For discussion on 8 December 2008

Legislative Council Panel on Education

**Development of the
Hong Kong Diploma of Secondary Education Examination System**

PURPOSE

      The Hong Kong Examinations and Assessment Authority (HKEAA) needs funding to develop a new computer system to support the new Hong Kong Diploma of Secondary Education (HKDSE) Examination to be implemented in 2012. This paper seeks members' views on the funding proposal.

BACKGROUND

2.   The HKEAA is a statutory body established in 1977 under the HKEAA Ordinance (Cap. 261). Its statutory responsibility is to conduct the two existing public examinations (namely the Hong Kong Certificate of Education Examination (HKCEE) and the Hong Kong Advanced Level Examination (HKALE)) and the new Hong Kong Diploma of Secondary Education (HKDSE) Examination. It also runs a number of other assessments including the Territory-wide System Assessment (TSA), Language Proficiency Assessment for Teachers (LPAT), and a range of professional and international examinations (such as the General Certificate of Education (GCE) Examinations, and the Test of English as a Foreign Language (TOEFL)). The HKEAA operates on a self-financing basis and does not receive recurrent subvention from the Government.

3.   Under the new academic structure to be implemented starting with the first cohort proceeding to Secondary 4 in 2009/10 school year, the HKDSE Examination will replace the existing HKCEE and the HKALE. The current examination systems and infrastructure of the HKEAA that support the HKCEE and HKALE are neither designed nor able to support the new HKDSE Examination. A new system has to be developed. When seeking funding approval from the Finance Committee on 2 December 2005 vide FCR(2005-06)33 for the modernisation of the HKEAA's outdated information technology infrastructure and examination systems, we have already indicated that we would need to seek additional funding for implementing measures necessary for the HKDSE under the new academic structure in due course.

PROPOSAL

4.   We propose to create a new commitment of $152.309M for the HKEAA to develop the new HKDSE Examination system.

5.   The proposed project (the Project) covers –

(a)   the development of the HKDSE Examination system;

(b)   the upgrading of systems hardware and software and provision of additional hardware for the Onscreen Marking (OSM), Examination Personnel Management (EPM) and oral examination recording systems; and

(c)   technical solutions to address unclear radio signal in the delivery of listening examinations.

JUSTIFICATION

The new HKDSE Examination system

6.   There are at present two examination computer systems, one for HKCEE and one for HKALE.   The examination systems are made up of batch programs that are designed to run in sequence according to the stages of the examination cycle.   The programs cover various major tasks throughout the examination cycle, including candidate registration, examination administration, processing of scores, results generation, reporting and appeal processing.   There is also the OSM system which allows for scanning of scripts, on-line booking of onscreen marking centre by markers, and onscreen marking of scripts.   The EPM system is to process recruitment and assignment of and payment to examination personnel.

7.   The system design of the current examination systems for HKCEE and HKALE are not compatible with the HKDSE Examination operation mode since the two systems were designed based on HKCEE and HKALE requirements and operation mode.   They cannot support the requirements of the HKDSE Examination, such as multimedia assignment assessment for various New Senior Secondary subjects and Applied Learning (ApL) subjects, increase in number of subjects which adopt School-based Assessment (SBA) and their different requirements, different statistical modeling needs arising from new grading requirements and different certifications needs etc.   Upgrading the existing system is not possible as it is standalone with hard-coded business logics, and the resource requirement for enhancement to support the needs of HKDSE Examination is enormous.   Moreover, since there will be simultaneous administration of HKCEE/HKALE and HKDSE Examination in 2011, 2012 and 2013 (see table below), it is impracticable to enhance the current systems for the HKDSE Examination.   The development and implementation of a new examination system is part and parcel to the delivery of the HKDSE Examination.

	2010	**2011**	**2012**	**2013**
HKCEE	Last offer	For private candidates (including repeaters)		
HKALE			Last offer	For private candidates (including repeaters)
HKDSE Examination		SBA & ApL submissions; candidate registration	First offer	

8.   It is estimated that $110.369M would be required for the HKDSE Examination system, which covers costs of hardware, software, implementation services as well as change management and training.

Upgrading of systems hardware and software and provision of additional hardware for OSM, EPM and oral examination recording systems

9.   Onscreen marking was introduced in 2007.   It involves digital imaging of examination scripts and the use of computer software to distribute answer script of individual questions to markers, through a bank of networked computers.   The existing OSM system is built with the interface to operate with HKCEE, HKALE, LPAT and TSA system. It can only serve to mark scanned paper-based documents. The EPM system is to process recruitment and assignment of and payment to examination personnel, including markers, invigilators .

10.   The software of the two systems would need to be upgraded to integrate with the new HKDSE Examination system.

11.   Hardware of the EPM system would need to be strengthened because of the growing database of examination personnel.   Hardware of the OSM system should also be strengthened because the existing hardware can cater for 30 subjects only (HKCEE, HKALE, TSA and LPAT together).   In future, there will be 34 subjects altogether, and the HKDSE Examination will involve more double marking, well exceeding the capacity of the existing hardware.   Moreover, in 2012 and 2013, when HKALE and HKDSE Examination will both be conducted, the number of subjects will exceed 40.

12.   The estimated cost is $29.398M, covering hardware and software.

13.   The recording system aims to produce a more prudent and fairer oral examination to handle appeals from candidates.   The system has been implemented in some of the local examinations and will gradually cover public examinations.   Due to the double cohort year in 2012, additional hardware is required to cater for two examinations.

14.   The estimated cost is $1.487 M.

Technical solutions to address unclear signal of radio broadcasted listening examinations

15.   At present, listening examinations are delivered by RTHK.   Students bring their own FM radios to the examination centres.   Signal reception is affected by examination centre location and outside interference.   Complaints have been received from candidates on unclear radio signal every year.   HKEAA has conducted a study to test the radio signal coverage at locations of all 422 examination centers.   67 examination centres are rated "Poor" or "Very Poor" in terms of radio signal coverage.

16.   It is proposed to install FM radio signal repeaters at these 67 examination centres.   FM radio signal repeater is a combination of a radio receiver, amplifier and transmitter that receives a weak or low-level signal, amplifies and then retransmits it at a higher level or higher power.   The receiver will be installed at the roof top of the examination venues and the radio transmitter be installed at the examination hall so that the radio signal received will be amplified and relayed to the examination hall.   The radio transmitter will also be configured to eliminate blind spots.   Clear reception of radio signal will be ensured, thus facilitating a fairer listening examination.

17.   The estimated cost is $11.055M, including hardware and installation costs.

IMPLEMENTATION PLAN

18.   In order to match with the critical delivery of HKDSE Examination system going live in 2012, HKEAA targets to start the project by tendering in the first quarter of 2009 so that the system development work can start no later than the third quarter of 2009.

19.   The examination cycle of the first HKDSE Examination in 2012 will start in the third quarter of 2011 with the submission of SBA marks and the candidate registration.   Then, there will be the subject examinations, onscreen marking, processing of marks and grading of results for release in the third quarter of 2012. The cycle will end after completion of appeal reviews by the end of the third quarter of 2012.   With experience from the implementation of the HKDSE Examination system, the HKEAA will fine tune the applications and the system, and address any run-in issues, which may take about two to three years.   The critical deliverables and the delivery dates are set out in the table below.

		Deliverables
1.	Third quarter of 2011	Completion of the SBA sub-system for capturing SBA marks. Completion of the candidate registration sub-system for capturing and processing registration data.
2.	Fourth quarter of 2011	Completion of upgrading and testing of OSM and EPM systems for full scale onscreen marking of HKDSE Examination scripts.
3.	First quarter of 2012	Completion of installation and testing of FM radio signal repeaters at examination centres.
4.	Second quarter of 2012	Completion of marks processing and results grading sub-systems to capture and process raw marks for results grading using the standard-referenced reporting approach.
5.	Third quarter of 2012	Completion of the sub-systems for supporting the release of results and appeal reviews for 2012 HKDSE Examination.
6.	Fourth quarter of 2015	Completion of fine-tuning the applications and the system, and of addressing any run-in issues, based on experience from implementing the HKDSE Examination system.

20.   To implement the new HKDSE Examination system successfully, the HKEAA will ensure that both the internal staff and the external examination personnel and stakeholders (including teachers, centre supervisors and invigilators, markers and other personnel) are well informed and trained on their roles.   The HKEAA will launch publicity for the change, and hold briefing sessions for examination personnel and stakeholders.

21.   The HKEAA is aware of the importance of careful and controlled implementation of the new HKDSE Examination system, particularly the need for proper testing before full implementation.   To ensure quality and smooth execution of the Project, the HKEAA will test the system from all aspects, including integration test, user acceptance test, loading and performance test, drill test and disaster recovery test, to ensure the system meets the business and technical requirements.

22.   A detailed implementation schedule is set out at Enclosure 1.

FINANCIAL IMPLICATIONS

23.   We propose to make a capital grant of $152.309M for the Project.   A breakdown of the capital grant is set out below –

	Project items	*Estimated Cost ($ million)*	
(I)	Development of the HKDSE Examination system		110.369
(A)	Implementation services	64.475	
(B)	Hardware	20.798	
(C)	Software	25.096	
(II)	Hardware and software upgrade, and additional hardware provision for the existing OSM, EPM and oral examination recording systems		30.885
(III)	Technical solutions to address unclear signal for listening examinations (provision of FM radio signal repeaters)		11.055
		Total:	*152.309*

24.   The projected cash flow is set out below –

Financial Year	*Cash flow ($ million)*
2009-10	26.163
2010-11	61.190
2011-12	48.261
2012-13	14.518
2013-14	2.177

25.   The project will entail annual recurrent costs of $17.440M, which will be partly offset by a recurrent saving of $7.894M per annum in incidentals like system maintenance cost, and efficiency gain from savings in overtime costs, temporary staff costs etc.   The net additional recurrent costs of $9.546M will be borne by the HKEAA.

MONITORING THE USE OF THE GRANT

26.   A Steering Committee will be formed under the HKEAA to monitor the progress of the Project.   The Steering Committee will be chaired by the Chairman of the HKEAA and will have representative from the Education Bureau (EDB).   Furthermore, the existing governance structure, that is, the HKEAA Council and its Information Technology Committee (ITC) and Finance and Audit Committee (F&AC) will also play significant roles.   The ITC will scrutinize and monitor the planning and delivery of the proposed Project whereas the F&AC will monitor the use of the proposed grant.   The Council will monitor the overall implementation from a strategic and macro perspective.   The HKEAA will keep separate accounts for the transactions relating to the grant.

27.   In respect of the Government's general monitoring role, the EDB is represented on the Council and the HKEAA's committees.   Also, the HKEAA is required to submit its annual estimates of income and expenditure and programme of its proposed activities to the Administration for approval, and to table its annual audited accounts and report of activities at the Legislative Council every year, under the HKEAA Ordinance (Cap. 261).   As regards specific monitoring of the use of the proposed grant and the progress of the Project, the Government will, aside from being represented on the Steering Committee, require the HKEAA to report to it on a regular basis.

THE WAY FORWARD

28.   Subject to Members' comments, we plan to submit the funding proposal to the Finance Committee for approval in January 2009.

Education Bureau
December 2008

Implementation schedule of the development of the new HKDSE Examination system

	Items	2009				2010				2011				2012				2013				2014	
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
(I)	**Development of the new HKDSE Examination system**																						
(A)	**Implementation services**																						
(1)	**Examination operations**																						
(a)	Candidate registration processing (from capture and processing of registration data to issue of admission forms)		▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓									
(b)	School based assessment processing		▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓									
(c)	Examination centre allocation		▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓									
(d)	Examination personnel management		▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓									
(e)	Script tracking and reporting		▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓									
(f)	Applied Learning assessment processing		▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓									
(g)	Marks processing and Grading (for standard referenced reporting and Applied Learning)		▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓									
(h)	Certificate processing and printing		▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓									
(i)	Statistical modeling, analysis and reporting									▓	▓	▓	▓	▓									
(2)	**Examination services**																						
(a)	Complaint and irregularities management											▓	▓	▓	▓	▓							
(b)	Appeal case management											▓	▓	▓	▓	▓							
(3)	**Change management and training**				▓					▓	▓					▓	▓			▓			
(II)	**Systems hardware and software upgrade, and additional hardware installation for existing systems**																						
(A)	**OSM and EPM systems**									▓	▓	▓											
(B)	**Oral exam recording system**													▓	▓								
(III)	**Technical solutions to address unclear signal for listening examinations (provision of FM radio signal repeaters)**													▓	▓	▓							