For discussion
on 7 February 2012

Legislative Council Panel on Security

Development of Asset Management and Maintenance System in the Fire Services Department

PURPOSE

This paper aims to provide supplementary information on the proposal to develop the Asset Management and Maintenance System (AMMS) in the Fire Services Department (FSD) in response to the request of the Panel.

BACKGROUND

2. At the Panel meeting on 6 December 2011, Members were consulted on the proposal to develop the AMMS in FSD (LC Paper No. CB(2)447/11-12(03)). Members expressed concerns on the specific functions of the proposed AMMS, and the potential manpower savings and their redeployment subsequent to the implementation of the proposed system.

BACKGROUND OF DEVELOPING AMMS

3. The fire-fighting and rescue work of FSD requires specialized equipment and materials such as fire appliances, fireboats, ambulances, communication equipment, breathing apparatus, personal protective gears, fire extinguishing foam, rescue tools, first aid supplies and medicines, etc. Other supporting equipment and materials such as uniforms, computer system and office equipment are also necessary. Currently, there are about 19 000 types of assets in FSD, with a total value of about $820 million. They either carry an expiry date or are subject to wear and tear in daily operation. A steady supply of these materials and the safety and reliability of their functions/conditions are vital to the discharge of fire-fighting and rescue duties by frontline staff and the operations of the department.

4. At present, detailed information of these assets are either kept in paper form or electronically in separate databases in different locations, and are managed by various units including individual fire stations and ambulance depots, etc. Owing to the lack of an integrated computer system in FSD, the department cannot effectively monitor the performance and status of these assets. In addition, FSD does not have a centralised computer system to keep the maintenance records of fire engines, equipment and rescue tools. More time and manpower is thus required to prepare the relevant analysis reports and such reports are unable to present an overall picture, which affect the efficiency of the monitoring work.

5. The Efficiency Unit (EU) has completed the study on procurement and related management issues for FSD. We briefed Members on the findings of the study at the Panel meeting on 17 January 2011. The study pointed out that due to the lack of an integrated computer system in FSD, much of the procurement work was carried out manually. The absence of readily available management information also made it difficult for the department to monitor the effectiveness of procurement and inventory control, evaluate suppliers' performance and support the procurement planning work. In the light of these issues, the study recommended FSD to develop an integrated computer system to improve the efficiency and effectiveness of its procurement work.

PROPOSED DEVELOPMENT OF AMMS

6. The AMMS proposed by FSD will cover the whole life cycle of asset management, including procurement planning, acquisition, inventory control, asset maintenance and disposal. The system will provide an integrated electronic platform and database for keeping and consolidating asset information (such as value of the assets and their location, stock quantity, maintenance and disposal records, etc.) in various units and locations. The system will enable the staff of different units to speedily access and retrieve such information, thus making the control of a wide variety of assets and related procurement work more effective. This will in turn facilitate and support FSD in providing reliable services to the public.

7. The proposed AMMS will be developed on the basis of an off-the-shelf enterprise resource planning system[1], and be suitably modified to meet the needs of FSD. The system will provide an integrated database that will centrally and systematically record all asset-related data of the department. It will also automate manual operations as far as possible, and provide statistical and management reports. These functions can support the department in the following areas:

(a) Supply chain management – process applications for materials supply, draw up procurement plans, prepare supplier lists, invite quotations, issue purchase orders, issue notices for goods delivery, record goods delivery details and arrange for payments;

(b) Inventory control – forecast materials demand, set safety stock levels for warehouses, track the asset status, control release of batches and support barcode identification technology;

(c) Repair and Maintenance management – support allocation planning of maintenance materials and manpower, develop maintenance timetables, schedule and monitor maintenance operations as well as efficiency; and

(d) Business intelligence analysis – provide analytical and reporting tools for more effective management and maintenance of assets.

The major functions of AMMS and specific examples are set out in **Annex A**.

EXPECTED BENEFITS

8. The EU has completed a business process study for the proposed AMMS, and considered that the proposed system can improve the quality and standard of work on procurement and asset management, thus bringing about the following benefits to FSD :

[1] **An enterprise resource planning system** refers to an off-the-shelf software package which can meet the organizational needs on asset management and deployment of other resources through the provision of a centralised database and integrated functions.

(a) Enhance decision making – to address the problem that FSD's asset information is in paper form and stored in different locations, the proposed AMMS can centralise the storage of a large amount of asset data and perform systematic analysis. This will facilitate the staff to make decision and enhance the quality of the decision-making process. For example, the AMMS can help monitor the procurement progress, assess the effectiveness of maintenance work, project budget requirements, and formulate asset replacement schedule, etc.

(b) Enhance asset performance monitoring – the proposed AMMS will centrally keep assets maintenance records and data on required parts and suppliers to allow real-time checking. This will facilitate the concerned staff to analyse data and information on the suppliers' performance, observe the trends and identify potential problems in advance. For example, maintenance staff may analyse the maintenance records and causes of fault, and accordingly adjust the asset maintenance programme and replacement plans in order to ensure that reliable services are provided to support frontline operations.

(c) Optimise inventory level – Through its centralised database, the AMMS can provide information on the stock level of warehouses in various locations, level of demand, and past consumption pattern, etc. This can assist the staff to replenish the materials at the right time and with the right quantity, so as to reduce the space and cost of storage. Excessive or shortage of stock can be avoided as well.

(d) Increase asset availability – For those assets requiring regular maintenance, such as vehicles, fire-fighting equipment and rescue tools, FSD at present prepares the preventive maintenance schedule manually and performs the maintenance on a regular basis in accordance with a fixed schedule (e.g. three times of maintenance per year for fire engines). However, the actual circumstances may not have been taken into account in formulating such schedules, such as the availability of spare parts and relevant maintenance staff. The proposed AMMS can take into account the number of maintenance staff and their workload on hand, pre-set maintenance requirements for vehicles / equipment such as vehicle mileage and age, availability of spare parts and maintenance reserve, and devise a preventive maintenance schedule more suitable than the fixed schedule currently being used. The waiting time for the maintenance staff and supply of spare parts can be shortened, and the availability of asset can be increased.

FINANCIAL IMPLICATIONS

Non-recurrent Expenditure

9. We estimate that the implementation of the proposed AMMS will require a total non-recurrent expenditure of $49.830 million over a five-year period from 2012-13 to 2016-17 for the acquisition of computer hardware, software and related services. A detailed breakdown is at **Annex B**. Meanwhile, it will entail an additional non-recurrent staff cost of $2.773 million, involving a total of 58 man-months of fire services officers and civilian staff for managing the project. FSD will absorb the staff costs through internal redeployment.

Recurrent Expenditure

10. We estimate that the recurrent cost for the implementation of the proposed AMMS is $4.520 million (in a full year) from 2016-17 onwards. Such requirements will be reflected in the Estimates of the relevant years. A detailed breakdown is at **Annex C**. FSD will redeploy within the existing resources a total of 15 man-months of fire services officers, civilian staff and IT staff to manage the system and provide system support, entailing a recurrent staff cost of $0.877 million per annum to be partly offset by savings in manpower resources described in paragraph 11(b) below.

Cost Savings

11. We estimate that the implementation of the proposed AMMS will bring about annual savings of about $8.538 million in a full year from 2015-16 onwards, comprising -

(a) *Realisable savings*

Since the proposed AMMS can improve the procurement efficiency and make more accurate forecast of the stock consumption rate, we expect that a reduction of 1% of the stock, i.e. savings of about $0.84 million, can be achieved. In addition, AMMS can enhance the asset maintenance work and thus extend the usable life of asset. Basing on the annual expenses on the procured machinery, vehicles and equipment, it is estimated that the AMMS can reduce 2% of the depreciation rate, i.e. savings of $1.138 million can be achieved. AMMS can also reduce the annual maintenance cost of the existing standalone database system of about $19,000. We estimate that the total savings will be $1.997 million.

(b) Notional savings

The notional savings will be achieved through productivity gains by automating some clerical work of various units in planning, procurement, inventory control, maintenance and disposal of old equipment after implementation of the AMMS. According to the estimation of FSD and EU, a total of about 117 man-months, i.e. staff cost of about $6.541 million, can be saved per annum.

At present, many of the staff members concerned are not solely dedicated or working full time on asset management and maintenance duties. Instead, they work under more than 160 work units at different locations including fire stations, Procurement and Logistic Unit, Workshop and Transport Division, etc. Therefore, FSD cannot delete the same number of staff directly upon the implementation of the AMMS. Notwithstanding, FSD will redeploy the manpower savings internally to further enhance its service quality. Apart from handling the work described in paragraph 10, the manpower savings can also help to enhance the following work:

(i) allow operational staff to concentrate on their frontline work;

(ii) enhance the service quality of the maintenance work;

(iii) cope with new vehicles and equipment maintenance work;

(iv) strengthen the testing on and inspections of existing equipment; and

(v) enhance efforts in keeping up with new development and new technologies of fire-fighting equipment, and introduce them to FSD for use by frontline staff as necessary.

IMPLEMENTATION PLAN

12. We plan to implement the project according to the timetable as follows and expect the system to be commissioned by October 2014 –

	Programme	Target Completion Date
(a)	Tender preparation, evaluation and award of contract	November 2012
(b)	System analysis and design	May 2013
(c)	Site preparation, procurement of hardware / software, system installation and modification	March 2014
(d)	System integration tests, data conversion / migration, and security risk assessment and audit [2]	July 2014
(e)	User training	September 2014
(f)	System live-run	October 2014

ADVICE SOUGHT

13. Subject to Members' views, we plan to seek funding approval from the Finance Committee in April 2012.

Security Bureau
Fire Services Department
January 2012

[2] Since the proposed AMMS will keep sensitive data such as tender information and vender details, a security risk assessment and audit to the AMMS is required in accordance with the guidelines of the Office of the Government Chief Information Officer.

Annex A

The Major Functions of AMMS

	Major functions	Examples
(1)	***Supply Chain Management*** AMMS will systematically record the whole supply chain flow and procedures involved for real-time access and use by the management for tasks such as applying for materials, formulating procurement plans, preparing supplier lists, inviting quotations from suppliers, issuing purchase orders, requesting for delivery, recording details of goods received and arranging for payment, etc. AMMS will prompt the staff concerned to take appropriate actions and prepare related documents for control and follow-up by the management.	• After a staff member has completed an application form in the system (e.g. applying for uniforms), the system will automatically verify his eligibility. If approval is required for the application, AMMS will automatically forward the form to the responsible staff for approval. The system will keep track of the progress of the application on a real-time basis for reference by the concerned staff. • When the stock level falls below the quantity expected to be required, AMMS will automatically notify the staff responsible for procurement, and prepare related documents for their consideration and verification. The whole procurement process will be recorded in the system, thereby assisting staff concerned to monitor and follow-up the progress.
(2)	***Inventory control*** AMMS can set pre-defined safety stock level for individual items, and can forecast future consumption rate according to past procurement lead time, records of application, life span of products,	• Basing on the number of staff eligible for applying for uniforms, past trends of application, number of cases on hand, etc., AMMS will automatically calculate the types and quantity of uniform which should be procured, and remind

	Major functions	Examples
	etc. Reminders for timely procurement will also be issued. AMMS will support barcode identification technology to enable accurate and speedy record of inventory information, e.g. details of the supplier, batch number and life span, etc. This will facilitate the department to monitor the flow and distribution of the assets and their effective consumption.	procurement staff to timely replenish an appropriate quantity of stock, with a view to reducing the chance of having excessive or shortage of stock. • AMMS will record the barcodes of products with an expiry date (e.g. first-aid items or medicines) for monitoring their life span, and advising staff concerned to adopt the 'first-in, first-out' rule when distributing and using such products. The system will also issue reminders to the staff in possession of the products near their expiry.
(3)	***Repair and Maintenance management*** AMMS can generate preventive maintenance programmes in accordance with pre-defined criteria of the department and related information. The idle time for vehicles/equipment to wait for maintenance staff and replenishment of spare parts at the workshop can be reduced, thus increasing the availability of the assets.	• AMMS will take into account the number of maintenance staff and their workload, the pre-defined maintenance criteria such as the mileage and age of a vehicle, the availability of spare parts and supply of maintenance reserve in formulating the preventive maintenance programme. It will automatically issue advance notice to related units for maintenance. • AMMS will forecast the quantity of spare parts required for future maintenance work basing on the existing types and quantity of vehicles and the requirement of each time of maintenance. It will automatically issue reminders for procurement to

	Major functions	Examples
		ensure timely supply of spare parts, and can therefore reduce the number of occasions in which shortage of spare parts is found during maintenance.
(4)	***Business Intelligence Analysis*** AMMS will record information of assets throughout their life cycle, provide analytical and reporting tools to assist concerned staff to conduct in-depth analyses, and compile statistics on important information relating to asset management. These analysis and reports can help the management to monitor and ensure that the quantity, performance and conditions of the assets are maintained at a safe and reliable level.	• When it is confirmed that major maintenance is required for a fire appliance, maintenance staff can directly and promptly check and obtain data of the appliance stored in the database of AMMS (such as the original purchasing price of the fire appliance, maintenance records and expenses, performance and conditions of the fire appliance, etc.). AMMS can assist the concerned staff in making decision on major repair / disposal / replacement by analysing such data and comparing it with appliances of the same type. • Moreover, the Procurement and Logistics Group may promptly obtain information on the consumption rate and pattern of consumables in a particular period through the analysing tools of AMMS. Responsible staff can take follow-up action timely if abnormal changes in such data are observed.

Annex B

Non-Recurrent Expenditure for the Development of the Asset Management and Maintenance System

	Items	2012-13 ($'000)	2013-14 ($'000)	2014-15 ($'000)	2015-16 ($'000)	2016-17 ($'000)	Total ($'000)
(a)	Hardware	-	1,919	8,959	1,920	-	12,798
(b)	Software	-	966	1,772	484	-	3,222
(c)	Implementation Services	-	2,851	6,408	3,890	5,862	19,011
(d)	Contract Staff	750	1,620	1,021	450	-	3,841
(e)	Site Preparation	-	-	960	-	-	960
(f)	Consumables	-	-	987	-	-	987
(g)	Data Conversion	-	-	4,048	-	-	4,048
(h)	Security Risk Assessment and Audit	-	-	273	-	-	273
(i)	Training	-	-	160	-	-	160
	Sub-total :	750	7,356	24,588	6,744	5,862	45,300
	Contingency :	75	736	2,459	674	586	4,530
	Total :	**825**	**8,092**	**27,047**	**7,418**	**6,448**	**49,830**

Annex C

Recurrent Expenditure (in a full year) for the Implementation of the Asset Management and Maintenance System

	Item	2016-17 onwards ($'000)
(a)	Hardware and Software Maintenance	1,478
(b)	System Support Services and Maintenance	2,698
(c)	Consumables	344
	Total :	**4,520**