For discussion
on 9 January 2012

Legislative Council Panel on Education

Infrastructure Enhancement for Education Information System (EdIS)

Purpose

This paper seeks Members' views on the Administration's proposal to enhance the infrastructure of the Education Information System (EdIS) of the Education Bureau (EDB).

Background

2. The EdIS which comprises seven computer systems supports EDB to deliver its core business functions. The systems provide support to the operational, administrative and management processes of EDB such as registration of schools, teachers and school managers, enforcement of universal basic education, allocation of school places, processing of school fee applications, calculation of school staff entitlements, monitoring resources and services provided to schools, etc. A summary of the seven computer systems are listed at Annex A.

3. At present, EDB maintains records for over 700 000 students, 50 000 teachers, and 4 000 schools and educational institutions as well as processes various school places allocation and placement for primary 1, secondary 1 and secondary 4 applicants. Given the large amount of data and the complexity involved in providing fair and accurate school places allocation, EDB places much emphasis on the strategic use of information technology (IT) to enhance the efficiency of its business operations in both EDB and schools and to meet the rising expectations of the public.

4. The major components of EdIS' existing IT infrastructure, which comprises the mainframe, midrange, personal computer (PC) and local area network (LAN) platforms, were implemented in 1995. With technological advancement over the years, the IT infrastructure is becoming obsolete and inadequate to meet the ever increasing needs.

Constraints of the Existing IT Infrastructure

5. In 2010, EDB commissioned an external consultant to conduct a

feasibility study to review the existing IT infrastructure and to propose areas for enhancement in order to keep pace with the latest IT development and to support the changing business requirements of EDB. The major findings are summarized in the ensuing paragraphs.

Constraints of the existing mainframe platform

6. The existing mainframe hosting service is being provided by a commercial data centre operator. As the existing mainframe machine is approaching the end of its serviceable life with some of the major components becoming obsolete, the supply of related products and qualified support staff with appropriate technical skills for maintenance of the existing platform is rather limited in the market. Renewal of on-going maintenance service for the computer systems will become very costly, if not impossible. Without proper and professional support, system reliability will also be undermined. Besides, as mainframe applications are text-based, the user interface is not as user-friendly as web-based applications. To ensure the continuation of the existing services supported by the EdIS and to enhance the capability for future growth and harness improvement opportunities, there is an imminent need to enhance the existing IT infrastructure of EdIS.

Failure to support holistic view of data amongst systems

7. The existing computer systems adopted the proven technology at the time of implementation, which was more than 15 years ago. The design cannot support holistic view of data amongst computer systems and there are also constraints on the integration and data sharing between the mainframe and the midrange and PC/LAN systems. Information on students, schools, school places allocation and teachers is being managed in different computer systems/platforms. The lack of a holistic interface of related data frustrates attempts to get a full picture of all the relevant information for operational and policy formulation purposes. Such interface must be manually provided. For example, users responsible for Secondary One Allocation (SOA) need to access the Web-based School Information Management System separately to verify the corresponding planned class structure details before they could update the number of school places available for allocation via the SOA system. As electronic school surveys running under the PC platform cannot cross-check with information on schools and students of the mainframe and midrange systems, it is difficult to maintain the consistency and accuracy of data in the various systems. Substantial staff effort of EDB and the schools concerned are hence required to manually process and verify survey data, which is time-consuming and error-prone.

Limited system processing capabilities

8. The existing mode of operation and system capabilities of EdIS cannot fully meet the increasing demand of the latest and evolving business needs. Many EdIS functions are provided in batch mode running on mainframe. The overnight turnaround time of some of the batch functions, such as the capture of student enrolment information and maintenance of student particulars, and the manual follow up of data rejections via another batch processing cycle would hinder work efficiency. Besides, the use of the existing end-user query tool requires the users to have specific knowledge of the data structure and the language syntax to specify the searching criteria. Usually, the ad-hoc queries will be processed in batch mode. It is not timely and inconvenient to get information from the computer systems using the existing tool, making it inefficient to handle user queries.

The Proposed Infrastructure Enhancement for EdIS

9. Having carefully considered the findings and recommendations of the feasibility study, we propose, with the support of the Office of the Government Chief Information Officer, to redevelop the EdIS into an integrated computer system on an upgraded IT infrastructure with the latest technology, open standards and best practices such as cloud computing and web technology.

10. As the enhanced EdIS would incorporate a central database on the particulars of students and teachers as well as school places allocation results, EDB will strictly comply with relevant Government security regulations and requirements. Security measures will be implemented to ensure and protect data privacy, such as encryption of sensitive data when stored in the database and during transmission on the Internet. Detailed security and data privacy assessments would be conducted before implementation of the system. Security risk assessments 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.

Justifications

Enhancing business agility and extensibility

11. The proposed EdIS project will address the constraints of the existing mainframe platform. It will maintain all existing functionalities and level of stability of the school places allocation systems and will also support various kinds of users (i.e. EDB staff, school users, parents and students) to access the computer systems in a flexible and secure fashion. The upgraded IT infrastructure will be more scalable and flexible to cater for new business

requirements and better equipped for exploring new means to improve service quality, including the introduction of new online electronic services to students and parents. For example, it can readily be extended to support the delivery of school places allocation results by electronic / mobile channels as contingency measures in case of bad weather conditions where schools or allocation centres may be closed for result collection.

Enhancing operational efficiency and management support capabilities

12. The existing EdIS is scattered onto different platforms. Each computer system requires its user authentication, has its own convention of operation and only allows access to its own set of data. The introduction of the new IT infrastructure and more advanced software tools will enable the new EdIS to provide a unified platform and central repository of students, teachers and schools information. There will be improvements to the following operational and management support functions –

(a) Improved work efficiency of both schools and EDB by providing a holistic view of all data with a unified user interface and a more comprehensive and flexible way for information searching among different business functions. For example, on-line enquiry on detailed information of a particular school such as planned class structure, student details and teacher particulars would be easier and more user-friendly. Data collection exercises from schools could be made more efficient and effective to save the efforts of schools in manual collation and compilation of the required data;

(b) Enhanced data accuracy with more stringent validations and checking across computer systems, thus save staff effort of schools and EDB in handling abnormal situations;

(c) Support traditional and simplified Chinese, hence facilitate data exchange among computer systems;

(d) Support more advanced and easy-to-use end-user query tools in facilitating decision support of EDB with more effective and efficient data extractions for analysis; and

(e) Better control of batch job processing and execution, and reduction of their turnaround time and failure rate.

Improving system integration

13. Apart from the interface with the Web-based School Administration and Management System being used in schools, the existing EdIS has cross-departmental system interface / exchange with the Student Financial Assistance Agency (SFAA) and the Hong Kong Examinations and Assessment Authority. With the up-to-date technology and open standards of the new EdIS, the interfaces would be enhanced to facilitate data exchange among relevant parties and bureaux and departments for the purpose of administering different student financial assistance schemes. Specifically, the cross-departmental system interface has enabled SFAA to confirm students' enrolment information through matching with EDB's central student database for the purpose of disbursing the School Textbook Assistance Scheme (instead of relying on manual checking with schools) with effect from 2010/11 school year. This has substantially reduced the administrative work on the part of schools. Riding on this platform, we are now working with SFAA to further strengthen the two-way electronic communication on students' information with schools so as to minimise manual efforts involved in handling other types of financial assistance for needy students, including the Examination Fee Remission Scheme and Student Travel Subsidy System.

Streamlining business processes

14. The upgraded EdIS will help streamline the business processes of EDB, which include early identification of suspected non-attendance cases reported by schools at the beginning of each school year, communication with schools through electronic means such as reminding schools to complete school surveys on time in addition to paper means. The feasibility of joining-up with relevant government bureaux and departments to facilitate school registration applications from the public through electronic means can also be explored.

Financial Implications

Non-recurrent Expenditure

15. We estimate that the setting up of IT infrastructure and implementation of the proposed EdIS will require a total non-recurrent expenditure of $157.017 million over five years from 2012-13 to 2016-17. Apart from costs associated with purchasing hardware, software, system hosting and services for system implementation (such as system analysis and design, programming, data conversion, system setup, user acceptance test, security and data privacy assessments, system nursing, etc.), contract staff will be hired to provide support in the overall project management. The detailed cost breakdown is set out below –

Estimated Expenditure	Amount ($ million)	
Implementation Services	89.839	(57%)
Hardware, Software and Consumables	25.493	(16%)
Contract Staff	14.615	(9%)
Accommodation	8.664	(6%)
System Hosting and Communication Network	4.132	(3%)
Contingency	14.274	(9%)
Total:	157.017	(100%)

16. The estimated cashflow requirements between 2012-13 and 2016-17 are as follows –

	2012-13	2013-14	2014-15	2015-16	2016-17	Total
Estimated Expenditure ($ million)	0.117	7.445	39.423	53.918	56.114	**157.017**

Recurrent Expenditure

17. We estimate that the recurrent expenditure for maintaining and running the new system will be $18.251 million per annum as from 2018-19[1], which will be fully met by realisable savings in paragraph 18 below. The detailed cost breakdown is set out below –

Estimated Annual Expenditure	Amount ($ million)
On-going Support Services	10.723
Hardware and Software Maintenance and Consumables	4.396
System Hosting and Communication Network	3.132
Total:	18.251

Recurrent Cost Savings

18. We estimate that the infrastructure enhancement for EdIS will generate annual savings of $19.473 million from 2017-18 onwards, which can fully cover the estimated recurrent costs of $18.251 million per annum arising from the proposed infrastructure enhancement. The annual savings will consist of –

[1] Partial amount of the annual recurrent expenditure will be incurred for 2016-17 and 2017-18. Full amount will be incurred from 2018-19 and onwards.

(a) realisable savings of $18.353 million per annum, including –

(i) $7.63 million of maintenance costs of the existing systems, including mainframe system hosting, hardware and software maintenance, printing services, computer operator services and external support services for midrange and PC/LAN platforms; and

(ii) $10.723 million of on-going support services expenditure for application maintenance and support of existing system.

(b) cost avoidance of $1.12 million per annum of additional software maintenance costs, which would otherwise be required to support the upgrading of the obsolete mainframe system.

Staffing Implications

19. The enhancement project would necessitate a major revamp of the existing information systems supporting the core business operations of the EDB. The existing systems, in particular the school places allocation and placement systems are complex and critical. The implementation of the project demands substantial investment of manpower resources from EDB, mainly in the areas of project planning, monitoring and control, gathering and understanding user requirements, co-ordination of project deliverable acceptance, user testing and training. To oversee, co-ordinate and support the complex development of EdIS, we would create time-limited posts through the established mechanism.

Implementation Plan

20. The whole period of implementation of EdIS is estimated to take about four years. The detailed implementation plan is shown at Annex B. Assuming that the tender for the implementation of the project can be awarded in 2013-14, the implementation of EdIS can start in 2013-14 and be completed in 2016-17.

Way Forward

21. Subject to Members' views, we will seek funding approval for the infrastructure enhancement for EdIS from the Finance Committee of the Legislative Council in Q2 2012.

Education Bureau
December 2011

Annex A

Existing Composition of EdIS

	Computer System	Platform
1.	Student Information Management System	Mainframe
2.	Primary One Admission System	Mainframe
3.	Secondary One Allocation System	Mainframe
4.	Secondary Four Placement System	Mainframe
5.	Web-based School Information Management System	Midrange & PC/LAN
6.	Web-based Teacher Information Management System	Midrange & PC/LAN
7.	Security Control System	Mainframe

Annex B

EdIS Implementation Plan

	Activity	Target Completion Date
(a)	Tendering	October 2013
(b)	System analysis and design	January 2015
(c)	System development	December 2015
(d)	User acceptance	July 2016
(e)	Data conversion	August 2016
(f)	System live-run	September 2016
(g)	System nursing	February 2017