INFORMATION SYSTEMS FOR GOVERNMENT FISCAL MANAGEMENT

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29 November, 2007
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INTRODUCTION

Information systems provide public sector managers a modern set of tools to assist them in performing a variety of tasks, such as: (a) designing appropriate fiscal and monetary responses to changing macro economic conditions; (b) ensuring accountability for the deployment and use of public resources; (c) improving the effectiveness and efficiency of public expenditure programs; (d) mobilizing domestic resources and managing external resources (foreign aid and loans); (e) managing the civil service; and (f) decentralizing operations with adequate controls.

Many of the functional processes in the fiscal management area, such as, revenue collection, execution of budgetary expenditures, require the processing of a large number of transactions, in limited periods of time, across a country wide network of offices. In view of the high transaction volumes and rates and the dispersed location of offices where these transactions are processed, the process of retrieving information from manual records and reclassifying it in a format or classification scheme appropriate for management information and control can be extremely time-consuming and labor-intensive. In practice, without some degree of automation, the information required for economic management may simply not be available with the required degree of timeliness and accuracy. Computer-based systems that support fiscal management processes are therefore of particular interest to public sector managers and present them with new opportunities for the availability of timely and accurate information. Three aspects are particularly important.

(a) Computer based information systems make possible integration of transaction classification and posting with transaction processing. This means that as a transaction is processed, e.g. as a payment is made, it is simultaneously classified and posted to the relevant account. This ensures that all transaction data is promptly and correctly included in system data bases.

(b) Use of computer based systems enables automation of many controls and procedures. As the transaction is processed the system applies the necessary controls, e.g. ensures that a proper budget allocation exists prior to approving a payment. Manual intervention is required only in cases which require an exception to the procedures. In these cases, the system would keep an appropriate audit trail that would include details regarding the authorization for the exception.

(a) Such systems enable rapid compilation of data and generation of reports. Data from across the network of offices (e.g. Treasury offices) can be rapidly consolidated at the central ministry of finance. Data in the system data bases can be presented in a variety of formats in accordance with management requirements.
Public sector projects for computerization of financial management processes pose a number of major design and implementation problems. First, investments required are very sizable and can easily span several years. Investments in such systems in moderate sized countries could easily range from $10-50 million over a five year period. Secondly, the implementation of these systems generally requires substantial reform in existing institutional arrangements. Thirdly, different information flows among different elements of the system have to be closely integrated to achieve the full advantages of computerization. It is vital that the second and third of these problems be tackled effectively in systems design and implementation in order to realize the benefits of improved efficiency and better fiscal decision making.

It is only too common, particularly where substantial reforms to the underlying management process are required, for systems to be implemented piece meal without significant reform and little attention paid to critical flows of information between system components. The end result is often a set of partial information systems with overlapping and/or conflicting functionality, and a resulting lack of integrity in the overall fiscal data bases. For design and implementation of effective government fiscal management information systems, it is essential therefore, that (a) required reforms of the underlying financial management processes be clearly agreed and understood as the basis for systems design; and (b) functional and technical specifications for system design based on these processes, provide clear guidelines for integrating all of the subsystems needed to support GFM.

This paper starts with a discussion of the essential characteristics of integrated systems giving some emphasis to the need to identify core and non core elements of the overall GFM systems network. It suggests a methodology that could assist in the design of an integrated network of systems and goes on to apply this methodology to develop a framework that identifies the various elements of a GFM information systems network and describes critical inter linkages. Finally, the paper discusses some of the pre-requisites for successful implementation of integrated financial management systems.

CHARACTERISTICS OF INTEGRATED SYSTEMS

Integrated systems are not monolithic. For practical system implementation it is essential that system elements be developed in a modular way. These modules are integrated in the sense that they can exchange data and that there is a single secure point of entry for commonly used data. Modules in an integrated system can be distinguished as core modules and non-core core modules. Core modules are those that are essential to the operation of the system and which define standards for data exchange for other system components. Non-core modules by contrast perform an ancillary function and should provide data in the form required by the core system or use data in a way that be reconciled with core system data. As will be discussed in more detail later, the General Ledger System\(^1\), (GLS) which maintains the data

\(^1\) In traditional government accounting, the ledger is the summary book of account used to control each item of expenditure under heads and sub- heads of appropriation for each government fund.
base for GFM, and accounts payable and receivable, which are the main transaction processing systems, would generally be considered to be the core of most GFM systems. Other systems such as debt management or tax and customs administration, though of vital importance to GFM, must be seen as supportive of the core system. by (a) adhering to the data exchange standards of the core and (b) reconciling data and reports with core data and reports.

A basic underlying principle for the design of integrated systems is that they be structured along functional rather than organizational lines. A number of organizational units and agencies are closely involved with different aspects of GFM and they need to share information among themselves. A particular GFM system module should provide support to a functional area across all these organizations. This approach enables the creation of systems and data bases in which the primary responsibility for the timely provision of a particular subset of data resides with the organization responsible for that function. However, data in the system data bases should be accessible by all other relevant organizations (subject to appropriate security controls). Adherence to this design principle eliminates duplicative data gathering and, more importantly, enables all agencies responsible for specific GFM functions to work with the same set of data, thereby eliminating risks of data inconsistencies, which are inevitable in separately gathered data.

The first step towards achieving integration is to develop a framework that provides an overview of the systems network required to support GFM. This framework would address questions such as:

a) What are the different information systems modules that are required to support GFM functional processes;

b) What is the scope, scale and type, of a particular systems component; and,

c) How do these systems modules interrelate in terms of their information flows.

This framework is developed by analyzing the basic functional processes associated with GFM, the overall regulatory framework that underpins these processes, their information requirements, functional responsibilities of agencies commonly responsible for the processes, information flows between the processes, the nature, volume and frequency of these flows, and the data characteristics of the information used and created by the processes.

The framework would consist of:

a) A Systems Architecture that identifies the major component modules of the systems network required to support GFM, the type of information maintained by each systems module and the information flows between various modules; and,

c) A Technology Architecture that identifies the appropriate technology choices for the hardware and software to set up the various modules.

Once the initial framework has been set up and the pre-requisites and criteria for integration have been spelled out and incorporated in the implementation plan, the actual implementation and integration of systems modules is a goal that can be phased over time.
This section describes in brief the major functional processes associated with government fiscal management and presents the information systems architecture required to support these processes. The information systems architecture shows the core elements of a GFM systems network required to support GFM functional processes and the main information flows between elements. The functional processes associated with government fiscal management and the information requirements for these processes have been documented by (Davies, Hashim and Talero (1994), Hashim and Allan (1994)) and in other World Bank publications (see references). The information systems architecture for GFM has been derived by analyzing data from a number of countries on fiscal management processes and the information systems required to support these processes.

FUNCTIONAL PROCESSES

A brief description of the major functional processes associated with GFM is given below:

*Macro Economic Forecasting*

This process assists expenditure and resource planning by developing a macroeconomic framework linking the growth of national income, savings, investment and balance of payments to public expenditures and revenues. For budgeting purposes the process helps in the development of: aggregates of the government budget, notably revenues, expenditures, and the overall fiscal deficit and its financing; the balance between the capital and recurrent components of the budget; composition of expenditures by the main sector spending agencies; revenue forecasts consistent with macro-economic assumptions; forecasts of non-tax revenues based on macro-economic projections; estimates of resources available from domestic and external borrowings; projections of current expenditure.

*Budget Preparation*

The set of processes under this heading start with the development of a budget circular indicating economic prospects, broad policy objectives, and how the budget is expected to attain them, and sectoral allocations/ceilings, consistent with the macroeconomic framework. The next step is the preparation and analysis of line agency expenditure proposals and revenue forecasts and their consolidation into an annual budget document after a series of discussion between line ministries, the MOF, the budgetary committees of parliament and approval by the legislature. These discussions focus on how the budget proposals would meet the policy objectives outlined in the budget circular, on inter-se priorities of the various proposals, the validity of the resource requirements contained in these proposals and how they can best be accommodated in the overall budgetary envelope.
**Budget Execution, Accounting and Fiscal Reporting**

This set of processes cover the functions associated with implementing the budget, including the procurement of goods and services in accordance with budget estimates, the recording and accounting of all government transactions and development of periodic reports to monitor the overall flow of spending or use of appropriations, over the course of the year, highlighting major deviations from the planned budget and suggesting corrective measures.

**Cash Management**

This includes the processes of developing agency and central cash flow forecasts, the release of funds to spending agencies, the monitoring of cash flows and expected cash requirements, the issue and redemption of government securities for financing government programs.

**Debt Management**

This process defines the tasks associated with maintenance of records on all contracted public debt on an individual loan basis and classified according to source and type loan. This process also assists economic and policy analysis by determining, e.g., the debt implications of different fiscal and deficit financing policies by preparing projections of debt service commitments under existing and anticipated contracts.

**Revenue Administration**

The process deals with administration of tax policies and covers the actual levy and collection of revenues including taxes and duties as laid down in these policies, and the valuation and collection of non tax revenues, such as, stamp duties, user fees, charges for services etc.

**Civil Service Administration**

This covers the activities associated with the development and maintenance of government’s human resource policies including manpower planning, complement control, civil service pay and pension polices, the fiscal impact of these policies and their administration.

**Auditing**

The process deals with the analysis and scrutiny of public, financial and other transactions to ensure the compliance with government policies and procedures and to ensure cost effective usage of public funds in accordance with overall government priorities.
INFORMATION SYSTEMS ARCHITECTURE

The attached diagram (Figure 1) presents the information systems architecture for GFM showing the major elements of the systems network required to support GFM functional processes and the main information flows between elements. The Y axis lists the main functional processes associated with GFM and the X axis the organizations normally responsible for these processes. Each box in this diagram lies at the intersection of the functional process and the organization(s) normally associated with the process and may be seen as an information support system for that process. Each such system could in practice comprise a number of subsystems. The main information flows between the systems modules are also shown in the diagram.

As shown in the diagram the main elements of the GFM information systems network consist of modules to support each of the major functional processes associated with GFM. In an actual systems development exercise, each box presented in this diagram will need to be analyzed further in terms of the processes it covers, the information flows associated with the processes and linkages with other systems, to determine the characteristics of these modules. In view of their central place in the fiscal management process, this paper carries out such an analysis for the core elements of the GFM systems network, namely those involved in the processes of government budgeting and accounting. This is done in the next section. This is followed by a very brief description of the other elements of the GFM information systems network.

SYSTEMS FOR GOVERNMENT BUDGETING AND ACCOUNTING

The objectives of a well performing budget, resource allocation and management system are to:

(a) control aggregate spending and the deficit;
(b) facilitate strategic prioritization of expenditures across policies, programs and projects for allocative efficiency and equity;
(c) encourage better use of budgeted resources, to achieve outcomes and produce outputs at the lowest possible cost.

GFM systems provide decision makers and public sector managers with a set of tools to support these objectives. The architecture of the information systems network is determined by the basic functional processes that public sector managers employ to achieve these objectives and the overall regulatory framework that underpins these processes. We, therefore, start with a discussion of these aspects.

OVERALL REGULATORY FRAMEWORK

The overall regulatory framework for operation of the various component modules of the system network consists of the following elements: (a) the control structure; (b) the
accounts classification; and (c) the reporting requirements. The information systems will need to incorporate features to ensure that they abide by the requirements of this framework. Therefore, the regulatory framework needs to be in place—possibly, reviewed and modified—before productive work can commence on the design of computer systems to support fiscal management. A full discussion of the overall regulatory framework is outside the scope of this paper. However, this paper does describe the basic elements of this framework to highlight control factors that should be incorporated in the design of component system modules.

(a) Control structure

Many of the basic controls that are to be applied to the use of government funds are derived from a legislative framework, very often with basic principles laid down in financial provisions in the constitution and laws related to the management of public finances. Controls are defined at several levels: formal legislation and regulation that control the structure of funds and appropriations, and administrative practices. Financial legislation and administrative regulations specify the detailed requirements for control to ensure that transactions are properly authorized and documented and that appropriation authority is not exceeded. Within most legislative frameworks, receipts of governments are paid into a fund (which will herein be referred to as the consolidated fund (CF) 1 and any expenditure from the fund must be formally appropriated by the legislature.

Regulations, administrative instructions, and administrative practices specify the standards and procedures to be followed for transaction processing. These include (1) document and transaction level controls to ensure correct processing, full and correct recording, and audit trails; (2) access controls to ensure that only authorized personnel can record, change, or report information; and (3) overall system controls to ensure that the system embodies the established processing standards.

Formal regulatory frameworks in the western industrialized economies have generally evolved at a time when the predominant interest was to ensure that the executive arm of government used public funds properly and within the limits authorized by the legislature. Legislative developments have not always kept pace with the needs of modern economies, where the concerns of fiscal management are much broader. In particular, the roles of the budget in macroeconomic management and the efficient allocation of resources to meet social and economic objectives are as important as the traditional compliance role. Defining such needs and designing control systems to meet them is now an essential element of the design of GFM systems.

From a systems design point of view, the macroeconomic management objective has a direct bearing on definition of the control structure. It is necessary to look beyond controls specified at a legislative level and the traditional compliance role of the accounting system. For fiscal management, the overall deficit of the general government and the way in which this deficit is financed are crucial variables. It is vital that all elements of the budget and

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2/ The fund becomes the basis for accounting and reporting in government. It is common to divide the overall CF into several funds—for example, a fund for current receipts and expenditures, a fund for loan and capital receipts and expenditures, and a fund for receipts and expenditures on behalf of other parties (trust funds). Any fund may have a number of sub-funds.
accounting information system be designed to produce this information in a timely way, to facilitate the formulation and execution of macroeconomic policy.

The resource allocation aspects of fiscal management are reflected in systems design primarily through appropriate budget and accounts classification and reporting specifications, which are discussed in the following sections.

(b) Accounts classification

The accounts classification code structure is a methodology for consistently recording each financial transaction for purposes of expenditure control, costing, and economic and statistical analysis. A standard, government-wide classification code structure needs to be set up to provide a consistent basis for:

- Consolidating government-wide financial information;
- Integrating planning, budgeting and accounting;
- Capturing data at the point of entry throughout the government;
- Compiling budget allocations and program and project costs within and across various government agencies.

The design of the accounts classification structure should, therefore, be determined by the information requirements for each of the above objectives. In principle, this structure should accommodate the following elements: fund, program, organization unit, project, and object of expenditure classifications. Program codes should identify program elements and supplements down to the basic program decision units. Similarly, organization codes should identify budget and cost centers. Projects can be related either to organizations or programs, but should be further sub-classified independently of these structures in terms of sub-projects, jobs, and functions. The object classification should serve both administrative and economic classifications and be divided into sub-categories for control purposes. The object classification should also be consistent with economic classification codes used for generating national accounts or government finance statistics (GFS).

(c) Reporting requirements

Governments must specify reporting requirements and objectives in two areas: (a) external reporting—to provide information to the legislature and the public, as well as other countries, international organizations, overseas investors, and financial markets; and (b) internal management reporting—for government policy makers and managers. In general, the broad requirements for external reporting are specified in the budget legislation and detailed requirements are given in regulations, instructions, and administrative practice (e.g., report formats actually in use).

From the point of view of resource allocation, increasing emphasis has been given in recent years to improving reporting standards by linking financial and performance information and giving a clearer perspective on resource use by using accrual-based reports in addition to the usual cash-based government accounts. Development of such
report formats is, in general, occurring mainly in the industrialized market economies. Nonetheless, it is suggested that the design of GFM systems in any country should take into account, to the extent possible, the likely development of such report formats in the future.

FUNCTIONAL PROCESSES

The functional processes carried out by the central government in the areas of budgeting and accounting—and linkages to the control framework—are illustrated in Figure 2, and the main elements are briefly described below. As indicated in Figure 2, the functional processes of budgeting and accounting can be categorized as those carried out by the central agencies and those carried out by the spending ministries and agencies. Those of the former group are most directly linked to the control framework—indeed, one of the main functions of the central agencies (particularly the ministry of finance) is to ensure that the control framework is properly applied throughout government. The functional processes cover two interrelated areas: (1) Macro fiscal forecasting, budget preparation and approval; (2) budget execution, cash management; and accounting. The first set of processes support the objectives of setting fiscal policy and strategic priorities. The second set of processes support the objective of optimizing the use of budgeted resources and ensuring accountability.

Macro Economic Forecasting, Budget Preparation and Approval

Figure 2 shows the budget preparation processes carried out by the central agencies in the column titled “Budget and Cash Management Processes.” The processes that take place at sector agencies that deal with the preparation of estimates for programs and projects that constitute the sectoral work programs (public sector work program or PSWP) are shown in the column titled “PSWP Management.”

At the start of the budget cycle, the central agencies (generally the Ministry of Finance) send the sector agencies a budget circular indicating economic prospects and broad policy objectives (in some cases, based on a formal macroeconomic framework paper), and giving the parameters within which the budget for each ministry is to be prepared. The circular may give specific ceilings for expenditure by each agency and program. The sector agencies respond with their budget proposals. As indicated in Figure 2, the financial information in these proposals should be categorized (a) by type of expenditure—as per budget classification and, at the broadest level, distinguishing recurrent from capital expenditures; and (b) according to whether they are continuations of programs approved under existing policy or are new project proposals.

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2/ As noted, from a macroeconomic point of view, the concern is with the general government rather than simply with the central government budget. Aggregate reports from all elements of general government should be compiled in a timely and reliable way—and essentially the same processes described for central government should also apply to local levels of government and extrabudgetary components of general government.
Since budget requests generally exceed resources, negotiations between central and sector agency staff at the technical level are required to review costings for existing programs and new project proposals. Cabinet level (or cabinet committee level) discussions are often required to set priorities among the project proposals to ensure that the selected proposals are in accordance with sectoral priorities and to select those that can be funded within the macroeconomic framework. The framework should be updated frequently, particularly during budget initiation and finalization, as well as for subsequent reviews during the year.) As a result of these discussions, a draft budget document is prepared.

After preparation by the executive branch, the legislature reviews the estimates and approves the budget. The duration of legislative consideration- and degree of change that can be introduced at this stage vary considerably among countries.

This approved budget then becomes the legal basis of the PSWP to be executed by the sectoral ministries. It gives estimates of expected revenue and borrowing and the amount of expenditure—by budget and accounts classification—that is authorized to be spent on approved programs and projects. It usually contains data on past expenditures and may also contain descriptions of programs and projects and data on expected performance expressed in terms of outputs and/or outcomes expected from investment outlays during the year. (As discussed below, the approved budget may be modified in the execution phase by supplementary appropriation (requiring legislative approval) or by virement—shifts of resources within the approved total—with the approval of the central agencies).

Two groups of information systems support the process of setting fiscal policy and strategic priorities by assisting with the preparation of budget estimates. These are:

(a) **Information Systems to support Macro Economic Forecasting**

This group of systems are normally used by the MOF, the Planning Organization, and the Central Bank and assists them with macro fiscal forecasting and the development of the macro economic framework. This is in turn used by the MOF to set aggregate budget parameters and guidelines for budget agencies to submits budget estimates. These systems require data from external economic data bases, and the assumptions regarding GNP, inflation rates, and the central government deficit. Additionally they require information on programs and projects the government intends to implement over the period of the program, data on estimates of tax and non-tax revenues, data on domestic and external borrowings etc., maintained by other components of the GFM systems network. These information flows are shown in the diagram.

(b) **Information Systems to assist in Budget Preparation and Approval**

These systems are the next group of information systems required in the fiscal management cycle. These systems support the processes of budget estimates preparation. They receive from the various line agencies the details of their ongoing and planned programs and projects, consolidate
them, and produce from them the documents that form the basis of the negotiations between the line agencies and central agencies (MOF). After finalization of the budget, the systems produce the approved budget estimates.

In order to satisfy these requirements, the systems should be able to capture and maintain the budgetary proposals and income estimates of all government agencies and to capture any subsequent changes during the budget preparation, approval and amendment processes. The evaluation of the budget proposals include an examination of the manpower component, the maintenance, and other operating expenses, and of the capital outlays program, using baseline data from previous periods for comparison. Examination of the capital budget requires data on the status (physical and financial) of government-approved projects, (both locally and foreign-funded). The system should be able to access and generate the baseline data from the relevant past-year databases.

However, since the budget is the primary instrument of economic management to ensure that macro economic and sector strategies are translated into programs and projects and a primary tool to assist in the strategic prioritization of public expenditures. The budget preparation systems would therefore need to be supplemented with tools (such as those for cost benefit analysis) that assist the sector and core agencies to decide between alternative investment scenarios.

**Cash Management, Budget Execution and Accounting**

**Cash Management**

At the start of the year, sector agencies prepare forecasts of cash requirements for the year, based on known and anticipated commitments for both recurrent and capital expenditures. These forecasts highlight information on firm commitments and the foreign exchange component (if any) of anticipated expenditures. The cash requirements and revenue projections obtained from the agencies responsible for revenue collection are developed into a consolidated cash flow forecast by the Ministry of Finance.

Once the budget is approved, the MOF has the task of controlling the release of funds, monitoring progress on budget implementation, and managing the cash resources of the government. From the start of the financial year, the MOF releases funds (warrants/cash allocations) periodically to sector agencies, keeping in view the approved budget, the sector agency cash requirements, and the overall resource availability. As the fiscal year progresses, the sector agencies prepare monthly/quarterly requests for funds and submit actual expenditure (and revenue) statements for the previous month/quarter. Capital expenditure warrants are allocated to specific projects.

Warrants authorized by the MOF are sent to the unit (the treasury, the accountant general’s office (AG), or its equivalent) that is the custodian of the CF—hereinafter referred to as the treasury. The warrant either authorizes the treasury to make payments
out of the CF or authorizes the treasury to make money available for payment by the responsible accounting officers of the sector agencies. The latter can be achieved either by giving authority to debit the central government account or sub-account) or by crediting separate bank accounts (which are nonetheless under overall treasury control) of the ministries in the central bank (CB) or authorized service banks.

**Budget Execution**

On receipt of the warrant authority from the MOF and access to funds from the treasury, sector agencies begin implementing the approved programs and projects. The line agencies start using the appropriated funds by requisitioning, procuring, and paying for goods and services.

A typical sequence of administrative steps for the acquisition of goods and services is shown in Figure 2. The first step is the placing of purchase orders for the goods and services—and recording the resulting commitments in the accounting system. The second step is the acquisition of goods and services. After work is completed or services rendered, bills are received; spending agencies then verify the receipt of goods and the accuracy of the bills. The third step is the preparation of payment vouchers, which are then passed to the treasury for review and, upon approval, issue of a check of payment order. Where payment is decentralized, however, ministries may issue payment orders directly; these may be drawn on a central account or a ministry account—depending on whether control of bank accounts is also decentralized. The payment orders are thereafter paid by the bank.

To ensure proper expenditure control, sector agencies are required to institute a system of commitment planning and control to ensure that (a) expenditure does not exceed the sum approved by parliament for specific purposes; and (b) expenditure is within the warrant amounts. The latter element of expenditure control is often used by the MOF/treasury to ensure that expenditures do not exceed actual resources (which may be less than estimated in the budget). When a receipt shortfall occurs, it is essential that the treasury be aware of the commitments (e.g., statutory payments, such as public debt, staff salaries and allowances, unpaid bills and existing contractual obligations) for which cash is needed during the year.

The spending ministry staff—or treasury staff assigned to this task—are responsible for steps one and two. At step three, the issuing of the payment order, many of the above processes have to be scrutinized again, possibly including the following verifications: the identity of the spending officer, the availability of budget provisions,

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4/ It should be noted, however, that the processes are simplified substantially for expositional purposes. One complexity is that many important payment categories do not follow the precise order-bill payment pattern shown in the diagram. Payment of payroll, salaries, and debt service are examples. Each needs a specific functional process description—and should be developed as a linked subsystem of the Accounting System. It should also be noted that, in many governments, some inputs (such as drugs or building materials) are purchased centrally. These purchases follow the routine described (though possible through a revolving fund arrangement within the CF), and ministries wishing to use these items requisition from stores when required and transfer funds to the credit of the purchasing authority.

5/ In some cases, payments may be handled by the regional offices of the treasury.
the exact budgetary imputation, the verification of the receipt of goods and services, and the observation of financial regularity.

Receipt transactions are also shown in Figure 1, in a very simplified form. Again, detailed processes of administration and collection would need to be specified for a full functional process analysis—these, too, would generally be set up as separate subsystems of the Accounting System.

Tax revenue from customs duties, income, excise, and land taxes is managed by the revenue collection agencies; it is deposited in local commercial banks and remitted to the government’s central account in the Central Bank (CB). The CB then sends a daily report to the treasury on inflows to this central account.

Non-Tax revenue from fees, administrative charges, and product sales (e.g., products made in prison) are also managed by the collection agencies and transferred to the CF.

**Accounting**

The basic processes involved in government accounting are (a) maintaining records of spending authorizations at the appropriation and funds-release (warrant levels); (b) processing transactions—recording the transactions as they occur, applying the requisite controls, posting to the appropriate account, and listing transactions and associated data for control and audit; and (c) maintaining ledger accounts to monitor and control actual spending and receipts against budget and warrant controls.

The information systems support for the processes associated with cash management, budget execution and accounting are provided by the following set of systems.

**Cash Management System**

The Cash Management system assists Government to maintain an up-to-date picture of the government’s liquidity position and cash requirements. It obtains information on actual agency expenditures and cash balances in government (including agency) accounts from the general ledger, revenue inflows, borrowing, loan disbursements, treasury bills, government bonds, and cash deposit maturities are obtained either from the general ledger or from the specific systems for these areas, for example, the debt management system. Using this information, the government can decide on (a) budget ceilings and fund releases to line agencies; and (b) the timing of the issues and redemptions of government securities, to provide short-term financing for shortfalls.
(b) **Information Systems for Budget Execution, Accounting and Fiscal Reporting**

Systems support is focused on four main systems (1) budget and warrant control; (2) accounts payable; (3) accounts receivable; and (4) the treasury general ledger system (TLS) or the financial general ledger (FLS) system and together they constitute the government’s Core Accounting System (CAS). The first of these is concerned with maintaining data on spending authority, the second and third with processing transactions as soon as possible after they occur, and the fourth with compilation of summary records for control and analysis.

These systems are the center piece of the GFM systems network and they are the primary repository of financial data and serve as the basis of the government’s Financial Management Information System (FMIS). These systems would be used to perform the basic accounting functions, to perform the processes associated with budget execution, monitoring and control, to obtain the status of actual expenditures on ongoing projects. These systems also monitor and evaluate the overall budget implementation processes and produce the necessary fiscal reports. In addition, these systems would provide useful financial information to the line ministries, and spending units (in their respective areas) to enable them to better manage their work programs. These systems need to be comprehensive in terms of coverage and be a source of reliable and timely data to be a credible source of information for users.

These systems maintain data on approved budgeted appropriations (both capital and recurrent), sources of financing for programs and projects, budget transfers, and supplementary allocations, fund releases (warrants) against budgetary allocations over the course of the year, and data on commitments and actual expenditures against budgeted allocations.

The budget execution systems normally operate at two levels—the line agency level and the central level at the MOF. The line agencies’ systems (operated by their finance departments) enable managers to track the budget implementation process and implement expenditure controls at the agency level. The central systems track the budget execution process for the government as a whole.

The basic accounting processes should be automated and data captured only once as an accounting transaction progresses through the system. This system, introduced along with a modern budget classification system and an appropriate chart of accounts would enable expenditures and revenues to be recorded at a very detailed level and related to specific programs and projects. Data recorded at this level will then be directly available for use for program and project management. This data will also be easily amenable to cross classification in other ways as required for financial analyses.
The introduction of an automated accounting system would ensure completeness of data capture (that is no transaction would be processed outside the system) and rigorous application of all relevant financial controls to all transactions processed by the system. The controls normally required to be incorporated in the CAS are described in detail in Annex I.

BUDGET EXECUTION USING INFORMATION SYSTEMS

Specific details of how the various government agencies involved in budget execution would use the related information systems in the performance of their duties as they relate to the execution of budgetary expenditures are described in this section.

The various steps in the execution of budgetary expenditures are shown schematically in figures 3 (a,b) and 4 (a,b). Case I (a) represented in figure 3(a) shows the scenario where the Treasury is responsible for making payments from the Treasury Single Account (TSA) which is held at the Central Bank and the Central Bank directly deals with all government payments. Case II (a) represented in figure 4(a) shows the scenario where the Ministries/ Spending units are directly responsible for making payments from the TSA held at the Central Bank. Cases I(b) and II (b) represented in figures 3(b) and 4(b) respectively, show the corresponding scenarios when the retail banking operations are handled by a fiscal agent (normally an authorized commercial bank) on behalf of the Central Bank. The Central Bank recoups all payments made by the fiscal agent for government operations and the fiscal agent makes daily deposits of all government revenues to the TSA in the Central Bank on a daily basis.

Budget Appropriations: The process begins with the recording of the approved budget (and any amendments thereof), by the Ministry of Finance (MOF) in the FLS, by individual appropriation item or revenue estimate. The Budget Department of the MOF prepares and registers in the FLS the detailed allocation of budgetary appropriations by ministry, and advises ministries accordingly. This should be done within the limits of appropriation approved by the Parliament.

Cash Requirements Forecast: At the start of the year, Financial plans detailing projected outlays and receipts are entered to the cash management system. As the year progresses sector agencies prepare / quarterly monthly requests for funds by category of spending. These are also input to the system.

Commitment Limits: It may be appropriate for Treasury to propose commitment limits against spending unit expenditure items. The Treasury does this after taking into account the balance in the Central Bank accounts and the balance in Ministries expenditure items by accessing the system.

Fund Allocations (Warrants): Treasury would then make funds allocations to ministries for each category of spending. Under ideal circumstances, the
Funds allocation would be consistent with the proposed commitment limits advised to ministries earlier. Both proposed and actual cash allocation quarterly limits would also be consistent with the commitment levels and budget appropriations. The degree of consistency in the process will largely depend on the quality of the budget initially prepared, the initial financial planning process and the revenue collection outcome.

Ministries Inform Spending Units: The Ministries would then advise budgetary appropriations commitment limits and fund allocations to their respective spending units. These limits would be entered into the system.

The advance knowledge of indicative cash limits, as well as of quarterly commitments limits, will allow agencies to make the best arrangements and to set priorities in a situation of scarce resources, so that any necessary cuts in expenditures by agencies can be made in a more orderly, rational and an effective way.

Requests for Expenditure and Actual Commitment Transactions: As the year progresses, sectoral ministries will process requests for expenditure. After verifying the appropriateness of the expenditure and availability of budget appropriation and funds, registration of actual commitments would be made in the system. If the ministries and spending units are directly linked to the system they will record the commitment themselves. If they are not they will advise the treasury of these commitments. The treasury will then record the commitments into the system. In the case of spending units (SU) located outside the center, the transactions will be recorded in a parallel system through a Regional Treasury Unit (RTU).

Verification of Receipt of Goods and Payment Orders: Following the verification for a given expenditure, ministries directly linked to the system would record the corresponding payment order in the system. The system would automatically check that the order falls within the funds allocation limit set for that Ministry. The outlying spending units would process a payment order through the RTU. The latter would check the payment order issued by SU and register it in the FLS.

In the verification stage, once all the requirements for a particular obligation have been met, the Ministry / spending unit should confirm that the commitment is ready for payment.

Payment Processing: At the same time as payment orders are registered in the FLS, the banking system must be advised in order to make the necessary payment (that is to transfer funds from a Central Government account to the creditor). In a fully developed system this can be done automatically. At the end of each day, the FLS would structure a file with complete information on the creditors and payments to be made, as advised by ministries and spending units. This file would be sent to the Central Bank or, by the RTU to the Regional Branch of the Central Bank, which holds the Government account. The applicable Bank would transmit the relevant information (and funds) to each commercial bank, to credit to the
appropriate account, and debit the government account. The appropriate Bank would confirm to the FLS (through the RTU) the debits in the Government account. Alternatively, the applicable Accounting Office could forward to the appropriate bank a consolidated listing of the registered payment orders requiring payment. Action by the banking system would be as described earlier, but confirmation to the Accounting Office would be manual.

It should be noted that the process outlined above can be simplified for certain types of expenditure, either administratively or by automated procedures in the FLS. Some of these cases are discussed below.

**Commitments for Civil Service Salaries:** Salary commitments may be advised only once a year on an estimated basis and adjusted as necessary during the year.

**Payments for Civil Service Salaries:** In theory each payment of each civil servant could be treated as a discrete payment and processed in the manner already described. However, given the number of individual payments involved, the similar structure of each payment, the regular occurrence of payments, and the addition personnel issues which need to be considered, it is preferable to develop a separate sub-system for processing salary payments—the payroll system—in a manner compatible with the overall expenditure process.

**Small Expenditures:** The commitment (and verification) of small expenditures (up to a predetermined limit) can be entered into the system simultaneously with the order for their payment. However, the system must know in advance which appropriation items allow such simplification, to prevent misuse.

**Commitments for the Investment Component of the Budget:** Commitment control for the current component of the budget can be operated satisfactorily on a within year basis, primarily as an aid to sound cash management activities. However, in the case of the Investment component, where many projects have a financial life of more than one year, it is often useful to maintain an accurate record of the forward expenditure commitment generated by undertaking the project. If this is done Government has a better understanding of the flexibility available to it for future investment decisions. This process can be accommodated in the FLS by extending the commitment control field against each investment appropriation line item to cover 2 years beyond the budget year. As long term commitments are entered the financial impact is recorded, for budget and ‘out’ years.

Tracking the implementation of capital projects normally requires separate subsystems at the agency levels. For these, it is important to maintain data on both the financial and physical status of projects, including historical data.
OTHER GFM MODULES

In addition to the core modules described above a number of other information systems modules support GFM processes. These are discussed below.

Debt Management System
These systems maintain information on public domestic and external borrowings. This includes information contained in loan documents and transactions and issues of government securities. In addition to accounting information these systems also provide important information required in the formulation of fiscal policy, such as forecasts of draw down and debt servicing liabilities and debt implications of different fiscal and deficit financing policies. Payment related to government borrowings are carried out by the central system based on the data in the debt management system. Loan receipts recorded in government accounts are processed by the central accounting system and then used to update the debt database maintained by the debt management system.

Systems to Assist in Fiscal Aspects of Civil Service Management
The aspects of Civil service management which are relevant from the point of view of GFM are the processes associated with post management and complement control and with payroll and pension payments. The corresponding systems modules therefore form important elements in the GFM network of information systems as shown in the diagram. The payroll, pensions and employee advances systems post summaries to the central system periodically.

Systems for Revenue Administration
This group of systems assist the government in first, the processes associated with the formulation of tax and tariff policies and then, the collection of tax and non tax revenue. A number of separate systems are involved in this group: for example, those supporting the administration and collection of income taxes, customs duties or VAT., and those supporting the collection of various types of non-tax revenues, such as e.g. stamp duties. The revenue administration systems provide summary information on revenue collections to the Core Accounting Systems as shown in the diagram. Revenues collected by the tax and customs
administration departments would be recorded at an aggregate level in the FLS, and would be reconciled with deposits made in the banking system.

**Systems for Fixed Assets Accounting**
This system maintains records of all government assets and makes provisions for annual valuation and eventual disposal of assets.

**Systems for Cost Accounting**
They provide facilities for accumulation of costs for products and/or services.

**Systems for Monitoring Public Enterprises**
This module monitors key indicators of performance for agencies funded in part or wholly by the government.

**Systems to Support Auditing**
Auditing takes place at two levels; internal audit at line ministries during the course of the FY and external audit by the auditor general through random checks and on the final accounts for the FY. These systems assist the internal and external audit agencies in their functions.

## TECHNOLOGICAL CONSIDERATIONS

**Requirement for a multi-tiered network**
Several elements of the GFM systems network requires systems modules at the line agency and central levels with facilities for generating, storing, and processing data at each level and for exchanging data between levels. The data volumes encountered can vary widely across the nodes of the network. Government wide GFM systems require a multi-tiered network. This could consist of stand-alone microcomputers, local area network (LANs), or minicomputers, located at the nodes (MOF, other core agencies, the line agencies, and subordinate/regional treasury offices), and connected by telecommunication lines.

The transaction processing and database management at each node are carried out by the local computers. The summary or detailed data required for the applications are transmitted to the computer in the agency responsible for that system (e.g., to the MOF’s budget division for the budget system, to the treasury for the accounting and cash management systems.) This configuration is often preferred because (i) computing power is distributed commensurate with node requirements, making this system less vulnerable to malfunctions at the central site; and (ii) end users at the line agencies have more control of their technological and data resources, which inculcates a sense of ownership.

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6 The revenue recording would be at a level of aggregation consistent with the estimates presented in the budget documentation.
in the systems. In the absence of good telecommunication facilities, the data transfer between the nodes and the center could be periodic (say, daily, weekly, or monthly, depending on the application system) in an off-line/batch node. The size of each node’s computers would depend on the amount of its data and number of its transactions. They could be stand-alone microcomputers, microcomputers connected by a local area network (LAN), or fairly large capacity minicomputers at the center and larger line agencies.

**Systems Portability and Scalability**

A key consideration while designing such systems is that for systems modules that are to be implemented at multiple levels, the software should be similar at each node and scaleable—that is, able to be run on small or large computers without major changes. These properties can be achieved by choosing compatible computers offered by a single vendor that offer multiple size configurations. However, this would restrict further additions to the network to this vendor and line of computers. To avoid these restrictions, the application systems should be developed using tools and DBMS software that can operate on machines of different sizes offered by several vendors. This feature is called software portability.

To ensure vertical and horizontal portability, and scalability, the hardware should be an open system—assembled from components that conform to generally (though not universally) accepted standards. The hardware and software would therefore be interchangeable, providing greater flexibility. It will be some time before there is a full set of products on the market that truly conforms to open systems standards; at present, the UNIX environment comes the closest. Most vendors now offer a version of UNIX. Since UNIX versions vary slightly with the vendor, some application changes may be required before it can be used on a different vendor’s machine; however, time and effort involved in making these changes would be small compared to entirely rewriting the applications.

Another consideration in choosing the application development environment is that certain tools, such as fourth-generation languages (4GLs), RDBMs, and graphic user interfaces (GUIs) make it easy to add or change application features, including changes to database structures, associated programs, and report formats. The use of these tools increases application development productivity and, therefore, reduces development time. These tools also enable end users to access the databases themselves and to program simple reports.

**Application-Specific Technological Requirements**

The specific technology required for the various system modules would depend on the modules’ functional characteristics, including the amount of data handled, the size of the databases, the number and rates of transactions, and the volume of the information flow between modules. A number of design elements are also important, such as the distribution of the processing—whether the information is processed centrally or among widely separate locations. If the latter, the following factors should also be taken into account: how frequently the information needs to be aggregated at the center, and the requirements for output facilities (such as graphics, report writing, and desktop publishing) and for analytical facilities.
CRITICAL SUCCESS FACTORS

Government commitment and management support

Improving the quality of fiscal management systems would introduce transparency in the fiscal and resource allocation processes. This would affect those who benefit from the current weaknesses. These interests may act to delay project actions or divert it from its objectives. Continued government commitment to the reform of the public sector and to strengthening the basic financial management institutions is therefore a primary critical success factor for successful project implementation.

Introduction of a new institutional structure of budget execution would require re-organization and re-alignment of the roles and responsibilities of related Government agencies, such as the MOF, the Central Bank and the Treasury and their relationships to the line ministries. Implementation of changes would need government support at the highest levels to ensure that the change process is completed smoothly. A phased and gradual introduction of new policies and procedures and a broad appreciation program, for public sector managers, in the advantages offered by the new systems and processes would allow a wider appreciation of benefits and would enhance ownership.

Institutional capacity and skills

Systems reform projects may need to cope with the organizational capacities of the agencies implementation of reforms and to manage project implementation. The numbers and skill levels for finance and technical staff required to set up such systems are considerable. To ensure sustainability the project may need to supplement existing skills and provide for financing and hiring of project implementation specialists, fiscal management specialists and other technical skills as required. Government may need to review salary scales of staff in key areas to retain them within the civil service and to explore other modes of employment and avenues for hiring staff. For example, hiring staff for specific assignments from the private sector. In any case an ongoing policy of training would need to be adopted to cope with significant attrition rates that can be expected.

On the technical side an information systems organization should be established or existing organizational units strengthened, to incorporate and retain the skills and to manage the systems planning, development, and operation. The following skills are required: i) High-level project design and planning skills; ii) project management skills; iii) Technical implementation skills—to operate and use the hardware and software; iv) User support skills—to develop user and technical documentation, to train end users, and to set up a hot line as well as more formal training for end users.

Inter-agency coordination

Successful implementation of an integrated network of information systems, such as defined here, is crucially dependent on cooperation between a diverse set of users. Project preparation and implementation is complex as it is done in a multi-agency environment. A steering group with representatives from all major stakeholders would ensure that all participant agencies needs are taken into account during systems design so
that agencies do not have to resort to independent and duplicative initiatives. It would also establish systematic data sharing arrangements, protocols and schedules between the various systems so that all agencies have access to financial data on an as required basis. The lead responsibility for the different component modules of the overall system should rest with the organizations directly responsible for the corresponding functional process.

**Systems and data administration**

Information system support would normally be distributed among several agencies across government. Therefore, coordinating mechanisms should be created to ensure that a common set of policies, procedures, and standards, are put in place for managing data and systems across government. The standards should, inter alia, cover the protocols for communications, data entry, editing, and updating screen input and output formats, back-up and recovery, security, contingency and disaster planning, and technical and user documentation.

**Formal project planning**

Project planning methodologies should be used to design, implement, and monitor the GFM Systems and project management responsibilities should be clearly identified. Phased implementation would ensure that the system can be easily absorbed by organizations.

**Local technical support**

It is imperative that the hardware and software chosen be supported locally. The vendors must have a local presence to be able to provide training and technical support during the life of the system.

**Management of change**

Implementation of information systems is intimately connected with and normally has a direct on the way people do their day to day work. It is imperative that appropriate change management procedures are also instituted, in addition to formal training programs, to ensure that staff feel comfortable in their new work environment and in particular do not feel insecure on account of misplaced fears of job redundancy etc.

At a more complex level, information systems may lead to re-definition of the relative authority and power relationships of individuals and groups within organizations. The change management exercise would need to cater to address these aspects also.
ANNEX I - CONTROL PROCESSES IN PUBLIC EXPENDITURE MANAGEMENT

Incorporating Control Processes in the System

Control and/or certification of the actions of those implementing expenditure proposals and making payments is a recognized attribute of any public expenditure management system. This annex provides an outline of a control model which would be suitable for implementation in the context of computerizing the Financial Ledger System described above. Once computerized, the FLS is clearly capable of undertaking many of the routine arithmetic checks necessary in the process, and can be utilized to ‘intervene’ at critical points, such as to ensure payments from the Government’s accounts do not exceed budget appropriations at the appropriate line item level. However, there still remains a requirement to confirm that certain actions have been performed properly, before any data is registered in the system. It is assumed that the Ministry of Finance will continue to exercise the control functions, in particular:

financial control - by a MOF officer out-posted to Ministries (and where necessary significant spending units) to perform the functions before the commitment is made; and

accounting control - by the appropriate Provincial (or lower level) Accounting Office to perform the function before payment is made.

The commitment to expend public money should be governed by an explicit set of rules and procedures to ensure that expenditures correspond to the accounts and purposes decided in the budget -- and of course to prevent fraud and abuse. Included in this set of procedures is a requirement that a person independent from the preparation stages of procurement/payment process confirm that correct actions have been taken. This confirmation process should be efficient and contain no redundant steps. In the commitment/payment/reporting process three clear phases can be identified:

1. **Before the commitment is made (financial control):**

   At this stage, it is necessary to confirm:
   a) that the proposal to spend money has been approved by an authorized person;
   b) The Budget has appropriated money for the purpose and sufficient money remains available in the proper expenditure category;
   c) that the expenditure is proposed under the correct category.

2. **Before payment is made (accounting control):**

   Before money is withdrawn from the Government account it is necessary to confirm that:
a) a valid obligation exists  
b) a competent person has signified that the service has been performed as expected;  
c) the invoice or other document requesting payment is correct and suitable for payment; and  
d) the creditor is correctly identified.  

Other requirements, such as confirmation that staff recruitment intentions are within approved limits, or that other specific administrative or special instructions have been complied with, may also be added to the confirmation process at the first stage, or may be left to the responsibility of the spending agency concerned.  

3. After final payment is made (audit):  

In the context of certifying the financial reports relating to the financial year in question the Court of Accounts would:  
a) examine and scrutinize any or all expenditures or transactions to the extent it chooses;  

b) report any irregularities, in a manner and to whom it considers appropriate.  

To protect against the risk of major fraud or abuse, in addition to application of the procurement regulations in force, a special committee shall have the right to review, before contract confirmation, selected contracts of an amount greater than TL .... . The committee shall be chaired by a senior member of the Ministry concerned and include a member from the Financial Inspection Service, the Ministry of Finance, Treasury, and, when appropriate a representative of the Central Bank.