For Discussion
on 17 December 2001

Legislative Council Panel on Constitutional Affairs

Development of a New Electoral and Registration System

PURPOSE

This paper seeks Members' views on a proposal of the Registration and Electoral Office (REO) to develop a new Electoral and Registration System (EARS) to replace the existing one.

BACKGROUND

Existing EARS

2.   The existing EARS is a mainframe computer system developed in 1993. It maintains the electoral records of some three million Legislative Council (LegCo) Geographical Constituency and District Council Constituency electors, 180,000 Functional Constituency (FC) electors and subsector voters, 800 Election Committee members, as well as information on the membership of umbrella organisations for updating the FC and subsector registers. The system also prints annual electoral registers, poll cards, mailing labels and election notices.

3.   The EARS underwent three major enhancements in 1994-95, 1997-98 and 1999-2000 to expand its functionality to meet the specific needs of major elections.   However, due to the constraints of the system and the need to complete enhancements within limited time, the computer applications subsequently added to the system were not fully integrated.   As a result, these applications have to be run on standalone computers, leading to maintenance of multiple databases and inefficient information flow among different systems.   The existing mainframe

architecture also limits options available to REO in capitalising on new technologies to automate the manual workflows in processing voter registration applications and re-allocating voters to different constituencies if and when constituency boundaries are changed. These two major electoral tasks are currently performed in a very labour-intensive manner. During the annual voter registration drives, a large number of temporary staff have to be engaged in processing voter registration applications and entering voters' records into the EARS. Likewise, a lot of manual efforts are involved in re-allocating voters to different constituencies if and when constituency boundaries are changed.

4.   In addition, the capacity of the existing EARS is reaching its limit. The electorate size, however, is expected to continue to increase. Apart from storage difficulties, the system has constraints in terms of its capability to perform data matching with other departments. At present, as provided for under the law, REO matches its data with departments (Immigration Department and Housing Department for the time being) for the purpose of updating voters' residential addresses on the electoral rolls. We have in mind extending this arrangement to other departments. The existing EARS will not be able to cope with new demands when the data matching arrangement is extended to other departments. Furthermore, as the existing EARS is also not fully bilingual, REO staff have to do the English translation before data entry if the voter registration forms are completed in Chinese. This hampers efficiency and accuracy of data input. Finally, given the old system design, the existing EARS has become increasingly difficult and expensive to maintain.

JUSTIFICATIONS

Development of a new EARS

5.   In 2000, the REO commissioned a feasibility study on a new EARS. Based on the recommendations made by the consultant upon the completion of the study in July 2001, we propose a new system with the following main features -

>   (a)   a comprehensive database on electoral records of voters and other information on election;

(b)   sufficient capacity to handle future growth in the number of electors;

(c)   automation of existing manual workflows (including processing of voter registration applications, re-allocating voters to different constituencies and assignment of voters to polling stations);

(d)   a fully bilingual system for storage of electoral records and printing of poll cards;

(e)   storage of election expenses and relevant information on electoral arrangements; and

(f)   a uniform interface with other Government computer systems (including the Electronic Service Delivery (ESD) system).

Anticipated Benefits

6.   The new EARS will bring about the following service improvements-

(a)   the new system incorporates new functionality which is currently performed on separate PCs. Relevant data and information can now be stored in the new EARS more systematically. This will enable REO to deliver its electoral functions more efficiently and effectively. It will also make it easier for subsequent system back-ups and administration;

(b)   the expanded capacity for electoral records to be stored in both English and Chinese will enable REO to handle the future growth in the electorate size effectively. Apart from improving the accuracy of electors' records, the bilingual facilities will also offer the flexibility for electors' records to be presented on the voter registers in either English or Chinese according to the preference of the electors;

(c)   the proposed EARS will have a new sub-system, namely the document management system (DMS).

With the DMS and the integration of the address hinterland list, the processing of voter registration applications will be automated, thereby improving operational effectiveness. This will also result in faster processing time and reduced error rates;

(d)   another sub-system to be incorporated is the geographical information system. It has the capability of automating the re-allocation of electors if and when constituency boundaries are changed. It can provide better support services for the Electoral Affairs Commission (EAC) in drawing up constituency boundaries, as the system can easily and speedily generate a wide range of options for consideration by the Commission. This will further enhance the quality of decisions and enable EAC to complete the delineation exercise in a more efficient manner;

(e)   the use of a highly scalable architecture and a modular approach in the design of the new EARS will offer the greatest flexibility for further enhancements and expansions. This will increase the capability of the proposed EARS to cater for new requirements that will arise from an evolving electoral system;

(f)   the proposed uniform interface function will further streamline the processing of electronic voter registration applications received through the ESD system. It will also enable REO to extend the existing data matching arrangements to other departments, thereby improving the updatedness of the electoral rolls;

(g)   REO will be able to provide a year-round service for voters to check their records on the voter registers through terminals set up in District Offices. The department can also be more responsive to voters' enquiries relating to their electoral records; and

(h)   the proposed EARS will incorporate all relevant information required for future planning. This can, for example, facilitate REO to compile budget estimates and put in place the necessary practical arrangements for future elections.

Cost-benefit Analysis

7.　　　　　The non-recurrent and recurrent costs to be incurred for the new EARS between 2001-02 and 2013-14 are $175.78 million.　We estimate that the proposed EARS will achieve a total saving of $148.92 million during the same period.　The saving will come in different amounts annually, depending on whether general elections will be held in the year or not.　On average, there will be annual realisable savings of $2.15 million (starting from 2003-04) and notional savings of $12.53 million (starting from 2004-05). A breakdown of the annual realisable savings and notional savings is at Annex A.

8.　　　　　A cost-benefit analysis for the new EARS is at Annex B.

FINANCIAL IMPLICATIONS

Non-recurrent Expenditure

9.　　　　　The total non-recurrent costs for developing the proposed new system is estimated at $66.42 million.　Of this, $62.5 million is for purchasing hardware and software, setting up server sites, procuring professional service for equipment installation and system configuration, as well as hiring contract staff service for system implementation.　The remaining $3.92 million is to create two time-limited REO posts responsible for co-ordinating the user requirements and supporting the development of the new EARS.　The estimated recurrent cost of the new EARS is $5.86 million in 2003-04 and $10.35 million from 2004-05 and onwards.　A detailed breakdown of the non-recurrent and annual recurrent costs is at Annex C.

IMPLEMENTATION

10.　　　　　We aim to implement the system in time for the 2004 LegCo elections.　A tentative implementation timetable is as follows -

Milestone Activities	**Expected Completion Date**
(a) System analysis and design	October 2002
(b) System implementation	October 2003
(c) System live run	November 2003
(d) System being used for preparation of the 2004 LegCo elections	early 2004

CONSULTATION WITH EAC

11.　　　　Members of the EAC have been consulted on the proposed development of the new EARS. They are supportive of the proposal.

OTHER RELEVANT INFORMATION

12.　　　　Before arriving at the recommendation outlined in the above paragraphs, the consultant engaged by REO has in fact considered two other options, namely:

(a)　　to enhance the existing EARS on the mainframe; and

(b)　　to customize an off-the-shelf voter registration package.

13.　　　　Both options, however, are deemed to be not feasible. Option (a) requires the addition of a mid-range system to the mainframe, and the mixture of the two will create a complex architecture which is more difficult to maintain and change to meet future requirements and changing needs. For option (b), although it has the benefit of reduced risk, development costs and time, the package would still require very significant customization to meet our requirements of supporting storage and display of Chinese characters. The non-recurrent and recurrent costs of these two options are also higher than that of the recommended one.

A table comparing the costs of the three options is at Annex D.

WAY FORWARD

14.   Subject to any comments Members may have, we will submit the proposal to Finance Committee on 11 January 2002 for funding approval.

Constitutional Affairs Bureau
December 2001

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**Breakdown of annual realisable savings and notional savings
incurred between 2003-04 and 2013-14**

			$million	$million
(a)	**Realisable savings (starting from 2003-04)**			
	(i)	hardware and software maintenance of existing EARS	0.39	
	(ii)	Information Technology Services Department (ITSD) staff and contract staff for maintaining existing EARS	1.76	
		Sub-total		2.15
(b)	**Notional savings (starting from 2004-05)**			
	(i)	avoidance of costs for additional staff for processing voter registration applications	6.67	
	(ii)	avoidance of costs for additional staff due to improved automation in delineation of constituencies and reallocation of voters	2.30	
	(iii)	avoidance of costs for additional staff due to automated production of polling station location maps	0.22	
	(iv)	reduced cost for system enhancements	1.28	
	(v)	reduced data transfer efforts from new EARS to sub-systems	0.07	
	(vi)	apportioned cost of ITSD central computer system	1.99	
		Sub-total		12.53
		Total savings		14.68

Cost and Benefit Analysis of the
Proposed New Electoral and
Registration System (EARS)
(At 2001-02 Price Level)

Cost/Benefit	Yr. 2001/02	Yr. 2002/03	Yr. 2003/04 (DCs Election)	Yr.2004/05 (LegCo Elections)	Yr. 2005/06	Yr. 2006/07	Yr. 2007/08 (DCs Election)	Yr. 2008/09 (LegCo Elections)	Yr. 2009/10	Yr. 2010/11	Yr. 2011/12 (DCs Election)	Yr. 2012/13 (LegCo Elections)	Yr. 2013/14	Total
	HK$ Million	HK$ Million	HK$ Million	HK$ Million	HK$ Million	HK$ Million	HK$ Million	HK$ Million	HK$ Million	HK$ Million	HK$ Million	HK$ Million	HK$ Million	HK$ Million
Non-recurrent Expenditure at 2001/02 Price Level														
Hardware & Software	0.00	10.12	10.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.24
Site Preparation	0.00	1.93	2.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.19
Consumables	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Professional Service	0.00	2.40	2.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.80
Contract Staff Service	0.24	14.33	13.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.59
Contingency (10% of above)	0.02	2.88	2.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.68
Sub-Total	0.26	31.66	30.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.50
Non-recurrent Staff Cost at 2001/02 Price Level														
REO Staff Cost	0.00	3.46	3.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.92
ITSD Staff Cost	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sub-Total	0.00	3.46	3.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.92
Non-recurrent Cost Total at 2001/02 Price Level	0.26	35.12	34.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	69.42
Recurrent Expenditure at 2001/02 Price Level														
Hardware & Software	0.00	0.00	3.18	3.26	3.26	3.26	3.26	3.26	3.26	3.26	3.26	3.26	3.26	35.78
Consumables	0.00	0.00	0.36	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	9.06
Support Service	0.00	0.00	0.67	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	16.77
Professional Service	0.00	0.00	0.00	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	6.50
Contract Staff Service	0.00	0.00	1.38	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	34.38
Miscellaneous	0.00	0.00	0.27	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	6.87
Sub-Total	0.00	0.00	5.86	10.35	10.35	10.35	10.35	10.35	10.35	10.35	10.35	10.35	10.35	109.36
Recurrent Staff Cost at 2001/02 Price Level														
ITSD Staff Cost	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REO Staff Cost	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sub-Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Recurrent Cost Total at 2001/02 Price Level	0.00	0.00	5.86	10.35	10.35	10.35	10.35	10.35	10.35	10.35	10.35	10.35	10.35	109.36
A. Total Cost at 2001/02 Price Level	**0.26**	**35.12**	**39.90**	**10.35**	**10.35**	**10.35**	**10.35**	**10.35**	**10.35**	**10.35**	**10.35**	**10.35**	**10.35**	**178.78**
Realisable Tangible Benefit at 2001/02 Price Level	0.00	0.00	0.95	2.27	2.27	2.27	2.27	2.27	2.27	2.27	2.27	2.27	2.27	23.65
Notional Tangible Benefit at 2001/02 Price Level	0.00	0.00	0.00	12.20	6.85	7.46	25.53	10.71	8.76	8.76	25.53	10.71	8.76	125.27
B. Total Benefit at 2001/02 Price Level	**0.00**	**0.00**	**0.95**	**14.47**	**9.12**	**9.73**	**27.80**	**12.98**	**11.03**	**11.03**	**27.80**	**12.98**	**11.03**	**148.92**
C. Net Saving (B-A)	**-0.26**	**-35.12**	**-38.95**	**4.12**	**-1.23**	**-0.62**	**17.45**	**2.63**	**0.68**	**0.68**	**17.45**	**2.63**	**0.68**	**-29.86**
C1. Net Present Saving (C discounted at 4% p.a.)	**-0.26**	**-33.77**	**-36.01**	**3.66**	**-1.05**	**-0.51**	**13.79**	**2.00**	**0.50**	**0.48**	**11.79**	**1.71**	**0.42**	**-37.25**
C2. Cumulative Net Present Saving	**-0.26**	**-34.03**	**-70.04**	**-66.38**	**-67.43**	**-67.94**	**-54.15**	**-52.15**	**-51.65**	**-51.17**	**-39.38**	**-37.67**	**-37.25**	**N/A**
D. Benefit/Cost Ratio														
D1. Benefit at Present Value (B discounted at 4% p.a.)	**0.00**	**0.00**	**0.88**	**12.86**	**7.80**	**8.00**	**21.97**	**9.86**	**8.06**	**7.75**	**18.78**	**8.43**	**6.89**	**77.18**
D2. Cost at Present Value (A discounted at 4% p.a.)	**0.26**	**33.77**	**36.89**	**9.20**	**8.85**	**8.51**	**8.18**	**7.87**	**7.56**	**7.27**	**6.99**	**6.72**	**6.46**	**148.53**
D3. Benefit/Cost Ratio (Total D1/Total D2)	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**0.52**

Cost and Benefit Analysis of the Proposed Electoral and Registration System
(At 2001-02 Price Level)

YEAR	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	Total
							($ million)							
COST														
Non-recurrent Expenditure (a)	0.26	33.62	32.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	66.42
Recurrent Expenditure (b)	0.00	0.00	5.86	10.35	10.35	10.35	10.35	10.35	10.35	10.35	10.35	10.35	10.35	109.36
Total cost (c)=(a)+(b)	0.26	33.62	38.40	10.35	10.35	10.35	10.35	10.35	10.35	10.35	10.35	10.35	10.35	175.78
SAVINGS														
Realisable Savings (d)	0.00	0.00	0.95	2.27	2.27	2.27	2.27	2.27	2.27	2.27	2.27	2.27	2.27	23.65
Notional Savings (e)	0.00	0.00	0.00	12.20	6.85	7.46	25.53	10.71	8.76	8.76	25.53	10.71	8.76	125.27
Total Savings (f)=(d)+(e)	0.00	0.00	0.95	14.47	9.12	9.73	27.80	12.98	11.03	11.03	27.80	12.98	11.03	148.92
Net Savings (f)-(c)	-0.26	-33.62	-37.45	4.12	-1.23	-0.62	17.45	2.63	0.68	0.68	17.45	2.63	0.68	-26.86
Net Present Value (Note)	-0.26	-32.33	-34.62	3.66	-1.05	-0.51	13.79	2.00	0.50	0.48	11.79	1.71	0.42	-34.42
Net Cumulative Savings (Note)	-0.26	-32.59	-67.21	-63.55	-64.60	-65.11	-51.32	-49.32	-48.82	-48.34	-36.55	-34.84	-34.42	NA

Note : A discount rate of 4% is adopted for the financial appraisal of a computer project where the cashflow is expressed at constant prices.

Breakdown of the non-recurrent and recurrent costs of the new EARS

A. Non-recurrent Costs

		2001-02 $ million	2002-03 $ million	2003-04 $ million	Total $ million
(a)	Purchasing computer hardware and software	-	10.12	10.12	20.24
(b)	Setting up server sites and LAN	-	1.93	2.26	4.19
(c)	Procuring professional service for equipment installation, system configuration, etc	-	2.40	2.40	4.80
(d)	Hiring contract staff for system implementation	0.24	14.33	13.02	27.59
(e)	Contingency	0.02	2.88	2.78	5.68
	Sub-total	**0.26**	**31.66**	**30.58**	**62.50**
(f)	Providing for REO staff costs	-	1.96	1.96	3.92
	Sub-total	-	**1.96**	**1.96**	**3.92**
	Total	**0.26**	**33.62**	**32.54**	**66.42**

B. Recurrent Costs

		2003-04 $million	2004-05 and onwards $ million
(a)	Maintaining hardware and software	3.18	3.26
(b)	Purchasing consumables	0.36	0.87
(c)	Hiring contract operators to support daily operation	0.67	1.61
(d)	Hiring maintenance services for sub-systems	-	0.65
(e)	Hiring contract staff responsible for on-going maintenance and minor enhancements	1.38	3.30
(f)	Miscellaneous	0.27	0.66
	Total	**5.86**	**10.35**

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Cost Comparison of
Three Options Proposed in Feasibility Study

Option 1   -   redeveloping a new EARS (the recommended option)

Option 2   -   enhancing the existing EARS

Option 3   -   customising an off-the-shelf voter registration package

	Option 1 $million	Option 2 $million	Option 3 $million
Non-recurrent costs[1]	66.42	79.81	103.91
Recurrent costs per annum [2]	10.35	18.87	18.85

[1]   made up of hardware and software, site preparation, professional service, contract staff service, contingency as well as government staff costs required for system implementation.

[2]   made up of hardware and software, consumables, support service, professional service, contract staff service, miscellaneous as well as government staff costs required for maintaining the system annually.