustaining the existing IT equipment and software for data warehouse and related end-user computing systems, which can be incorporated into CBDAS, will be \$4,752,000.

(b) *Annual notional staff cost savings of \$23,659,000*

This represents fragmented staff cost savings from productivity gain as a result of enhanced efficiency in data analysis and risk assessments as well as the streamlined and automated processes in analysing system log and recovery of infected workstations. The fragmented savings will be redeployed to support other tasks of C&ED.

Encl. 34. A cost and benefit analysis for the proposal is at Enclosure.

/IMPLEMENTATION

IMPLEMENTATION PLAN

35. Subject to the funding approval of the Finance Committee (FC), C&ED plans to start the relevant procurement procedures in 2022. Full commissioning of SCITI is targeted in the fourth quarter of 2026. A detailed implementation timetable is as follows –

Activity	Target Completion Date
(a) Cloud infrastructure	
(i) Invitation of tenders	Q4 2022
(ii) Award of contract	Q3 2023
(iii) Roll-out of cloud infrastructure	Q4 2024
(b) CBDAS	
(i) Tendering and award of contract	Q4 2024
(ii) Roll-out of CBDAS	Q4 2026
(c) IT security enhancement	
(i) Tendering and award of contract	Q3 2024
(ii) Roll-out of IT security enhancement	Q3 2025
(d) Full commissioning of the proposed SCITI	Q4 2026

PUBLIC CONSULTATION

36. We consulted the Panel on Security of the Legislative Council on the funding proposal on 3 May 2022. Members supported the submission of the proposal to FC for funding approval.

BACKGROUND

37. In 2019, C&ED promulgated the “Smart Customs Blueprint” to steer the development of Smart Customs, covering all core aspects of C&ED’s business. A pivotal objective of the “Smart Customs Blueprint” is to build up an all-in-one Smart Customs, through using innovative technology in the formulation, development and deployment of various systems, equipment, devices and tools, as well as enabling data sharing within C&ED.

Cost and Benefit Analysis for the Implementation of Smart Customs Information Technology Infrastructure

	Cash flow (\$'000)								
	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	Total
1. Non-recurrent									
Expenditure	2,647	10,200	249,430	20,268	33,065	-	-	-	315,610
Staff cost	5,891	5,892	5,892	5,892	5,892	-	-	-	29,459
Total Non-recurrent Cost	8,538	16,092	255,322	26,160	38,957	-	-	-	345,069
2. Recurrent									
Expenditure	-	-	-	-	-	50,261	50,261	50,261	150,783
Staff cost	-	-	-	-	-	6,093	6,093	6,093	18,279
Total Recurrent Cost	-	-	-	-	-	56,354	56,354	56,354	169,062
Total Non-recurrent and Recurrent Cost (A)	8,538	16,092	255,322	26,160	38,957	56,354	56,354	56,354	514,131
3. Savings									
Realisable savings ¹	-	-	-	-	-	6,901	6,901	6,901	20,703
Notional savings ²	-	-	-	-	-	23,659	23,659	23,659	70,977
Total Savings (B)	-	-	-	-	-	30,560	30,560	30,560	91,680
Net Savings (C) = (B) - (A)	(8,538)	(16,092)	(255,322)	(26,160)	(38,957)	(25,794)	(25,794)	(25,794)	(422,451)
Net Cumulative Savings	(8,538)	(24,630)	(279,952)	(306,112)	(345,069)	(370,863)	(396,657)	(422,451)	

¹ This represents the savings being the staff cost for manual effort to support the existing data warehouse, as well as the costs for sustaining the existing IT equipment and software for data warehouse and related end user computing systems, which can be incorporated into Customs Big Data Application System.

² Notional staff cost savings will be achieved from productivity gain as a result of enhanced efficiency in data analysis and risk assessments as well as the streamlined and automated processes in analysing system log and recovery of infected workstations.