ITEM FOR FINANCE COMMITTEE

HEAD 156 – GOVERNMENT SECRETARIAT :
EDUCATION AND MANPOWER BUREAU
New Capital Account Subhead Hong Kong Examinations and Assessment Authority
New Item "Grant to support the modernisation and development of the examination systems of the Hong Kong Examinations and Assessment Authority"

> Members are invited to approve the creation of a new commitment of $198.87 million under a new subhead for providing a capital grant to support the modernisation and development of the examination systems of the Hong Kong Examinations and Assessment Authority.

PROBLEM

The existing outdated information technology (IT) infrastructure and highly manual examination processes of the Hong Kong Examinations and Assessment Authority (HKEAA) are inadequate to meet current and future needs and community expectations. However, HKEAA does not have sufficient resources to implement the improvement measures to modernise and develop its examination systems.

PROPOSAL

2. The Secretary for Education and Manpower proposes to provide a capital grant of $198.87 million to HKEAA to support the following measures to modernise and develop its examination systems –

(a) modernising the IT infrastructure and systems,
(b) introducing centralised onscreen marking, and
(c) enhancing security and supervision of public examination operations.

/JUSTIFICATION .....

JUSTIFICATION

3.   Hong Kong's two public examinations (i.e. the Hong Kong Certificate of Education Examination (HKCEE) and the Hong Kong Advanced Level Examination (HKALE)) are well respected internationally for their rigour and high academic standards. However, while HKEAA has a history of reliable and cost-effective administration of the two public examinations, the examination systems of HKEAA have become antiquated. A number of incidents in recent years (such as missing original examination scripts, examination scripts being marked in public places, and misreporting of 2005 HKCEE English Language (Syllabus B) Oral paper results) have aroused widespread public concerns. Public confidence in the examination systems has been sorely tested and needs to be restored.

4.   HKEAA has been facing a number of problems in its outdated examinations systems and processes, as set out below –

(a)   **outdated IT infrastructure and systems** – as revealed in an external expert review completed in early August 2005, the IT infrastructure needs a major overhaul to support HKEAA's service needs ahead;

(b)   **loss of original examination scripts** – there is no backup for the original examination scripts. The movement of scripts between HKEAA and markers could lead to loss of original scripts, resulting in serious consequences. There are also incidents of markers marking the scripts in inappropriate places where the public may gain access to the original scripts;

(c)   **lack of automation** – the highly manual examination processes are costly, inefficient, insecure and prone to human errors, and have led to a long processing time for examination results. Both the Education and Manpower Bureau (EMB) and the University Grants Committee-funded institutions are keen to see the processing time shortened to allow more time for teaching and learning, and facilitating the university admission processes; and

(d)   **inadequate security and supervision of examination centres** – the security in the dispatch of question papers to the examination centres in schools is an ongoing matter of concern. Moreover, centre supervisors and invigilators (most of them being teachers) need stronger support to handle ad-hoc incidents at the examination centres.

Encl. 1   A more detailed synopsis of the problems faced by HKEAA is set out in Enclosure 1.

                                                                                      /**Need** .....

Need for capital grant

5.   HKEAA proposes to adopt a three-pronged approach to tackle the problems –

     (a)   **Modernising the IT infrastructure and systems**

                HKEAA proposes to undertake measures to improve its IT infrastructure and systems, in line with the recommendations of an external expert review committee[1]. The proposed measures include replacing obsolete hardware, revamping and strengthening network infrastructure, adopting web-based platforms, and introducing modern standards in IT project management, system design, development tools and quality assurance. The measures aim to provide modernised IT infrastructure and systems with capability for growth for HKEAA to meet its service needs over the coming years.

     (b)   **Introducing centralised onscreen marking**

                HKEAA proposes to introduce centralised onscreen marking. One of the most important developments in the administration of public examinations by examination bodies worldwide in recent years has been the advancement of technology which allows marking to be conducted onscreen. This involves the digital imaging of examination scripts and the use of powerful software to deliver individual questions to markers, through a bank of networked computers. The software enables a variety of means for real-time quality control of the marking of papers, thus eliminating a great deal of physical handling of original examination scripts and providing for automatic addition of marks. This would address a range of problems such as security of scripts and supervision of marking quality. The introduction of centralised onscreen marking is in line with developments overseas and in at least 14 provinces/municipalities in the Mainland of China.

     (c)   **Enhancing security and supervision of public examination operations**

                HKEAA proposes to implement measures to improve security and supervision of public examination operations, in line with best practices elsewhere. The measures would involve the use of Radio Frequency Identification (RFID) tags to monitor the movement of

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[1]   The committee was appointed by the Secretary General of HKEAA in March 2005 to review and make recommendations to improve HKEAA's IT infrastructure and systems

question papers, adoption of bar code technology to track movement of original examination scripts, and installation of Closed Circuit Television (CCTV) and Access Control systems at all secure stores to strengthen security. HKEAA also plans to install online computers, video/web cameras, barcode technology and other security devices to enhance examination security and enable effective communications between the headquarters and the examination centres.

6. Modernising our public examination systems and in particular the implementation of centralised onscreen marking has become a top priority as EMB, and in fact the community at large, could not accept further missing of examination scripts and misreporting of public examination results.

7. However, the capital expenditure required ($198.87 million) and the additional recurrent accommodation needs for undertaking the above necessary measures cannot be readily absorbed by deploying HKEAA's existing resources. HKEAA has been set up as a self-financing organisation with Government heavily subsidising its accommodation requirements, and its main funding source is the fees charged for the two public examinations (i.e. HKCEE and HKALE). With the fees for the two public examinations having been frozen for seven consecutive years since 1999 and a 5% increase scheduled for 2006, HKEAA has yet to achieve full cost recovery for the two public examinations. HKEAA is currently operating on an estimated expenditure of about $278 million in the 2005/06 school year. As at 31 August 2005, HKEAA's reserve stands at about $45 million (or less than 19% of the annual expenditure). The current reserves and income stream of HKEAA are unable to meet the additional capital expenditure and recurrent accommodation requirements for the proposed improvement measures. A capital grant along with recurrent subsidies on accommodation from the Government is therefore necessary.

Accommodation needs

8. The implementation of centralised onscreen marking will involve a fundamental change in the culture and mode of work of the markers from marking on paper at their chosen locations such as their homes or offices to marking on computer screen at centralised centres. More than 5 000 teachers and academics serve as markers for HKCEE and HKALE each year. HKEAA aims to motivate the markers to accept the change, make them feel comfortable and at ease in the marking process, as well as facilitate their travelling to the centres. Provision of

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adequate facilities and comfortable marking environment in the marking centres (including sufficient space for marking scripts and areas for markers to take rest during the intensive and straining marking process) is essential to good quality marking and ensuring a sustainable supply of quality markers. Hence, we intend to establish a number of onscreen marking centres at convenient locations to provide accessibility and convenience for markers.

9.   At present, HKEAA is operating in two major buildings, namely the premises of the ex-San Po Kong Government Primary School in San Po Kong (allocated by Government by private treaty grant at nominal premium) and the Southorn Centre in Wanchai (provided by Government on a rent-free basis). The two government-funded premises provide an office space of about 4 500 square metres (m^2) and 2 600 m^2 respectively, totalling about 7 100 m^2. In the light of expansion over the years, HKEAA has leased a number of offices and storerooms providing a total space of about 2 900 m^2 in various locations.

10.   Based on HKEAA's current estimates, it will require an additional usable floor area of about 10 000 m^2 to accommodate scanning as well as facilities and ancillary services for onscreen marking (to be implemented for HKCEE Chinese and English subjects in 2007 involving about 1 600 markers).

11.   To meet the immediate needs for housing the scanning operations for the public examinations in 2006 and to launch a pilot on onscreen marking, HKEAA has recently leased office space of about 2 400 m^2 in commercial premises. For the medium term expansion plan of HKEAA to set up the centralised onscreen marking centres starting from 2007, the Government intends to provide vacant school premises to HKEAA through short-medium term leases at nominal premium. This would help save HKEAA's rental outlay while putting vacant school premises to productive use. The notional cost to Government cannot be ascertained but is accepted in principle as an extension to the current form of accommodation-related assistance to HKEAA, notwithstanding the self-financing objective.

12.   We have so far identified two school premises for setting up centralised onscreen marking centres, one in Tsuen Wan[2] and the other in Lai King[3] , providing about 3 300 m^2 and 3 200 m^2 of usable floor area respectively.

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[2] The site involved is at 7 Shing Mun Road in Tsuen Wan. It was formerly a school, and is currently occupied by EMB as Fung Hon Chu Gifted Education Centre, which will soon be relocated.

[3] The site involved is at Lai King Estate, Lai King. It was formerly an estate primary school and has already been vacated now.

The space so provided could accommodate the IT systems for scanning and storing of examination scripts, administrative staff for operating these systems and up to about 700 out of 1 600 onscreen marking workstations requested. With the two school premises, HKEAA will procure and install the relevant IT systems (in paragraph 5(a) above) and the afore-mentioned workstations (for which the longer term accommodation arrangement has been confirmed) for commencing in 2007 the initial phase of centralised onscreen marking operations (in relation to paragraph 5(b) above).

13. HKEAA will in parallel be exploring with Government options for accommodating the site requirements for the remaining 900 or so workstations. In doing so, it will critically assess the demand for concurrent onscreen marking workstations having regard to the speed of marking for different subjects and the behaviour of markers under the new onscreen marking mode having regard to the pilot in 2006. We will monitor the situation and consider the need for further expansion of office space (particularly the onscreen marking centres) of HKEAA, possibly through identifying other vacant government premises. HKEAA will work out its longer term accommodation plan including that for the remaining onscreen marking workstations before committing to procurement. Meanwhile, in case there is slippage in the provision of longer term accommodation, HKEAA is prepared to lease commercial premises to tide over the space shortfall.

14. Outside the annual public examination period, the onscreen marking and examination scripts processing centres will be utilised throughout the year by HKEAA for other examinations and assessments (such as the Territory-wide System Assessment, Secondary 3 Putonghua Examination in 2007, and some 200 international and professional examinations which HKEAA administers on behalf of professional and overseas examination bodies). This will help to ensure value-for-money of the onscreen marking centres.

BENEFITS

15. The successful implementation of the proposed project will enable HKEAA to achieve the following benefits –

/**Modernising** .....

Modernising the IT infrastructure and systems

16.   A modernised IT infrastructure and systems will improve reliability and security of systems and will–

(a)   enhance flexibility in accommodating new examinations and changes to existing examinations;

(b)   reduce processing time and save manual operating costs;

(c)   improve service quality and efficiency under a web-based platform. Particularly, the internet access will improve accessibility of HKEAA's services and information by students, parents and the public, as well as reduce teachers' workload when communicating with HKEAA (e.g. online submission of School-based Assessment[4] results); and

(d)   improve internal communication, efficiency and responsiveness, as well as minimise incidence of human errors through automation of administrative work and control processes.

Introducing Centralised onscreen marking

17.   The introduction of centralised onscreen marking will –

(a)   eliminate the problem caused by missing scripts as original examinations scripts are backed up once they have been scanned and movement of scripts will be minimised;

(b)   eliminate the problem of marking in public places;

(c)   eliminate errors in copying and adding marks manually;

(d)   ensure timely delivery of scripts to markers hence enabling a prompt start to the marking process, and flexibility of allocating different questions to different markers so that we can capitalise on specialist knowledge and increase speed and accuracy in marking;

(e)   enable real-time monitoring of markers' performance and provide capacity for prompt remedial action (in cases where markers are found to be too harsh, too lenient or inconsistent);

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[4]   School-based Assessment (SBA) is being implemented for HKCEE Chinese Language and English Language subjects and will be reported in the examination certificates in 2007. The goal is for SBA results to contribute towards the overall assessment of candidates in all subjects in future.

(f)   make available more information on the marking of each question, thus providing a ready source for further research and analysis and/or feedback to schools and teachers; and

(g)   facilitate easy storage of scanned version of examination scripts and the possibility of on-demand access by candidates to their scripts.

The improvement in speed through elimination of script movement is particularly important in the light of anticipated increased need for double marking in subjects such as Chinese Language and Liberal Studies. This will help to reduce processing time of examination results, allowing the possibility of a later start of the public examinations and/or an earlier release of the examination results. Based on current estimate, we envisage that the processing time can be shortened.

Enhancing security and supervision of public examination operations

18.   The enhancement of security and supervision of public examination operations will –

(a)   prevent theft of question papers;

(b)   prevent loss of original examination scripts; and

(c)   enable better supervision of examinations and ensure prompt response to incidents that arise, as well as provide stronger support to centre supervisors and invigilators in handling and reducing examination irregularities.

COST SAVINGS

19.   The implementation of the proposals to modernise HKEAA's examination systems will lead to a recurrent realisable savings of about $2 million per annum for HKEAA, arising from elimination of many of the manual examination processes. The realisable savings will be redeployed to offset the additional recurrent expenditure arising from the new systems (paragraph 37 below).

20.   While it is difficult to present the intangible benefits of the proposed measures in quantifiable terms, the intangible benefits are significant. For instance, the introduction of scanning of the original examination scripts and centralised

onscreen marking will fundamentally improve our public examination systems, eliminating the adverse impact of losing the original examination scripts of candidates. The latter is significant as public examination results are critical credentials for candidates in their further studies and job applications, and such impact is very difficult to quantify.

IMPLEMENTATION PLAN

21.   HKEAA will implement the proposed measures (particularly the onscreen marking systems) by phases. It will collect feedback from markers on a regular basis, fine-tune and carry out sufficient testing of the systems and processes, in order to ensure successful and reliable deliverables before full-scale implementation. Reliability and accuracy of reporting examination results takes priority over the pace of implementation of onscreen marking although the latter is also considered important in eliminating the problems of the current highly manual examination processes.

22.   HKEAA plans to implement the measures to modernise its IT infrastructure and systems by phases over a period of about four years. HKEAA aims to start the project immediately so that the new IT infrastructure can be put in place by 2007 for commencement of subsequent migration and enhancement of the mission-critical applications.

23.   In 2006, before the full implementation of onscreen marking, HKEAA will implement the digital scanning of examination scripts for about 70% of current subjects (accounting for about 90% of all scripts) in the two public examinations. At the same time, HKEAA will carry out a pilot run of onscreen marking. Based on the results of the pilot, HKEAA will further refine the onscreen marking policies and procedures.

24.   In 2007, HKEAA plans to implement an initial phase of centralised onscreen marking for the HKCEE Chinese and English language subjects. More subjects will be included in subsequent years, paving the way for full implementation for the new Hong Kong Diploma of Secondary Education (HKDSE) to be launched in 2012 under the new academic structure for senior secondary education and higher education.

25. HKEAA plans to install CCTV and Access Control systems at all its secure stores in 2006. It will also use the RFID technology to prevent theft of question papers in 2006. In 2007, it will start the installation and pilot run of the monitoring and communication systems at examination centres (including the use of barcode technology to check examination attendance and count examination scripts, and the installation of web/video cameras). It will also record oral assessments with a view to enabling post-hoc checking of disputed judgments about candidates' performances, taking into account views of the stakeholders.

26. In order to ensure smooth implementation of the improvement measures, the HKEAA Secretariat will strengthen its staff development strategies starting from the 2005/06 school year. HKEAA has already put in place a strengthened training policy for the enforcement of procedures and security protocols. HKEAA will organise the following staff development programmes for its staff –

      (a) refresher training for IT staff,
      (b) training on raising the sensitivity/alertness of staff to critical problems and incidents,
      (c) training on incident management,
      (d) refresher training on security and confidentiality protocols,
      (e) training on management skills, and
      (f) new staff induction training.

27. In the light of the incidents in recent years, HKEAA will, in addition to the renewed effort on staff development, strictly enforce the procedures for incident management (which comprise built-in elements of authorisation, verification, documentation and reporting). HKEAA will also cultivate a more collaborative environment with closer communications at both the management and operation levels so as to efficiently deliver the proposed measures.

Encl. 2   28. A detailed implementation schedule for the proposed measures is set out in Enclosure 2.

29. In respect of obsolete computers displaced, HKEAA will ensure secure deletion of information, records and data installed in the computers before the disposal or re-use; consider the option of trade-in when planning for the disposal and procurement of new computer equipment; and for computer items which are not suitable for trade-in for various reasons (such as their low value or unfavourable trade-in terms), consider the option of donation to non-profit-making organisations. HKEAA will ensure that computer items will not be disposed of indiscriminately and that the environmental requirements will be met.

/FINANCIAL

FINANCIAL IMPLICATIONS

30.   Subject to Members' approval, we will make a capital grant of $198.87 million for the improvement measures. A breakdown of the capital grant is set out below –

		Measures	Estimated Cost ($ million)
(a)		Modernising the IT infrastructure and systems	62.67
(b)		Introducing centralised onscreen marking	
	(i)	IT hardware and software	44.18
	(ii)	Scanning service and image storage hardware for the 2006 public examinations	15.24
	(iii)	Renovation	35.50
	(iv)	Furniture and equipment	6.86
(c)		Enhancing security and supervision of public examination operations	34.42
		Total	**198.87**

The projected cash flow is set out below –

Financial Year	Cash flow ($ million)
2005-06	16.51
2006-07	139.53
2007-08	38.15
2008-09	4.68
Total	**198.87**

Encl. 3   A further breakdown of the above estimates, together with a breakdown of the projected cash flow, is set out in Enclosure 3.

31.   On paragraph 30(a) above, the estimate of $62.67 million is for modernising the IT infrastructure and systems, including the replacement of computer hardware and software so that they will run on a common platform, redesigning and strengthening the computer network linking HKEAA's various scattered office locations, enhancing/redeveloping about 60 existing applications, migrating legacy data and developing new applications.

32. On paragraph 30(b)(i) above, the estimate of $44.18 million is for acquisition and installation of IT hardware and software for centralised onscreen marking (including scanners, server hardware and software, network and other equipment), as well as development of application systems for scanning and onscreen marking of examination scripts. The system will include a total of 1 600 onscreen marking workstations for concurrent marking.

33. On paragraph 30(b)(ii) above, the estimate of $15.24 million is for contracting out the scanning services, printing bar code labels and purchasing the image storage hardware. EMB and HKEAA have committed at the special meeting of the Legislative Council (LegCo) Panel of Education on 12 September 2005, in the context of explaining the incident of misreporting HKCEE English Language (Syllabus B) Oral paper results in 2005, that HKEAA aimed to ensure there would be no missing scripts in 2006 and to run a pilot for onscreen marking. To overcome the constraints on lead time, to gather experience in using scanning and onscreen marking hardware and software, and to meet the examination schedule, HKEAA will contract out the scanning services for the two public examinations in 2006. The contractor will be required to work in HKEAA's premises under HKEAA's direct supervision. HKEAA has leased commercial premises for accommodating the scanning operations in 2006.

34. On paragraph 30(b)(iii) above, the estimate of $35.50 million is for renovating the two school premises (one of which has been vacant and the other will soon be vacant) identified at this stage to be converted to centralised onscreen marking centres, situated in Tsuen Wan and Lai King. These centres will provide a total of about 6 500 m^2 to accommodate the IT systems for scanning and storing of examination scripts, administrative staff for operating these systems and up to about 700 onscreen marking workstations for concurrent marking.

35. On paragraph 30(b)(iv) above, the estimate of $6.86 million is for installation of furniture and equipment (other than IT systems) in the onscreen marking centres.

36. On paragraph 30(c) above, the estimate of $34.42 million is for the acquisition and installation of a variety of equipment to improve the supervision of public examination operations (including notebook computers, web/video cameras, barcode scanners and other security equipment).

37.   Other than the notional accommodation-related subsidy from Government, HKEAA will need to incur recurrent costs of about $10 million per annum for the operation and maintenance of the new examination systems. Part of the recurrent costs will be offset by the recurrent savings of about $2 million identified. The net additional recurrent costs of the proposed measures will be fully borne by HKEAA.

38.   We will seek the necessary approval for additional funding for implementing further measures necessary for the HKDSE under the new academic structure in due course.

MONITORING THE IMPLEMENTATION

39.   HKEAA is aware of the importance of careful and controlled implementation when introducing changes to the examination systems, particularly the need for proper testing before full implementation. In addition, HKEAA is sensitive to the impact of the proposed changes on the thousands of teachers and other personnel who assist in the examination processes, including more than 5 000 markers and a similar number of centre supervisors and invigilators. To ensure quality and smooth execution of the measures, HKEAA Council has approved –

(a)   the setting up of a new Information Technology Committee (ITC) to advise on and monitor IT matters, which will include the proposed measures;

(b)   the restructuring of HKEAA's Information Systems Services Division (ISSD) with a view to enhancing the supervision and monitoring, as well as the necessary checks and balances in ISSD. In particular, the development and operations functions will be segregated and the management structure of the division will be realigned to support the segregation; and

(c)   the establishment of a Quality Assurance Unit (reporting directly to the Secretary General of HKEAA) to bring together the current dispersed quality assurance, internal audit and risk management functions. It will also provide more effective check and balance.

40. The monitoring work will be conducted under the existing governance structure, i.e. the HKEAA Council, its ITC and its Finance and Audit Committee (F&AC). The ITC will scrutinise and monitor the planning and delivery of the proposed measures whereas the F&AC will monitor the use of the proposed capital grant. The HKEAA Council will monitor the overall implementation from a strategic and macro perspective.

41. In respect of the Government's role of monitoring, EMB is represented on the HKEAA Council and the two committees (i.e. ITC and F&AC). 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 LegCo every year, under the HKEAA Ordinance (Cap. 261).

BACKGROUND INFORMATION

42. HKEAA is a statutory body established in 1977 under the HKEAA Ordinance (Cap. 261). Its statutory responsibility is to conduct the specified examinations of HKCEE and HKALE. It operates on a self-financing basis and does not receive any recurrent subvention from the Government. HKEAA is governed by a Council with members drawn from various sectors, including tertiary institutions, schools, business and the Government.

43. HKEAA also runs a number of assessments including the Territory-wide System Assessment, Language Proficiency Assessment for Teachers, 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)).

44. In September 2002, the HKEAA commissioned a consultancy to conduct a strategic review on the functions and capability of HKEAA, with a view to identifying the necessary changes to enable HKEAA to better fulfil its roles and functions under the Education Reform and the increasing expectation of the public. The strategic review completed in May 2003 and the recommendations of the review are being implemented by phases. In March 2005, the Secretary General of HKEAA appointed an external expert review committee to review and make recommendations to improve HKEAA's IT infrastructure and systems. HKEAA has drawn up the proposed measures in this paper based on the recommendations of this review.

45.　　　We consulted the LegCo Panel on Education on the proposal at its meeting on 14 November 2005. Members supported the rationale and need for modernising and developing HKEAA's examination systems, in particular the proposed introduction of centralised onscreen marking centres. Members were concerned about –

(a)　　the management of the examination systems and processes which, if not improved, would not help solve the current problems of the examination systems, even if improvement were made on the technology aspects;

(b)　　the accessibility of the onscreen marking centres (which would affect the markers' acceptance of change in marking culture) and whether the centralised onscreen marking would be implemented at a stable pace to ensure successful and reliable delivery without sacrificing the correct reporting of examination results in the process; and

(c)　　the impact on examination fees, if any.

We have addressed Members' comments at the panel meeting in this paper.

Education and Manpower Bureau
November 2005

Problems of the Existing Examination Systems of
Hong Kong Examinations and Assessment Authority

Hong Kong Examinations and Assessment Authority (HKEAA) has been facing a number of problems arising out of its outdated examinations systems and processes, as set out below –

Outdated IT infrastructure and systems

2. As revealed in the external expert review completed in early August 2005, much of HKEAA's computing hardware is obsolete and the database software is outdated. The systems lack integration and are operating on batch processing. They cannot operate in real time mode on a common platform. The network infrastructure has been stretched to the limit in terms of capacity, accessibility, reliability and security. In summary, the IT infrastructure needs a major overhaul to support modern days need and the planned introduction of onscreen marking.

Loss of original examination scripts

3. Currently, markers collect original examination scripts from HKEAA and mark them at home, at school and in other places. There is no backup for the original scripts and the movement of scripts between HKEAA, markers' homes and their places of work give rise to risks of loss of scripts, leading to serious consequences. In fact, almost every year a small number of original scripts were lost. There are also incidents of markers marking the scripts in public places in which the public may gain access to the original scripts.

Lack of automation

4. The manual processes (including the manual counting of examination scripts in the examination centres, physical distribution to and collection from markers of examination scripts, and manual checking of marks awarded to candidates), are costly, inefficient, insecure and prone to human errors.

5. Currently, original examination scripts are distributed to markers in a large batch. It is almost impossible to have any real-time supervision of the marking process and one can only tell whether a marker has been too harsh, too lenient or inconsistent after all the marking has been completed, by which time the options for remedying the situation are limited.

6.   At present, individual markers add up the scores manually after they have completed marking, and they enter the marks on a score sheet. The scores are then entered into the computer system. Because of the manual processes involved, errors are found in the manual addition or recording of scores or incorrect use of forms. Every year, HKEAA recruits a team of some 300 checkers from tertiary institutions to check the scores with a view to identifying and correcting data preparation errors. This checking process is again manual and time-consuming. Despite rigorous supervision of the checking process, some errors may still remain and go undetected unless they are picked up in the appeal process.

7.   Manual processes also extend the time taken to process examination results. In this connection, while the Education and Manpower Bureau is keen to see a later start of the public examinations to allow more time for teaching and learning, the University Grants Committee-funded institutions hope to obtain earlier access to the HKALE results so as to facilitate their admission processes. There are thus pressures from both sides to reduce the processing time of the examination results.

Inadequate security and supervision of examination centres

8.   The public examinations administered by HKEAA are conducted in examination centres provided by schools. The security of examination papers prior to their being dispatched to schools is an ongoing issue. In fact, the Court has recently heard an attempted theft case. Another major issue is the lack of support for centre supervisors and invigilators (most of them being teachers) and lack of communications between the headquarters and individual examinations centres in handling ad-hoc incidents (e.g. emergencies or non-compliance with examination regulations). As the centre supervisors often need to take immediate action in response to these ad-hoc incidents, there is an urgent need to provide stronger support so as to minimise examination irregularities.

Implementation Schedule of Hong Kong Examinations and Assessment Authority's Proposed Measures

	Items	2005-06				2006-07				2007-08				2008-09			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
(a)	*Modernising the IT infrastructure and systems*																
(a)(i)	Replacement of computer hardware and peripheral				▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓		
(a)(ii)	Improvement of network infrastructure				▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓		
(a)(iii)	Improvement of data storage				▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓		
(a)(iv)	Setting up new data centres				▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓		
(a)(v)	System migration and data conversion				▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓		
(a)(vi)	System enhancement				▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓		
(a)(vii)	IT consultancy				▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓		
(a)(viii)	Installation of IT development tools				▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓		
(b)	*Introducing centralised onscreen marking*																
(b)(i)	Installation and testing of computer hardware and software				▓	▓	▓	▓	▓	▓	▓	▓	▓				
(b)(ii)	Scanning operation and related work for the 2006 public examinations				▓	▓	▓	▓	▓	▓	▓	▓	▓				
(b)(iii)	Renovation				▓	▓	▓	▓	▓	▓	▓	▓	▓				
(b)(iv)	Installation of furniture and equipment				▓	▓	▓	▓	▓	▓	▓	▓	▓				
(c)	*Enhancing the security and supervision of public examination operations*																
(c)(i)	Setting up an examination control room				▓	▓	▓	▓	▓	▓	▓	▓	▓				
(c)(ii)	Making ready notebook computers for use at examination centres				▓	▓	▓	▓	▓	▓	▓	▓	▓				
(c)(iii)	Making ready video cameras for use at examination centres				▓	▓	▓	▓	▓	▓	▓	▓	▓				
(c)(iv)	Making ready barcode scanners for use at examination centres				▓	▓	▓	▓	▓	▓	▓	▓	▓				
(c)(v)	Recording of oral examinations				▓	▓	▓	▓	▓	▓	▓	▓	▓				
(c)(vi)	Installation of Closed Circuit Television and access control systems at secure storerooms				▓												
(c)(vii)	Installation of Radio Frequency Identification antennas/readers at secure storerooms				▓												
(c)(viii)	Installation and testing				▓	▓	▓	▓	▓	▓	▓	▓	▓				

**Estimated expenditure and cash flow for the proposed modernisation and development of
the Hong Kong Examinations and Assessment Authority's examination systems**

	Items	Total estimated expenditure $'000	2005-06 $'000	2006-07 $'000	2007-08 $'000	2008-09 $'000
(a)	*Modernising the IT infrastructure and systems*					
(a)(i)	Computer hardware and peripheral	8,520	1,190	5,960	850	520
(a)(ii)	Networking	3,000	420	2,100	300	180
(a)(iii)	Storage	5,000	700	3,500	500	300
(a)(iv)	Data centres	5,070		1,900	3,170	
(a)(v)	System migration and data conversion[1]	9,000	900	4,500	2,700	900
(a)(vi)	System enhancements[2]	24,830	2,480	12,420	7,450	2,480
(a)(vii)	IT consultancy	2,250	1,250	1,000		
(a)(viii)	IT development tools	5,000	700	3,500	500	300
	Subtotal for (a)	*62,670*	*7,640*	*34,880*	*15,470*	*4,680*
(b)	*Introducing centralised onscreen marking*					
(b)(i)	IT hardware and software					
	Scanner hardware	7,260		7,260		
	Server software for scanning and onscreen marking	5,500		5,500		
	Server hardware for scanning and onscreen marking	7,200		7,200		
	Computer equipment for onscreen marking[3]	18,220		18,220		
	Customisation and implementation service	6,000		6,000		
(b)(ii)	Scanning service for 2006					
	Scanning service	12,860	2,760	10,100		
	Barcode labels	1,330		1,330		
	Image storage hardware	1,050	1,050			
(b)(iii)	Renovation[4]	35,500		35,500		
(b)(iv)	Furniture and equipment	6,860		4,290	2,570	
	Subtotal for (b)	*101,780*	*3,810*	*95,400*	*2,570*	*0*

(c)	Enhancing security and supervision of public examination operations					
(c)(i)	Examination control room	2,000		2,000		
(c)(ii)	Notebook computers for use at examination centres[5]	10,920		2,730	8,190	
(c)(iii)	Video cameras for use at examination centres[6]	2,520		630	1,890	
(c)(iv)	Barcode scanners for use at examination centres[7]	8,400		2,100	6,300	
(c)(v)	Recording oral assessments	2,850		950	1,900	
(c)(vi)	Closed Circuit Television and Access Control systems at secure storerooms	3,250	3,250			
(c)(vii)	Radio Frequency Identification antennas/readers at secure storerooms[8]	1,350	1,350			
(c)(viii)	Installation and testing	3,130	460	840	1,830	
	Subtotal for (c)	34,420	5,060	9,250	20,110	0
	Grand total	198,870	16,510	139,530	38,150	4,680

[1] Provision for IT work of 4 500 man-days at $2,000 per man-day.
[2] Provision for IT work of 7 600 man-days at $2,000 per man-day.
[3] Provision for 1 200 personal computers and 400 tablet computers for markers.
[4] Provision for renovating two vacant school premises as onscreen marking centres.
[5] Provision for two notebook computers (including software) per examination centres for a total of 400 examination centres.
[6] Provision for two video cameras per examination centre for a total of 400 examination centres.
[7] Provision for five barcode scanners per examination centre for a total of 400 examination centres.
[8] Provision for six control gates of Radio Frequency Identification antennas and readers for use by secure stores for storage of question papers.