CHAPTER 7

Transport Department

Implementation of the Vehicles and Drivers Licensing Integrated Data IV System

Audit Commission
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This audit review was carried out under a set of guidelines tabled in the Provisional Legislative Council by the Chairman of the Public Accounts Committee on 11 February 1998. The guidelines were agreed between the Public Accounts Committee and the Director of Audit and accepted by the Government of the Hong Kong Special Administrative Region.

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IMPLEMENTATION OF THE VEHICLES AND DRIVERS LICENSING INTEGRATED DATA IV SYSTEM

Contents

PART 1: INTRODUCTION

1.1 This PART describes the background to the audit and outlines the audit objectives and scope.

Background

1.2 The Transport Department (TD) is the authority for administering the Road Traffic Ordinance (Cap. 374) and the legislation regulating public transport operations. One of its major responsibilities is the registration, licensing and inspection of vehicles, and licensing of drivers (Note 1). The TD owns and operates a computer-based system, known as the Vehicles and Drivers Licensing Integrated Data (VALID) System, for providing services relating to the registration of vehicles, transfer of vehicle ownership, issue and renewal of driving and vehicle licences, reservation of vehicle registration marks, and change of particulars of drivers and vehicle owners.

1.3 The VALID System was first introduced in 1974, upgraded to the second generation (known as VALID II) in 1976 and to the third generation (known as VALID III) in 1991. In addition to the TD's operational needs, the VALID III System also supported the operational requirements of eight government departments (viz. the Customs and Excise Department, the Environmental Protection Department, the Hong Kong Police Force, the Housing Department, the Independent Commission Against Corruption, the Inland Revenue Department, the Judiciary and the Treasury) under different application subsystems (Note 2). The VALID III System was run on a mainframe computer system with limited capabilities and functions (Note 3).

Note 1: *As at 30 September 2009, there were 638,500 registered vehicles, 578,600 licensed vehicles and 1,813,000 driving licences (i.e. 1,742,800 full driving licences, 1,300 driving instructor licences, 13,700 probationary driving licences and 55,200 learner's driving licences).*

Note 2: *These subsystems, including the Driver subsystem, the Driving Offence Point subsystem, the Driving Test Appointment subsystem, the Fixed Penalty Moving subsystem, the Fixed Penalty Parking subsystem, the Non-fixed Penalty subsystem, the Target Tracking subsystem and the Vehicle subsystem, provided different functionalities and features to support the operational needs of the TD and the other eight government departments.*

Note 3: *The system supported the functions of about 350 user terminals. Its limitations included the failure to support real-time data exchange between subsystems or input of Chinese characters, inflexibility in system enhancement, inability to support round-the-clock licensing transactions and difficulties in the replacement of some obsolete terminal spare parts.*

1.4 In 2000, the Efficiency Unit of the Chief Secretary for Administration's Office completed a feasibility study and concluded that the VALID III System was unable to meet the changing requirements and new functionalities required for supporting the operational needs of the TD and other user departments. To improve the operational efficiency and the delivery of customer service, the TD proposed to replace the VALID III System by a more advanced fourth generation computer system known as the VALID IV System.

1.5 The VALID IV System was a complex web-based computer system capable of handling a large increase in users, workload or transactions. The system also has the flexibility for system enhancement, and the ability for real-time data exchange (between system and subsystems), sharing of database and round-the-clock operation (Note 4).

System implementation

Funding approval

1.6 In June 2001, the Finance Committee (FC) of the Legislative Council approved funding of $110 million for implementing the VALID IV System to replace the VALID III System, with a target implementation date of end 2004. According to the funding submission to the FC, the project funds of $110 million would be used for purchasing computer hardware and software, site preparation, application development, implementation services and data conversion.

Award of contract

1.7 According to the Stores and Procurement Regulations, the Government Logistics Department (GLD — Note 5) is the agent for procuring stores (including administrative computer systems) for government departments. In May 2003, the GLD, as the Authorised Contractual Authority, awarded a contract (the Contract) to a contractor (the Contractor) for:

(a) developing the VALID IV System in the sum of $60.9 million; and

(b) maintaining the system at an annual cost of $5.7 million over a period of nine years after the one-year warranty period.

Note 4: *The system has 17 functional modules, 31 system interfaces with other systems/ subsystems and more than 30,000 programs (together with around 500 functions). The system can be operated through over 440 user terminals, supporting input in both Chinese (including simplified Chinese characters) and English.*

Note 5: *In July 2003, the GLD was established by merging the former Government Land Transport Agency, the Government Supplies Department and the Printing Department. For simplicity, the former Government Supplies Department is referred to as the GLD in this Report.*

1.8 Apart from the services provided under the Contract, some other services related to the project implementation would also be funded out of the $110 million approved by the FC. These included, for example, the site preparation work for the computer centres for the VALID IV System.

Monitoring mechanism

1.9 Starting from early 2001, bureaux/departments are responsible for the management and delivery of their own information technology projects (Note 6). The TD, being the owner of the VALID IV project, has the responsibility to monitor the project expenditure and implementation progress, to ensure the delivery of anticipated benefits on full implementation of the system, and to update the Office of the Government Chief Information Officer (OGCIO — Note 7) regularly on the project progress. The OGCIO's standard of project management methodology, known as the Projects in Controlled Environments (PRINCE — Note 8), was adopted by the TD for managing the project. After the award of the Contract, in June 2003, the TD set up a Project Steering Committee (PSC) in accordance with PRINCE (see para. 2.14) to provide overall guidance and direction for the VALID IV project.

1.10 The OGCIO, being the government information technology adviser, has the responsibility to review the project status including the project organisation, major milestones, completion date, expenditure situation, intended benefits and other related issues, and to provide advice and assistance to bureaux/departments where necessary.

Note 6: *Before 2001, the Office of the Government Chief Information Officer was responsible for managing and delivering computer projects. Starting from early 2001, bureaux/departments set up their own Information Technology Management Units. These units, staffed by a core team of Analyst or Programmer grade staff, provide support and advice to assist management of the bureaux/departments to formulate information technology strategy.*

Note 7: *In July 2004, the OGCIO was established by merging the former Information Technology Services Department and the information technology related divisions of the Communications and Technology Branch of the former Commerce, Industry and Technology Bureau. For simplicity, the former Information Technology Services Department is referred to as the OGCIO in this Report.*

Note 8: *PRINCE, introduced into the OGCIO in 1992, is a structured set of project management procedures designed specifically for managing projects in the information technology environment. Projects involving administrative computer systems are required to follow the methodology. It enables better planning of projects and more effective management of exceptional situation. The version revised in 2002 was adopted for managing the VALID IV project.*

System development

1.11 Under the Contract, the completion date (Note 9) of the VALID IV project was December 2004 (see para. 2.7), which was in line with the expected system implementation date of end 2004 as stated in the FC funding submission (see para. 1.6). In the event, the contract completion date was extended five times without varying the contract sum (Note 10). Finally, the system was rolled out in two phases. Phase I, consisting of the core functions, was rolled out in February 2007, while the entire system with the remaining non-core functions (i.e. Phase II) was rolled out in September 2007. As at 30 November 2009, the cost of the VALID IV project was $99 million (see Appendix A), which included the final contract sum of $61.1 million for developing the system (Note 11).

Audit review

1.12 The Audit Commission (Audit) has recently conducted a review of the TD's planning, monitoring and implementation of the VALID IV project. The audit review focused on the following areas:

(a) project planning and monitoring (PART 2);

(b) system implementation (PART 3); and

(c) post-implementation issues (PART 4).

1.13 Audit has found room for improvement in the above areas and has made recommendations to address the issues.

Acknowledgement

1.14 Audit would like to acknowledge with gratitude the full cooperation of the staff of the TD and the OGCIO during the course of the audit review.

Note 9: *In this Report, the terms "system implementation date" and "contract completion date" are used interchangeably.*

Note 10: *As the extensions of the contract completion date were approved by the GLD, no liquidated damages were imposed on the Contractor.*

Note 11: *The final contract sum included the additional costs incurred for some system enhancements made in the form of contract variations (see para. 3.17(a)).*

PART 2: PROJECT PLANNING AND MONITORING

2.1 This PART examines the planning and monitoring of the VALID IV project, and suggests measures for improvement in the following areas:

(a) tendering process (paras. 2.2 to 2.9);

(b) extension of contract completion date (paras. 2.10 to 2.13); and

(c) project management structure (paras. 2.14 to 2.30).

Tendering process

2.2 After obtaining funding approval for the VALID IV project in June 2001, the TD drew up a tender evaluation plan (Note 12). Tenders for the project were invited in May 2002. After evaluating the tenders and negotiating with the recommended tenderer, the Contract was awarded in May 2003. Appendix B shows a chronology of the key events for the tendering process of the project.

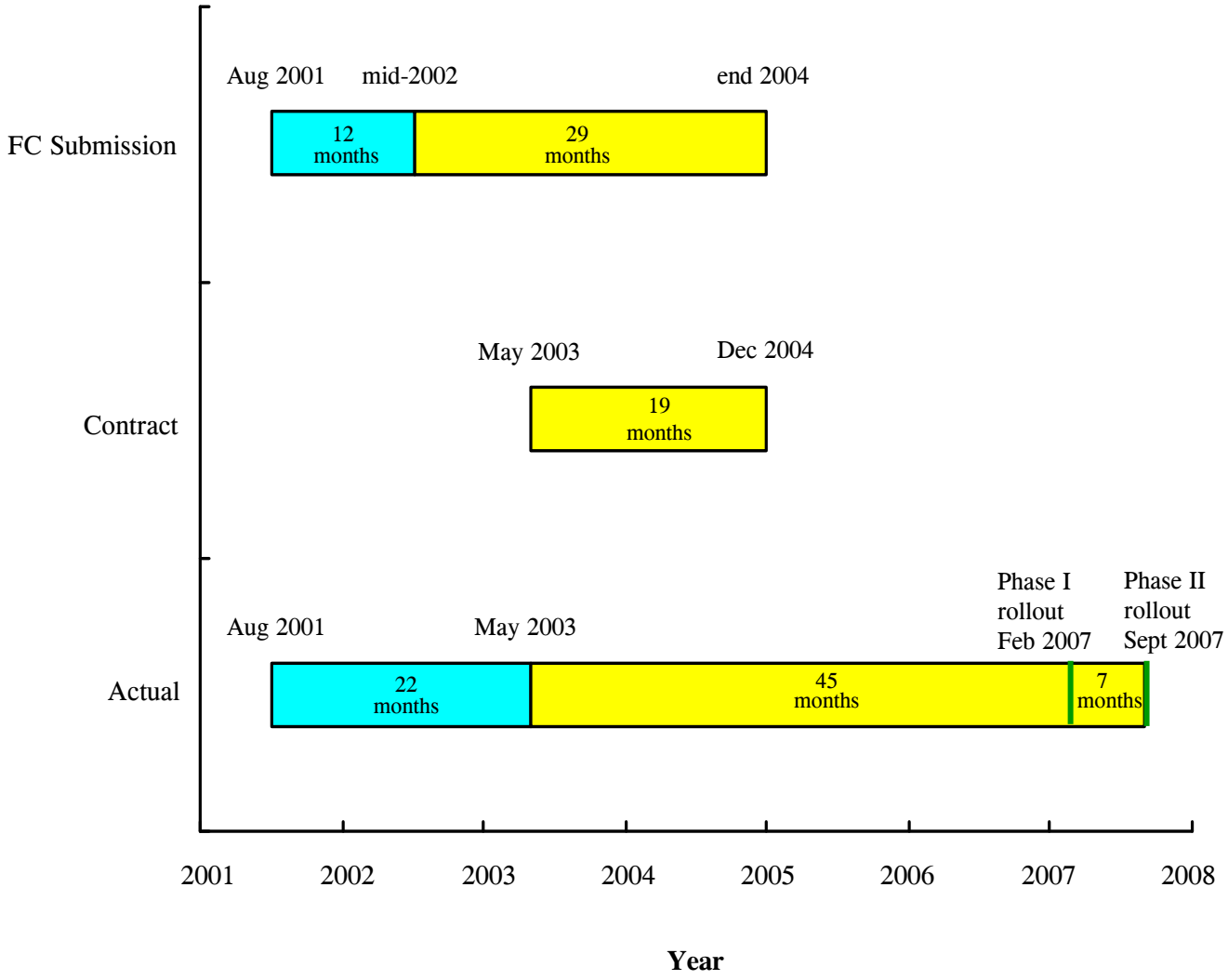
Audit observations and recommendations

2.3 According to the funding submission of the project to the FC, the expected tendering completion date was mid-2002, and the expected system implementation date was end 2004. However, the tendering process was not completed until May 2003, i.e. 10 months after the expected tendering completion date. Phase I of the system (with the core functions) was implemented in February 2007, and the entire system was rolled out in September 2007 (i.e. 33 months after the expected system implementation date). Figure 1 shows a comparison of the time scheduled for the tendering process and the system implementation as indicated in the FC submission, the original system implementation period stated in the Contract, and the actual time taken for the tendering process and system implementation.

Note 12: *A tender evaluation plan is a plan mapping out the tender evaluation organisation structure, evaluation methods and procedures, milestones, deliverables and timing associated with the tendering and selection process of the project.*

Figure 1

Comparison of planned and actual durations



Legend: Tendering process

System implementation

System rollout

Source: TD records

2.4 The tendering process comprised two stages: (a) tender preparation; and (b) tender invitation and evaluation, and tender negotiation and award of contract. Table 1 shows a comparison of the planned and actual duration of the tendering process.

Table 1

Duration of the tendering process

<table>
<tr><th rowspan="2">Tendering process</th><th colspan="3">Duration</th></tr>
<tr><th>Planned</th><th>Actual</th><th>Slippage</th></tr>
<tr><td>Tender preparation</td><td>Aug 2001 to Jan 2002
(6 months)</td><td>Aug 2001 to May 2002
(10 months)</td><td>4 months</td></tr>
<tr><td>Tender invitation and evaluation</td><td rowspan="2">Feb to Jul 2002
(6 months — Note)</td><td>May to Dec 2002
(8 months)</td><td rowspan="2">6 months</td></tr>
<tr><td>Tender negotiation and award of contract</td><td>Jan to May 2003
(4 months)</td></tr>
<tr><td>Total</td><td>12 months</td><td>22 months</td><td>10 months</td></tr>
</table>

Source: TD records

Note: The tender evaluation plan did not differentiate between the process of tender invitation and evaluation, and the process of tender negotiation and award of contract.

2.5 According to TD records, the slippage was due mainly to the longer time required to:

(a) obtain advice from the Department of Justice, the GLD and the Intellectual Property Department on the draft tender documents; and

(b) negotiate with the recommended tenderer on contract price, terms and conditions.

2.6 ***Need to allow sufficient time for tender negotiation.*** With regard to paragraph 2.5(b), the GLD commented in February 2002 that the proposed timetable in the tender evaluation plan was unrealistic. Specifically, the plan only allowed 24 days for the GLD to complete a number of processes, including vetting the TD's tender recommendation, conducting negotiation with the recommended tenderer and preparing the submission to the Central Tender Board. According to the GLD, it was impossible for the GLD to complete the required work within the given time for such a high-value and complex tender. In response, the TD revised the plan to allow 31 days for the GLD's work. In the event, the time allowed proved to be seriously inadequate, and the GLD took 6 months to complete its work, which included 4 months for conducting negotiation with the recommended tenderer.

2.7 ***Need to assess knock-on effect on system implementation date.*** As mentioned in paragraph 1.6, according to the funding submission, the expected system implementation date was set at end 2004. The slippage of 10 months in completing the tendering process posed a threat to the achievability of the expected system implementation date. In Audit's view, the slippage should have prompted the TD to conduct a thorough assessment of the need to postpone the system implementation date, or to take additional measures to make up for the lost time. However, there was no documentation of such an assessment and, in the Contract awarded in May 2003, the Contractor was required to complete the Contract within 19 months from the award of the Contract (i.e. not later than December 2004). In other words, little allowance was given to the knock-on effect of the tendering delay, and as a result, a much shorter time was allowed for implementing the system and completing the Contract, compared with 29 months in the original plan (see Figure 1 in para. 2.3).

2.8 **Audit has *recommended* that, in planning for a large-scale computer project in future, the Commissioner for Transport should:**

(a) **in consultation with the Director of Government Logistics, ensure that sufficient time is allowed in the tender evaluation plan for conducting tender evaluation and negotiation with the recommended tenderer, taking into account the scope and complexity of the project; and**

(b) **ensure that the contract completion date is realistic, taking into account the knock-on effect of any slippage in completing the tendering process.**

Response from the Administration

2.9 The **Commissioner for Transport** agrees with the audit recommendations. He has said that, in planning for a large-scale and complex computer project in future, the TD will:

(a) consult the GLD on the time frame for tender evaluation and negotiation to ensure the timely delivery of the project; and

(b) endeavour to set a realistic project completion date, taking into account the knock-on effect of any slippage in completing the tendering process.

Extension of contract completion date

2.10 The original contract completion date of the VALID IV System was December 2004. It was subsequently extended five times, from December 2004 to September 2007, for a total of 33 months. According to the Contract, prior approval of the GLD, the Authorised Contractual Authority, was required for any variations to the terms and conditions of the Contract, including the extension of the contract completion date.

Audit observations and recommendations

2.11 Audit examination of TD records revealed that, of the five extensions of the contract completion date, only the first extension had the GLD's prior approval. For the remaining four extensions, the GLD's approvals were given, on average, 3.75 months after the expiry of the last extended contract completion dates. Case A below is an example.

Case A: The fourth extension of contract completion date

Case particulars

By 2006, the Contract was still in progress, and the contract completion date had already undergone three extensions, from December 2004 to 30 April 2006. In view of the possible further delay in system implementation, the TD held a meeting with the GLD and the Contractor in March 2006 to discuss further extension and a proposed two-phased implementation approach. According to the TD's explanation given to Audit in January 2010, owing to the complexity of the proposed approach, the application for the fourth extension could not be submitted before the expiry of the extended contract completion date. It was in August 2006 that the GLD received the application to further extend the contract completion date to June 2007. In the months that followed, correspondence concerning the matter was exchanged among the GLD, the TD and the Contractor. On 26 January 2007, the GLD obtained all the information it considered necessary and, on 2 February 2007, approved the extension of the contract completion date to 29 June 2007.

Audit comments

According to the Contract, the GLD's prior approval was required for an extension of the contract completion date. This was a key control. However, from the above facts, it can be seen that this was a clear case of non-compliance. Audit is concerned that: (a) the application for extension was not made until August 2006, by which time the last extended contract completion date (i.e. 30 April 2006) had already expired by more than three months; (b) it took more than five months (from August 2006 to late January 2007) for the necessary information to be supplied to the GLD to enable it to process the application; and (c) as a result, by the time the GLD's approval was finally given in February 2007, it was already nine months after the expiry of the last extended contract completion date.

Source: TD records

2.12 **Audit has *recommended* that, in administering computer projects in future, the Commissioner for Transport should ensure that the GLD's prior approvals are obtained for extensions of contract completion date in accordance with the terms of the contract. In particular, the Commissioner should:**

(a) **introduce measures to ensure that applications for the extensions of contract completion date are submitted to the GLD well before the expiry of the completion date, so as to allow sufficient time for it to assess the justifications for the applications and their contractual implications; and**

(b) **promptly provide all necessary information as required by the GLD for processing the applications.**

Response from the Administration

2.13 The **Commissioner for Transport** agrees with the audit recommendations. He has said that, in administering a computer project in future, the TD will:

(a) tighten up the monitoring of project implementation, and ensure that applications for the extension of contract completion date, if any, are submitted by the contractor to the GLD well before the expiry of the completion date; and

(b) in collaboration with the contractor, promptly provide all necessary information to the GLD to facilitate the processing of applications.

Project management structure

2.14 A proper project management structure is essential for the effective management of a project. According to PRINCE, a PSC should be set up for the overall project management and major decision making of a project. The PSC approves all major plans and authorises exceptions. The major responsibilities of the PSC are to:

(a) review and approve technical and resource plans of individual project stages;

(b) conduct end stage assessment, which is a key control in project management. At the end of each stage of a project, the PSC will review the situation and decide whether the project should proceed to the next stage;

(c) review and approve actions for project exceptions and contract variations;

(d) authorise the start of the next stage; and

(e) ensure that all products of each project stage are delivered satisfactorily.

2.15 One of the major functions of the PSC is project assurance (i.e. to assure the TD that the project remains on course to deliver products of the required quality). The PSC can delegate the project assurance work to project assurance teams. However, it has the ultimate responsibility to ensure the integrity of the project. After setting up a PSC in June 2003 for the VALID IV project, the TD set up a Project Assurance Team (Note 13) in July 2003 to take up the project assurance function.

Audit observations and recommendations

Frequency of PSC meetings

2.16 According to TD records, the PSC held a total of 8 meetings during the 52-month implementation period of the VALID IV project (i.e. from May 2003 to September 2007). These meetings were held at an average interval of 6 months, with intervals ranging from 3 to 11 months between meetings (see Appendix C). Given the important roles of the PSC, Audit considers that more frequent meetings might be needed for effective project management.

Exception reports approved by PSC

2.17 According to PRINCE, a major task of the PSC is to review and approve project exceptions and contract variations. When the project is likely to fall behind schedule, an exception report of the situation and the recommended remedial measures should be presented to the PSC for approval.

2.18 During the implementation of the VALID IV project, six exception reports were produced. Four of them were discussed and approved at PSC meetings. The remaining two were circulated by e-mails to members for review and approval (Note 14). In Audit's view, the review and approval of exception reports by the PSC was a key control. The reports should have been thoroughly discussed and approved by the PSC at formal meetings, instead of by circulation.

Note 13: *Chaired by a Principal Executive Officer of the TD, the Project Assurance Team coordinated project activities at working level on a day-to-day basis.*

Note 14: *Of these two exception reports, one was for Stage 1 (i.e. the system analysis and design stage), and the other was for Stages 2 to 4 (i.e. the system development, user acceptance test and data conversion stages). These reports were approved by e-mails in July 2004 and September 2005 respectively.*

End stage assessment reports approved by PSC

2.19 According to PRINCE, another key control is the review and approval by the PSC of end stage assessment reports (see para. 2.14(b)). At the end of each stage of a project, the PSC is supposed to review the situation and decide whether the project should proceed to the next stage.

2.20 According to TD records, the end stage assessment reports for four stages were approved in a timely manner. For two stages (i.e. Stage 1 and Stage 4), however, the end stage assessment reports were only approved by the PSC 7 months and 3.5 months respectively after the completion of the stages. Table 2 shows the details.

Table 2

Approval of end stage assessment reports

Stage	Stage completion date (a)	Date of PSC's approval of end stage assessment report (b)	Time lapse (c) = (b) – (a)
1. System analysis and design	30.4.2004	3.12.2004	7 months
2. System development	12.1.2007	19.1.2007	7 days
3. User acceptance test	12.1.2007	19.1.2007	7 days
4. Data conversion	26.9.2006	19.1.2007	3.5 months
5. Implementation Phase I	13.9.2007	14.9.2007	1 day
6. Implementation Phase II	17.10.2007	18.10.2007	1 day

Source: TD records

2.21 Audit found that the PSC's belated approvals were due apparently to the long intervals between its meetings (see Appendix C). For Stage 1, the end stage assessment report was approved at the 4th PSC meeting held in December 2004. There was an interval of 8 months between the 3rd and the 4th PSC meetings. As for Stage 4, the report was approved at the 7th PSC meeting held in January 2007, with an interval of 10 months

between the 6th and the 7th PSC meetings. In Audit's view, the reports should have been approved in a timely manner for the intended control to function effectively. These audit findings also highlight the need for more frequent PSC meetings, a point Audit raised in paragraph 2.16.

Additional management meetings

2.22 In addition to the meetings held by committees under the formal management structure specified by PRINCE, the TD regularly held three groups of management meetings (hereinafter referred to as additional management meetings — Note 15) since September 2004, May 2005 and September 2005 respectively, to strengthen the monitoring of the project. In response to Audit's enquiry, the TD informed Audit in January 2010 that the purposes of the meetings were to: (a) update all parties of the latest development; (b) resolve all identified problems immediately; and (c) agree on the priority tasks of the project.

2.23 From September 2004 to May 2007, a total of 53 additional management meetings were held. The majority of the standing members of these meetings were also members of the PSC. Terms of reference for the additional management meetings were not laid down. There was no documentation to clearly define the organisational relationship between the three groups of additional management meetings and the PSC. It was also not clearly spelt out how the roles and responsibilities of these meetings were to interact with those of the PSC.

2.24 The OGCIO was, initially, not aware of the holding of additional management meetings. In May 2006, the OGCIO raised concerns about the frequency and manner of these meetings, particularly the increasing number of key project issues being discussed at the meetings. In response, the TD explained that the additional management meetings were held to strengthen the monitoring process in view of the slow progress of the project. Upon the TD's invitation, with effect from June 2006, the OGCIO's representative attended these meetings.

2.25 As holding additional management meetings regularly might have the effect of altering the existing project management structure under PRINCE, Audit considers that the TD should have sought timely advice from the OCGIO on the matter. In consultation with

Note 15: *The first group of additional management meetings was chaired by the Commissioner for Transport. The second group was chaired by a Principal Executive Officer and the third group was chaired by an Assistant Commissioner for Transport.*

the OGCIO, the TD should also have clearly defined how the regular additional management meetings were to fit into the management structure specified by PRINCE, and how their roles and responsibilities were to interact with those of the PSC.

OGCIO's requirements to enhance project governance

2.26 In March 2006, the OGCIO issued a circular to bureaux/departments to enhance the governance for computer projects with effect from 1 April 2006. According to the circular, under the enhanced project governance mechanism, for projects with an estimated cost over $100 million:

(a) departments submit monthly status updates of the projects to the OGCIO; and

(b) the Government Chief Information Officer attends the PSC meetings.

2.27 However, the aforesaid requirements were not strictly followed in the VALID IV project. Audit found that:

(a) quarterly status updates of the project (instead of monthly updates) were submitted to the OGCIO; and

(b) the Government Chief Information Officer attended only one PSC meeting held in March 2006. Thereafter, his staff attended the PSC meetings as the OGCIO's representative.

2.28 In this connection, it is relevant to mention an earlier observation made in Chapter 6 of Report No. 52 of the Director of Audit (i.e."Provision of e-government services") issued in March 2009. In that Report, Audit noted that the requirements of the enhanced project governance mechanism were not strictly followed for a number of projects, and recommended that the OGCIO should ensure full compliance with the requirements in future. In response to Audit's enquiry concerning the audit observations in paragraph 2.27, in January 2010, the OGCIO reassured Audit that action had been taken to ensure full compliance in future.

Audit recommendations

2.29 **Audit has *recommended* that, in administering a large-scale computer project in future, the Commissioner for Transport should:**

(a) **ensure that sufficient meetings are held by the PSC to fulfil its roles and discharge its responsibilities;**

(b) **make arrangement for all exception reports to be discussed and approved at PSC meetings, and avoid having such reports approved by circulation;**

(c) **ensure that all end stage assessment reports are reviewed and approved by the PSC in a timely manner; and**

(d) **regarding the holding of different groups of regular management meetings outside the formal management structure specified by PRINCE, seek timely expert advice from the OGCIO on whether it is advisable to do so, and clearly define how their roles and responsibilities should interact with those of the PSC.**

Response from the Administration

2.30 The **Commissioner for Transport** agrees with the audit recommendations. He has said that, in administering a large-scale computer project in future, the TD will:

(a) review project progress regularly to ensure that PSC meetings are held at major project milestones, including the approval of end stage assessment reports and exception reports; and

(b) seek advice from the OGCIO before holding additional management meetings outside the formal management structure specified by PRINCE, if necessary, and clearly define how their roles and responsibilities should interact with those of the PSC.

PART 3: SYSTEM IMPLEMENTATION

3.1 This PART examines the system implementation of the VALID IV project and suggests measures for improvement in the following areas:

(a) project delivery (paras. 3.2 to 3.14); and

(b) enhancements to the VALID IV System (paras. 3.15 to 3.19).

Project delivery

3.2 The VALID IV System was implemented in seven stages, as follows:

(a) ***Stage 1: system analysis and design (SA&D).*** The objective of this stage was to understand the environment of the VALID III System, analyse user requirements and produce system specification;

(b) ***Stage 2: system development.*** Physical system design and development were carried out according to the SA&D report;

(c) ***Stage 3: user acceptance test (UAT).*** Tests were carried out to verify compliance with the functionalities stated in the SA&D report;

(d) ***Stage 4: data conversion.*** The project team collected and confirmed with users the data conversion requirements, and identified the constraints for production cutover (Note 16). The existing data stored in the VALID III System was converted for use in the newly developed VALID IV System;

(e) ***Stage 5: implementation Phase I.*** The objective of this stage was to implement and document the core functions of the VALID IV application system (Phase I), and to conduct user training, disaster recovery drill and system rollout;

(f) ***Stage 6: implementation Phase II.*** The remaining non-core functions of the VALID IV application system (Phase II) were implemented and the entire system was rolled out; and

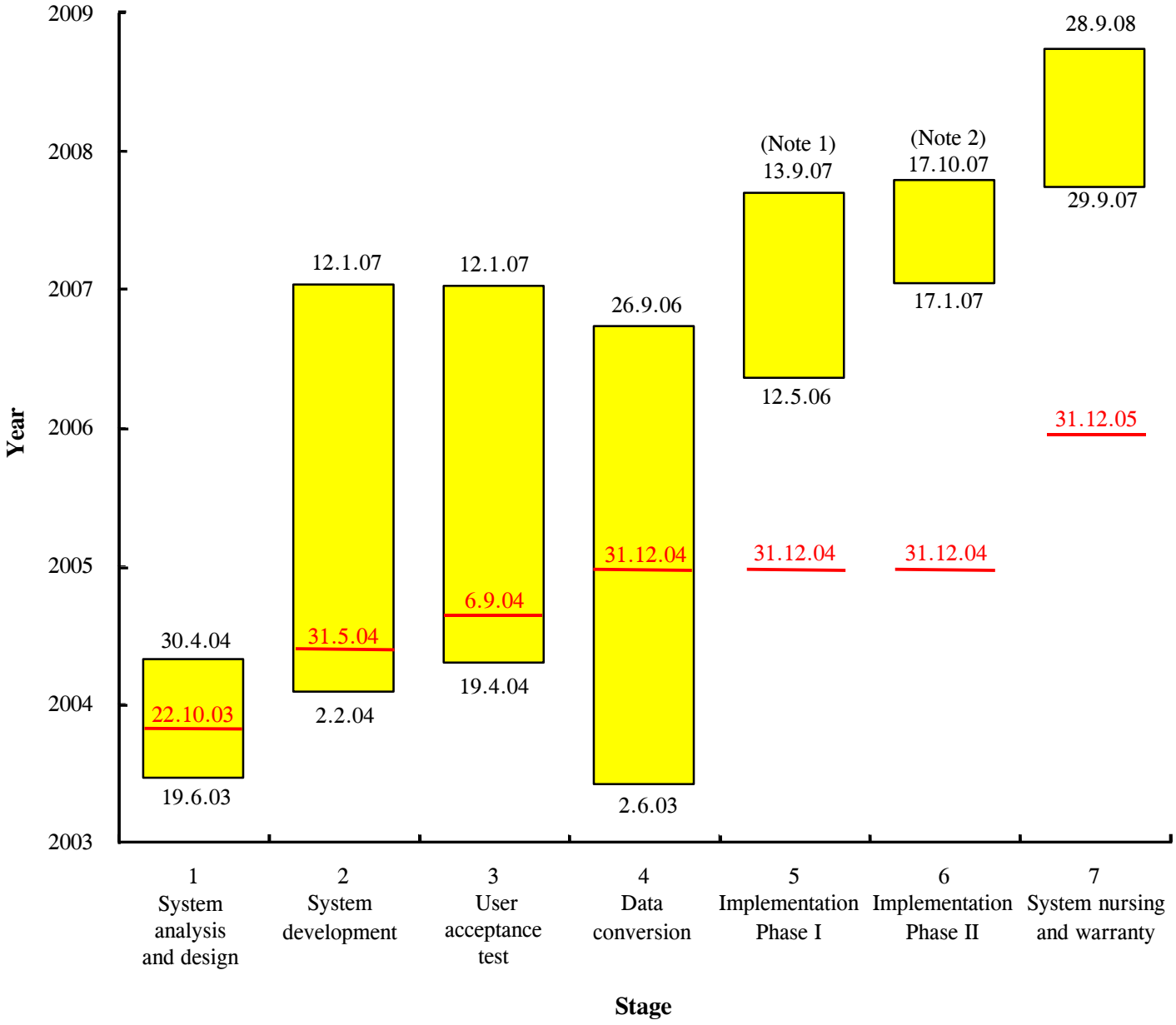
(g) ***Stage 7: system nursing and warranty.*** The Contractor provided nursing service for the system for a period of 12 months after the rollout of the system.

The entire VALID IV System was rolled out in September 2007. Figure 2 shows the durations of the seven stages.

Note 16: *Production cutover is a point at which a new system takes over and the old system is no longer used.*

Figure 2

Seven stages of the VALID IV project



Legend: Planned completion date of the stage

Duration of the stage (with actual commencement and completion dates)

Source: *TD records*

Note 1: *During Stage 5, Phase I of the system was implemented in February 2007. After conducting the system reliability test and end stage assessment, the stage was completed on 13 September 2007.*

Note 2: *The entire VALID IV System was rolled out in September 2007. The TD officially accepted the System on 17 October 2007.*

Audit observations and recommendations

Some VALID III business rules not identified

3.3 In the SA&D stage, it is essential to identify all relevant business rules (Note 17). After receiving the draft SA&D report in October 2003 (i.e. four months after the commencement of the SA&D stage), the TD expressed concern that some of the VALID III business rules were not covered in the report. This meant that the VALID IV system specification did not capture all the business logics applied in the VALID III System. As a result, the project team needed to conduct a thorough study of the programs of the VALID III System to identify the missing business rules, and certain system design for the VALID IV System needed to be reworked. According to TD records, this contributed to a 6-month delay in the completion of the SA&D stage. It also affected the schedule of the next stage, i.e. the system development stage.

3.4 In Audit's view, the TD needs to take appropriate measures to help prevent the recurrence of similar problems in future. For example, measures should be taken to regularly remind TD staff of the need to keep complete and up-to-date documentation of the business rules throughout the lifetime of its computer systems. This means that whenever a system is modified, the relevant documents should be updated accordingly and kept for future reference.

Parallel running of stages

3.5 According to the project initiation document which formed part of the Contract, Stage 1 (i.e. SA&D) would run from 19 June to 22 October 2003, to be followed by Stage 2 (i.e. system development) which would run from 23 October 2003 to 31 May 2004. Due to the delay in completing the SA&D stage as mentioned in paragraph 3.3, the system development stage was started while the SA&D stage was still in progress. The parallel running of the two stages meant that the work for the two stages had to compete for the resources of both the project team and the user sections. According to TD records, consequently, certain tasks took a longer time to complete and the overall project schedule was also affected.

Note 17: *Business rules are the directives and procedures to be followed by an organisation in conducting its business in accordance with the relevant regulations and guidelines. The rules are developed into system logics in a computer system for different functional applications by users.*

3.6 For large-scale computer projects in future, in Audit's view, the TD needs to take measures to avoid serious delays that may be caused by a change in implementation approach. For example, before changing to a parallel-run approach, the TD needs to conduct a thorough impact assessment on resource requirements and the project schedule. Where parallel running for some activities is considered feasible (e.g. for a system with multi-modular applications), a detailed plan on the parallel activities involved should also be prepared in advance to facilitate resource planning and deployment by the parties involved. In addition, the TD needs to seek timely and expert advice from the OGCIO on whether it is advisable for the SA&D stage and the system development stage to be conducted in parallel.

Program errors identified during UAT stage

3.7 According to the project initiation document, Stage 3 (i.e. UAT) would run from 24 February to 6 September 2004. In the event, the UAT stage was not completed until January 2007 (i.e. a slippage of 28 months).

3.8 During the UAT stage, users conducted functionality testing on the newly developed programs of the VALID IV System. Any program errors and test data problems were recorded as logs. According to TD records, some 6,300 logs were reported and a long time was taken to rectify them. The TD recognised that this was one of the factors contributing to the project slippage. The TD also recognised that, in order to prevent the recurrence of the problem in future projects, quality control in the software development process should be tightened and communication between the project team and the contractor's software development team should be strengthened. Audit agrees that these are useful measures to be adopted for implementing computer projects in future.

Replacement of key project staff

3.9 In the Contract, the number and composition of key project staff to be provided by the Contractor were specified, as follows:

(a) six ***core members***, namely, one Project Manager, two System Development Managers, one Analyst Programmer, one Database Advisor and one Technical Manager; and

(b) six ***non-core members***, namely, one Project Director, one Deputy Project Manager, one Quality Assurance Manager, one Data Conversion Lead, one Senior Technical and one Solution Architect.

3.10 According to the Contract, the TD's prior approval was required for replacing the core members. The Contract also required the core members to work full time for the project. The objective was to ensure that there would be adequate staff with the required experience and qualifications to provide the services.

3.11 According to TD records, during the implementation period, there were 12 replacements of the core members as a result of staff turnover. Contrary to the contractual requirement, however, Audit found that the TD's approvals were only given, on average, 8 months after these replacements took place. In one case, for example, the replacement of a core member took place in November 2003, but the TD's approval was given only 17 months later in April 2005. In Audit's view, the numerous instances of non-compliance should be a matter of concern because it defeated the purpose of the contractual requirement.

3.12 Furthermore, Audit found in three cases that the replacement staff had taken up the duties of the departing core members, in addition to their own duties as non-core members, for periods ranging from 7 to 16 months. In Audit's view, this was inconsistent with the contractual requirement that core members should work full time for the project (see para. 3.10).

Audit recommendations

3.13 **Audit has *recommended* that, in administering a computer project in future, the Commissioner for Transport should:**

Some VALID III business rules not identified

(a) **take appropriate measures to help prevent the failure to identify the business rules of a developed computer system from recurring (e.g. by regularly reminding TD staff of the need to keep complete and up-to-date documentation of the business rules throughout the lifetime of a computer system);**

Parallel running of stages

(b) **before changing the implementation approach (such as switching to a parallel-run approach), conduct a thorough impact assessment on resource requirements and the project schedule;**

(c) **prepare a detailed plan on the affected project tasks and activities in advance, in particular those to be conducted in parallel, to facilitate resource planning and deployment by the parties involved;**

(d) **seek timely and expert advice from the OGCIO on whether it is advisable for different stages (e.g. the SA&D stage and the system development stage) to be conducted in parallel, and on whether this is compatible with PRINCE;**

Program errors identified during UAT stage

(e) **take appropriate measures to minimise the number of program errors to be rectified in the UAT stage, including measures to:**

(i) **tighten the quality control in the software development process; and**

(ii) **strengthen the communication between the project team and the contractor's software development team;**

Replacement of key project staff

(f) **ensure that the TD's prior approval is obtained for the replacement of key project staff, in accordance with the relevant contractual requirement; and**

(g) **ensure compliance with the contractual requirement that core members should work full time for the project.**

Response from the Administration

3.14 The **Commissioner for Transport** agrees with the audit recommendations. He has said that:

(a) to prevent the recurrence of the failure to identify the business rules of a developed computer system in future, the TD has requested the existing contractor of the VALID IV System to regularly provide the TD with complete and up-to-date documentation of the business rules, which will be verified and kept by the TD;

(b) before changing the implementation approach of a project in future, the TD will consider ways to better assess the impact on resource requirements and project schedule, and to better prepare a detailed plan on the affected project tasks and activities in advance;

(c) in future, the TD will take into account the OGCIO's comments on whether it is advisable for different stages of a project to be conducted in parallel;

(d) the TD has taken appropriate measures to strengthen quality control in the software development process, and communication between the project team and the Contractor's team. The measures will continue for computer projects in future;

(e) the TD will endeavour to ensure that prior approval is given for the replacement of key project staff, and that the time used for identifying a suitable replacement arising from staff turnover is shortened to the minimum; and

(f) the TD will ensure compliance with the contractual requirement that core members should work full time for future projects.

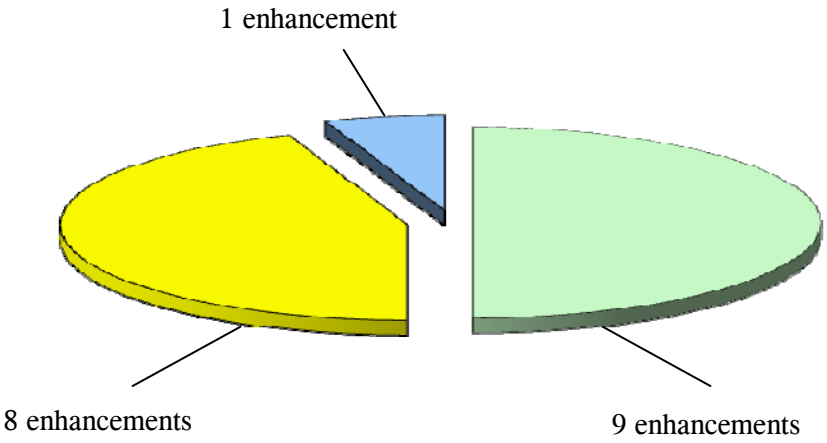
Enhancements to VALID IV System

3.15 From time to time, enhancements to computer systems have to be made to take into account changed circumstances and new business requirements arising from policy initiatives.

3.16 For the VALID IV System, a total of 18 enhancements costing $22 million were made. The enhancements were carried out by the Contractor during the contract period, although they were funded by different sources as shown in Figure 3.

Figure 3

Funding sources of enhancements



Legend: VALID IV project funds
User department
Block vote (see para. 3.17(c))

Source: *TD records*

Audit observations and recommendation

3.17 Audit examined the funding approvals for the 18 enhancements. The following are Audit's findings classified by funding sources:

(a) ***Project funds.*** 9 enhancements (involving $2.2 million) were financed by VALID IV project funds. For 5 enhancements (involving $1.9 million), made in the form of contract variations, Audit noted that timely approvals were obtained from the GLD Tender Board as the appropriate authority (Note 18). For the remaining 4 enhancements (involving $0.3 million), timely approvals were also obtained from the TD officer with appropriate direct purchase authority;

Note 18: *According to the Stores and Procurement Regulations, where funds are available, any variation to a contract which will increase the original value of the contract, or any increase in contract sums must be approved by the GLD Tender Board, or the Permanent Secretary for Financial Services and the Treasury (Treasury), depending on the amount of the variation.*

(b) ***User department.*** 1 enhancement (involving $0.3 million) was financed by a user department, namely the Customs and Excise Department, using its own funds. For this enhancement, the TD did not need to apply for funding; and

(c) ***Block vote.*** 8 enhancements (involving $19.5 million) were funded by the block vote administered by the OGCIO. Of these enhancements, Audit noted that only 5 enhancements (involving $9.1 million) had the OGCIO's prior funding approvals for the enhancement work. For the remaining 3 enhancements (involving $10.4 million), the OGCIO's funding approvals were obtained, on average, 5 months after the enhancement work had commenced. Case B below is an example of the latter cases.

Case B: Belated funding application for enhancement work

Case particulars

In late 2006, the TD engaged the Contractor to perform an enhancement to the VALID IV System. In March 2007, the Contractor completed the design of the enhancement. Eight months later, in November 2007, the TD submitted to the OGCIO a funding application for $1.64 million for the enhancement. In February 2008, the OGCIO approved the funding application.

Audit comments

Audit is concerned about the belated funding application in this case. For system enhancements in future, the TD should introduce measures to ensure that timely funding approvals are obtained for the enhancements.

Source: TD records

3.18 **Audit has *recommended* that the Commissioner for Transport should, for enhancements to computer systems in future, introduce measures to ensure that timely funding approvals are obtained for the enhancements.**

Response from the Administration

3.19 The **Commissioner for Transport** agrees with the audit recommendation. He has said that, for enhancements to computer systems in future, the TD will take appropriate measures to ensure that timely funding approvals are obtained.

PART 4: POST-IMPLEMENTATION ISSUES

4.1 This PART examines the following post-implementation issues and suggests measures for improvement:

(a) finalisation of project accounts (paras. 4.2 to 4.7);

(b) post-implementation evaluation (paras. 4.8 to 4.20); and

(c) incidents investigated after system rollout (paras. 4.21 to 4.25).

Finalisation of project accounts

4.2 As mentioned in paragraph 1.6, for the VALID IV project, the FC approved funding of $110 million for purchasing computer hardware and software, site preparation, application development, implementation services and data conversion. Up to November 2009, the TD had incurred $99 million for the project, a breakdown of which is at Appendix A. In other words, there was an unspent balance of $11 million.

Audit observations and recommendations

Project accounts not yet finalised

4.3 According to Financial Circular No. 8/2004 on "Non-works projects funded by the Government", upon completion of a project, the Controlling Officer should ask for a timely submission of the final project accounts. He should ensure that surplus funds are returned to the Government.

4.4 As shown in Figure 2 in paragraph 3.2, the entire VALID IV System was rolled out in September 2007, and the one-year nursing and warranty period expired in September 2008. However, up to November 2009, the accounts of the VALID IV project had still not been finalised. In Audit's view, the TD needs to expedite action to finalise the accounts and return the surplus funds, if any, to the Government.

Intended use of the unspent balance

4.5 Regarding the unspent balance of $11 million (see para. 4.2), Audit noted from TD records that it intended to use $8.1 million on computer related expenditure in 2009-10. In Audit's view, the intended expenditure of $8.1 million may not fall within the original

scope of the project. The TD may need to consider whether other sources of funds (e.g. the block vote administered by the OGCIO) are more appropriate, taking into account the nature of the intended expenditure and the scope of the project, and the fact that the System was rolled out more than two years ago.

Audit recommendations

4.6 **Audit has *recommended* that the Commissioner for Transport should:**

(a) **expedite action to finalise the accounts of the VALID IV project and return the surplus funds, if any, to the Government; and**

(b) **review whether the intended use of unspent balance, referred to in paragraph 4.5, falls within the original scope of the project, and consider using other sources of funds as appropriate.**

Response from the Administration

4.7 The **Commissioner for Transport** agrees with the audit recommendations. He has said that:

(a) the TD has expedited action to finalise the accounts of the VALID IV project and return the surplus funds, if any, to the Government; and

(b) the TD is conducting a review on the intended use of the unspent balance to ensure that it falls within the original scope of the project.

Post-implementation evaluation

4.8 ***Post-implementation departmental return (PIDR).*** Since 1992, a formal post-implementation evaluation mechanism has been in place to monitor the costs and benefits of administrative computer systems. To ensure that post-implementation reviews (PIRs) are conducted cost-effectively, a two-tier approach is adopted. According to OGCIO guidelines, the user department is required to submit a PIDR to the OGCIO within six months after the rollout of a computer system. The PIDR shows the anticipated and actual benefits/costs of the project, the planned and actual implementation schedule, and the causes of deviation, if any.

4.9 ***PIR.*** Based on the PIDR, the OGCIO will decide whether there is a need to conduct a PIR of the project. The objectives of a PIR are: (a) to evaluate the utilisation of resources, the realisation of benefits, and whether the implementation schedule as contained in the original funding submission has been adhered to; and (b) to identify necessary improvements to the computer system and recommend a course of actions to implement them.

Audit observations and recommendations

PIDR

4.10 ***Submission of PIDR.*** As far as the VALID IV System is concerned, the TD submitted its PIDR to the OGCIO in June 2008, nine months after the system was rolled out in September 2007. The TD explained in the PIDR that a longer time was required for calculating the total expenditure (including the staff cost) and consolidating the comments of all the parties involved in the project. Audit notes the TD's explanations, but considers that it should make greater efforts, for computer projects in future, to ensure that submissions of PIDRs meet the six-month requirement.

4.11 ***Unrealised savings.*** In the PIDR, the TD reported that, with one minor exception, all anticipated benefits were achieved. In this connection, Audit found that there was a delay of 26 months in achieving certain anticipated savings, because the core functions of the system (i.e. Phase I) were implemented in February 2007, 26 months after the expected implementation date (end 2004) stated in the FC funding submission (see para. 1.11). However, the unrealised savings for this 26-month period were not quantified and reported in the PIDR. Audit's enquiry indicated that such unrealised savings amounted to $15 million (see Appendix D). In Audit's view, this is a piece of significant information that should warrant reporting in the PIDR.

4.12 ***In-house development staff cost.*** In the FC funding submission, the in-house development staff effort for the project was estimated to be 285 man-months at a cost of $24 million. In the PIDR, the TD reported an actual staff effort of 1,079 man-months, which exceeded the estimated 285 man-months by 279%, due to the longer implementation period. However, it did not report the actual staff cost against the estimated cost of $24 million. According to Audit's calculation, the cost of the 1,079 man-months amounted to $55 million, which exceeded the estimated cost of in-house development staff by $31 million (i.e. 129%). Similar to the unrealised savings mentioned in paragraph 4.11, Audit considers that this is a piece of significant information that should warrant reporting in the PIDR.

PIR

4.13 ***Factors to be considered.*** According to the guidelines issued by the OGCIO in January 2008, PIRs are conducted on a selective basis (Note 19). In deciding whether to initiate a PIR, the OGCIO should pay particular attention to the extent to which the PIDR has indicated that:

(a) there has been a substantial delay or slippage in the progress of implementation; and

(b) there has been a substantial deviation from the agreed cost-benefit figures.

4.14 ***Decision not to conduct PIR.*** For the VALID IV project, in reviewing the PIDR submitted by the TD in June 2008 and revised in September 2008, the OGCIO officer noted that the project had experienced significant delays, and that substantial additional manpower resources were invested into the project. The officer also remarked that there appeared to be considerable room for improvement in the project management, monitoring and control. However, the officer did not recommend that a PIR be conducted. In December 2008, the OGCIO informed the TD that a PIR was not required on the grounds that:

(a) the project specifications were largely met. Explanations were properly given on the deviation in the realisation of benefits and the implementation schedule; and

(b) the Project Evaluation Report (Note 20), prepared by the Contractor and accepted by the TD, provided a thorough assessment of the effectiveness of the management procedures used during the VALID IV project implementation.

4.15 ***A relevant earlier audit observation.*** In this connection, it is worth reiterating an earlier audit observation made in Chapter 6 of Report No. 52 of the Director of Audit (issued in March 2009). In that Report, Audit noted that no PIR had been conducted by the OGCIO in the past ten years, despite the fact that there were projects with significant slippages which appeared to be suitable candidates for PIRs. The OGCIO has heeded Audit's advice in this regard and has recently conducted a PIR for a project that warrants it.

Note 19: *Within the OGCIO, an Administrative Computer Projects Committee, chaired by a Deputy Government Chief Information Officer, makes decisions on the need to initiate PIRs.*

Note 20: *The report provided an assessment of the effectiveness of the management procedures used during the VALID IV project design and implementation. It documented the experience gained throughout the project period for the TD's future reference.*

4.16 ***Need to revisit decision.*** The facts of the VALID IV project reinforce the audit observation referred to in paragraph 4.15. In Audit's view, the project should warrant a PIR, given the serious delays and the consequential financial implications (see paras. 4.11 and 4.12). The OGCIO may need to revisit its decision for not conducting a PIR of the project.

Audit recommendations

4.17 **Audit has *recommended* that, in administering a computer project in future, the Commissioner for Transport should:**

(a) **introduce measures to ensure that a PIDR is submitted to the OGCIO within the required six-month period; and**

(b) **ensure that all significant information, concerning unrealised benefits and increased in-house development staff cost caused by project delays, is reported in the PIDR.**

4.18 **Audit has also *recommended* that the Government Chief Information Officer should consider revisiting the decision for not conducting a PIR of the VALID IV project, taking into account the serious delays and the consequential financial implications, as well as the other audit observations mentioned in this Report.**

Response from the Administration

4.19 The **Commissioner for Transport** agrees with the audit recommendations in paragraph 4.17. He has said that the TD will:

(a) consider introducing measures to ensure that, in future, the PIDR is submitted to the OGCIO within the required period; and

(b) report significant information, concerning unrealised benefits and increased in-house development staff cost caused by project delays, in the PIDR as appropriate.

4.20 The **Government Chief Information Officer** agrees with the audit recommendation in paragraph 4.18 and will revisit the decision for not conducting a PIR of the VALID IV project.

Incidents investigated after system rollout

4.21 ***Problem.*** After a computer system rollout, incidents may occur that need to be investigated. For the VALID IV System, up to June 2009, the TD had investigated 32 incidents that were considered to have a significant impact on the licensing services or functions of the system. These included 7 incidents in which public services at the TD's licensing offices were suspended. The duration of service suspension averaged about 2 hours, ranging from 22 minutes to 4 hours in each incident.

4.22 ***Improvement measures.*** The majority of the incidents that occurred in 2008 were due to network failure. In an incident that occurred in March 2008, for example, the counter service at a licensing office was suspended for 3.75 hours as a result of network failure. To address the problem, the TD has since taken steps to improve the network performance, such as upgrading the server and installing monitoring tools.

Audit observations and recommendation

4.23 In addition to the measures mentioned in paragraph 4.22, since June 2008, the TD has been considering implementing a dedicated network for its computer centres and the four licensing offices. However, as at November 2009, the proposal was still under consideration.

4.24 In Audit's view, it is important for the TD to take all possible measures to prevent the recurrence of network failures that could cause the suspension of licensing services. **Audit has *recommended* that the Commissioner for Transport should expedite action to finalise the study of the dedicated network, and decide whether it should be implemented to enhance the network performance of the VALID IV System.**

Response from the Administration

4.25 The **Commissioner for Transport** agrees with the audit recommendation. He has said that the TD has completed the study and kicked off the implementation of the dedicated network to enhance the network performance of the VALID IV System. The target completion date is mid-2010.

Appendix A
(paras. 1.11 and 4.2 refer)

Expenditure on VALID IV project
(30 November 2009)

Expenditure item	Approved funding	Actual expenditure	Under/(over) spending	
	(a)	**(b)**	**(c) = (a) – (b)**	**(d) = $\frac{(c)}{(a)} \times 100\%$**
	($ million)	**($ million)**	**($ million)**	
Hardware and data communication	18.0	13.2	4.8	27%
Software	8.0	8.2	(0.2)	(3%)
Site preparation	8.0	4.6	3.4	43%
Application development	35.0	34.1	0.9	3%
Implementation services (Note 1)	19.8	29.2	(9.4)	(47%)
Data conversion	8.5	8.1	0.4	5%
Miscellaneous	2.7	1.6	1.1	41%
Contingency	10.0	–	10.0	100%
Overall	**110.0**	**99.0** (Note 2)	**11.0** (Note 3)	**10%**

Source: *TD records*

Note 1: *Implementation services referred to the provision of business process re-engineering and legal consultancy service, acquisition of technical consultants to provide professional advice on system infrastructure, security issues and risk assessment, and support services for system implementation.*

Note 2: *The actual expenditure included the final contract sum of $61.1 million paid to the Contractor for developing the VALID IV System.*

Note 3: *As at 30 November 2009, the remaining balance of the approved funding of the VALID IV project was $11 million.*

Appendix B
(para. 2.2 refers)

Tendering process — chronology of key events
(June 2001 to May 2003)

Date	Event
29 Jun 2001	Funding for the VALID IV project was approved.
31 Jul 2001	The PSC endorsed the project initiation document (Note) prepared by the OGCIO, and discussed the tendering approach.
30 Oct 2001	The project team finalised interviewing all users of the VALID III System.
24 Nov 2001	The project team delivered the requirement catalogue, and location and workload specifications for discussion at a meeting of the Project Assurance Team.
18 Jan 2002	The TD held a meeting to discuss the draft tender evaluation plan, tender documents and implementation plans.
22 Jan to 29 Apr 2002	The TD sought the comments of the Department of Justice, the GLD and the Intellectual Property Department on the draft tender documents.
17 May 2002	Tenders were invited.
12 Jul 2002	Tenders were closed.
24 Jul 2002	The TD started preliminary tender evaluation.
21 Dec 2002	The TD completed tender evaluation and submitted the report to the GLD.
29 Jan 2003	The GLD started negotiation with the recommended tenderer on contract price, terms and conditions.
May 2003	The GLD completed negotiation with the recommended tenderer.
22 May 2003	The Central Tender Board approved the tender recommendation.
26 May 2003	The Contract was awarded.

Source: *TD records*

Note: *The document describes the approach for managing the design and implementation of the VALID IV project, with the aim of ensuring the quality and timeliness in implementing the project.*

Appendix C
(paras. 2.16 and 2.21 refer)

Meetings of the Project Steering Committee

PSC meeting	Date	Interval between meetings
1st	27.6.2003	
2nd	5.12.2003	5 months
3rd	18.3.2004	3 months
4th	3.12.2004	8 months
5th	23.3.2005	3 months
6th	2.3.2006	11 months
7th	19.1.2007	10 months
8th	30.5.2007	4 months
	Average	**6 months**

Source: TD records

Appendix D
(para. 4.11 refers)

Unrealised savings
(January 2005 to February 2007)

Expenditure item	**Actual cost incurred for operating VALID III System** **($'000)**
Rental of data line	1,593
Maintenance of VALID III System	982
Apportioned cost of OGCIO's Central Computer Centre	12,406
Maintenance of Chinese processing of VALID III System	220
Total	**15,201**

Source: TD records

Appendix E

Acronyms and abbreviations

Audit	Audit Commission
FC	Finance Committee
GLD	Government Logistics Department
OGCIO	Office of the Government Chief Information Officer
PIDR	Post-implementation departmental return
PIR	Post-implementation review
PRINCE	Projects in Controlled Environments
PSC	Project Steering Committee
SA&D	System analysis and design
TD	Transport Department
UAT	User acceptance test
VALID	Vehicles and Drivers Licensing Integrated Data