Information Systems for Government Fiscal Management

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Poverty Reduction & Economic Management
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The ECA Region PREM projects portfolio contains a number of projects to set up modernize institutional structures to manage public finances in member countries as they move from centrally planned to market economies. Among these are the institutions and systems for budget preparation, budget execution, accounting, fiscal reporting, customs administration, taxation, debt and cash management, and auditing. Automated information systems underpin the business processes associated with these functions and offer unique opportunities to public sector managers to process business transactions efficiently, apply necessary controls and simultaneously gather and report timely and accurate information required for economic management. Implementation of information systems therefore, constitutes a crucial element of many of the projects designed to improve institutions and systems for economic management.

This paper is based on the authors' experience in designing and implementing Bank/IMF projects for setting up institutions and information systems for government fiscal management in several countries in the ECA region and elsewhere. It presents a methodology that could be useful in developing an integrated network of systems that could support the information requirements for economic management. Of particular importance is the concept of developing an information systems architecture that provides an overview of the systems network required to support fiscal management and identifies the major component modules and the information linkages between these modules. This information architecture can also serve as a road map for systems implementation.

Some of the concepts presented in this paper have been incorporated into the Public Expenditure Management Handbook published by the PREM Network center in June 1998. This paper gives a fuller and more complete treatment of these concepts and could be helpful to task managers and country officials in designing and implementing information systems for government fiscal management.

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Abstract

Ready access to accurate and timely information for decision-making, is a paramount requirement for public sector managers to function effectively in the current political environment, which is characterized by increased scrutiny of governmental actions, accountability and the ability to exercise financial controls. Computer-based information systems provide public sector managers a set of tools to access reliable and timely information for decision-making in an environment that requires consolidation of large amounts of data across dispersed locations. In fact, in the absence of some degree of automation, the basic data required for economic management may simply not be available with the required degree of timeliness and accuracy. Furthermore, since many of the functional processes in the fiscal management area are repetitive in nature and follow a prescribed set of rules, computer-based systems present public sector managers with unique opportunities to process business transactions efficiently, apply necessary controls, and simultaneously gather and report timely and accurate information required for decision making.

Despite its advantages, the implementation of information systems for the automation of financial management processes in the public sector poses a number of major design and implementation challenges. The investments required are sizable and can easily span several years. Implementation of these systems generally requires substantial reform of existing institutional arrangements. Multiple information flows among different elements of the system have to be closely integrated to achieve the full advantages of computerization. It is only too common, particularly where substantial reforms to the underlying management process are required, for systems to be implemented piecemeal without significant reform and with 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 databases.

To assist in the process of designing government fiscal management systems, 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 describes a methodology that could assist in the design of an integrated network of systems. It continues with a brief discussion of the key functional processes of government fiscal management and the main characteristics of the information systems required to support these processes. It uses the information on GFM functional processes and systems to develop a framework that identifies the various elements of a GFM information systems network and describes critical inter-linkages. The paper then discusses in some detail the functional processes, information flows and information systems for budget execution, accounting and fiscal reporting in view of their central place in the financial management process. The paper closes with a discussion of some of the factors that determine the choice of technology for the component modules of the GFM systems network and the prerequisites for successful implementation of integrated financial management systems.
Acknowledgments

The Authors are grateful to a number of colleagues from the World Bank and elsewhere for helpful comments on earlier drafts of this paper. In particular we would like to thank Peter Dean, Jit Gill, Malcolm Holmes, Fritz Konigshofer, Hana Polackova, Alexey Proskuryakov, Rino Schiavo-Campo, and David Wood for their comments.
1. Introduction

As countries that were part of the former Soviet Union and Eastern Europe move from centrally planned to market economies, and other developing countries proceed to open up their economies and free them from regulatory controls, public sector managers in these countries are required to perform a new set of functions. These include such functions as:

- designing appropriate fiscal and monetary responses to changing macroeconomic conditions;
- ensuring transparency and accountability in the deployment and use of public resources;
- improving the effectiveness and efficiency of public expenditure programs;
- mobilizing domestic resources and managing external resources (foreign aid and loans); and
- decentralizing operations while maintaining adequate controls.

In the new environment, increased scrutiny of governmental actions, heightened accountability and the ability to exercise financial controls are not only domestic requirements but are also important factors in determining international creditworthiness by multinational agencies and the international investment community in general in the context of global investment choices. Ready access to accurate and timely information for decision-making is a paramount requirement to function effectively in this environment.

The information used by public sector managers is generated as the agencies responsible for government financial management processes perform their functions, such as budget preparation, execution of budgetary expenditures, collection of revenues, etc. Since many of these functional processes require processing a large number of transactions in limited periods of time across a countrywide network of offices, the process of retrieving information from manual records and reclassifying it in a format or classification scheme appropriate for management decision-making can be extremely time-consuming and labor-intensive.

In such an environment, in the absence of some degree of automation, the basic data required for economic management simply may not be available with the required degree of timeliness and accuracy. Computer-based information systems provide public sector managers a set of tools to access reliable and timely information for decision-making in an environment that requires consolidation of large amounts of data across dispersed locations. Thus, such systems support rapid compilation and consolidation of data from across a countrywide network of treasury or tax offices at the central ministry of finance. Data in the system databases can be presented in a variety of formats in accordance with management requirements.

Furthermore, many of the functional processes in the fiscal management area are repetitive in nature and follow a prescribed set of rules. For example, the rules for processing expenditures or for calculating taxes and duties can be explicitly stated. In such cases computer-based systems present public sector managers with unique opportunities to process business transactions efficiently, apply necessary controls, and simultaneously gather timely and accurate information required for decision-making. Two aspects of this enhanced efficiency are particularly important:

(a) Computer-based information systems make it possible to integrate transaction classification and posting with transaction processing. This means that as a transaction is processed, e.g. as a payment is made, it can be simultaneously classified and posted to the relevant account. This ensures that all transaction data are promptly and correctly included in system databases.
(b) Use of computer-based systems facilitates automation of many controls and procedures. As a transaction is processed, the system can apply the necessary controls, e.g. ensure that a proper budget allocation exists prior to making a commitment or 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.

Despite its advantages, implementation of information systems for automating financial management processes in the public sector poses a number of major design and implementation challenges: The 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. Implementation of these systems generally requires substantial reform in existing institutional arrangements. Multiple 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 challenges mentioned above 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 piecemeal—without significant reform and with little attention paid to critical flows of information between system components. Often, the end result is a set of partial information systems with overlapping and/or conflicting functionality, and a resulting lack of integrity in the overall fiscal databases. For the 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 upon and understood as the basis for systems design; (b) functional and technical specifications for system design be based on these processes, and (c) clear guidelines be provided for integrating all of the subsystems needed to support Government Fiscal Management (GFM).

To assist in the process of designing government fiscal management systems, 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 describes a methodology that could assist in the design of an integrated network of systems. It continues with a brief discussion of the key functional processes of government fiscal management and the main characteristics of the information systems required to support these processes. It uses the information on GFM functional processes and systems to develop a framework that identifies the various elements of a GFM information systems network and describes critical inter linkages. The paper then discusses in some detail the functional processes, information flows and information systems for budget execution, accounting, and fiscal reporting in view of their central place in the financial management process. It closes with a discussion of some of the factors that determine the choice of technology for the component modules of the GFM systems network and the pre-requisites for successful implementation of integrated financial management 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 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 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 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 below, the General Ledger System (GLS), which maintains the database for GFM, and accounts payable and receivable—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 supporting the core system by adhering to the data exchange standards of the core and reconciling data and reports with core data and reports.

A basic underlying principle for the design of integrated systems calls for them to be structured along functional rather than organizational lines. A number of organizational units and agencies are closely involved with different aspects of GFM and need to share information among themselves. A particular GFM system module should provide support to a functional area across all these organizations. This approach supports the creation of systems and databases 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 databases 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:

- What are the different information systems modules that are required to support GFM functional processes?
- What is the scope, scale, and type of a particular systems component?
- 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:

- An Information 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
- A Technology Architecture that identifies the appropriate technology choices for the hardware and software required to set up the various modules.

Once the initial framework has been set up and the
prerequisites and criteria for integration have been spelled out and incorporated into the implementation plan, the actual implementation and integration of systems modules is a goal that can be phased in over time.
This section describes in brief the major functional processes associated with government fiscal management and presents an information systems architecture necessary to support these processes. This 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 (1993), Hashim and Allan (1994) and in other World Bank publications (see References). A brief description of the major functional processes and the associated information systems for GFM is given in Table 1. The information systems architecture for GFM is shown in Figure 1.

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. The Y axis lists the main functional processes associated with GFM and the X axis lists 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. 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.

Examples of information systems architectures developed for GFM systems in Turkey and Pakistan as part of Bank-financed projects are given in Annex I. It may be noted that although the organizational arrangements and functional responsibilities in the two cases are quite different, the basic information systems modules and the critical information flows between modules are the same. In these projects, the development of information systems architectures for fiscal management systems highlighted which elements of the GFM systems network the projects were targeting and the critical linkages that would need to be developed with the other network elements. This exercise also pointed out how the information systems modules being developed as part of separate projects fitted in and the major gaps in the GFM network that would need to be addressed as part of subsequent projects in order to make available to public sector managers the information required for economic management.

In an actual systems development exercise, each box presented in the information systems architecture diagram will need to be analyzed further in terms of the processes it covers and 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, the core elements of the GFM systems network, namely those involved in the processes of government budgeting and accounting, are analyzed in the next section of this paper.
Table 1: Government Fiscal Management Processes and Information Systems

<table>
<thead>
<tr>
<th>Government Fiscal Management Processes</th>
<th>Information Systems Support</th>
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<tr>
<td><strong>Macro Economic Forecasting</strong></td>
<td><strong>Information Systems to Support Macro Economic Forecasting</strong></td>
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<tr>
<td>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. 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 macroeconomic projections; estimates of resources available from domestic and external borrowings; projections of current expenditure.</td>
<td>This group of systems assist the MOF with macro fiscal forecasting and development of the macroeconomic framework. This is in turn used by the MOF to advise cabinet on aggregate budget parameters and guidelines for budget agencies to submit budget estimates. These systems require data from external economic databases, and the assumptions regarding GNP, inflation rates, and the central government deficit. In addition they require information on programs and projects the government intends to implement over the period of the MTEF, data on estimates of tax and non-tax revenues, data on domestic and external borrowings, for example, maintained by other components of the GFM systems network. Manpower component, the maintenance, and other operating expenses.</td>
</tr>
<tr>
<td><strong>Budget Preparation</strong></td>
<td><strong>Information Systems to Assist in Budget Preparation and Approval</strong></td>
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<tr>
<td>The process of budget preparation starts with the development of a budget circular indicating economic prospects, broad policy objectives, 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 discussions at cabinet level, 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 budget envelope.</td>
<td>The Budget preparation systems receive details of ongoing and planned programs and projects from the various line agencies, 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 by cabinet, the systems produce the approved budget estimates. The systems record and maintain the budgetary proposals and income estimates of all government agencies and record any changes during the budget preparation, approval and amendment processes. To assist in the evaluation of the budget proposals the system should be able to access and generate the baseline data on the manpower component, the maintenance, and other operating expenses from the relevant past-year databases. Examination of the capital expenditures requires data on the status (physical and financial) of government-approved projects, (both locally and foreign-funded). The budget preparation systems need to be supplemented with tools (such as those for cost-benefit analysis, evaluation, and performance measurement) that assist the sector and core agencies in deciding between alternative program proposals.</td>
</tr>
<tr>
<td><strong>Budget Execution, Accounting, and Fiscal Reporting</strong></td>
<td><strong>Information Systems for Budget Execution, Accounting and Fiscal Reporting</strong></td>
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<tr>
<td>This set of processes covers 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.</td>
<td>These systems are the centerpiece of the GFM systems network, the primary repository of financial data, and serve as the basis of the government's Financial Management Information System (FMIS). These systems are used 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. 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). Together they constitute the government's Core Accounting System. The first of these is concerned with maintaining data on spending authority. 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. The second and third group of systems are used to process transactions electronically as they occur, and record data on commitments and actual expenditures against budgeted allocations. The TLS/FLS is used for compilation of summary records for control and analysis.</td>
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### Table 1: Government Fiscal Management Processes and Information Systems (Continued)

<table>
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<tr>
<th>Government Fiscal Management Processes</th>
<th>Information Systems Support</th>
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<tr>
<td><strong>Cash Management</strong></td>
<td><strong>Cash Management System</strong></td>
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<tr>
<td>This includes the processes of develop-</td>
<td>The cash management system</td>
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<td>ing agency and central cash flow</td>
<td>assists Government to maintain</td>
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<td>forecasts, the release of funds to</td>
<td>an up-to-date picture of the</td>
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<td>spending agencies, the monitoring of</td>
<td>government's liquidity position</td>
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<td>cash flows and expected cash</td>
<td>and cash requirements. It</td>
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<td>requirements, the issue and redemption</td>
<td>obtains information on actual</td>
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<td>of government securities for</td>
<td>agency expenditures and cash</td>
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<td>financing government programs.</td>
<td>balances in government</td>
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<td>(including agency) accounts</td>
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<td></td>
<td>from the general ledger.</td>
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<td>Revenue inflows, borrowings,</td>
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<td>loan disbursements, treasury</td>
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<td>bills, government bonds, and</td>
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<td>cash deposit maturities</td>
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<td>are obtained either from the</td>
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<td>general ledger or from the</td>
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<td>specific systems for these</td>
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<td>areas, for example, the</td>
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<td>debt management system. Using</td>
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<td>this information, the</td>
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<td>government can decide on (a)</td>
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<td>budget ceilings and fund</td>
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<td>releases to line agencies;</td>
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<td>and (b) the timing of the</td>
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<td>issues and redemptions of</td>
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<td>government securities to</td>
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<td>provide short-term financing</td>
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<td>for shortfalls.</td>
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<td><strong>Debt Management</strong></td>
<td><strong>Debt Management System</strong></td>
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<td>This process defines the tasks</td>
<td>These systems maintain</td>
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<td>associated with maintenance of</td>
<td>information on public</td>
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<td>records on all contracted public debt</td>
<td>domestic and external</td>
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<td>on an individual loan basis and</td>
<td>borrowings. This includes</td>
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<td>classified according to source and</td>
<td>information contained in loan</td>
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<td>type of loan. This process also</td>
<td>documents and transactions</td>
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<td>assists economic and policy analysis</td>
<td>and issues of government</td>
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<td>by determining, for example, the debt</td>
<td>securities. In addition to</td>
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<td>implications of different fiscal and</td>
<td>accounting information, these</td>
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<td>deficit financing policies by</td>
<td>systems also provide</td>
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<td>preparing projections of debt service</td>
<td>important information</td>
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<td>commitments under existing and</td>
<td>required in the formulation</td>
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<td>anticipated contracts.</td>
<td>of fiscal policy, such as</td>
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<td>forecasts of drawdown and</td>
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<td>debt servicing liabilities,</td>
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<td>and debt implications of</td>
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<td>various fiscal and deficit</td>
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<td>financing policies. Payments</td>
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<td>related to government</td>
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<td>borrowings are carried out</td>
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<td>by the central system based</td>
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<td>on the data in the debt</td>
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<td>management system. Loan</td>
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<td>receipts recorded in govern-</td>
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<td>ment accounts are processed</td>
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<td>by the central accounting</td>
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<td>system and then used to</td>
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<td>update the debt database</td>
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<td>maintained by the debt</td>
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<td>management system.</td>
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<td><strong>Revenue Administration</strong></td>
<td>**Systems for Revenue</td>
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<td>The process deals with formulation</td>
<td>Administration**</td>
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<td>and administration of tax policies</td>
<td>This group of systems assist</td>
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<td>and covers the actual levy and</td>
<td>the government in the</td>
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<td>collection of revenues including</td>
<td>processes associated with</td>
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<td>taxes and duties as laid down in</td>
<td>formulating tax and tariff</td>
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<td>these policies, and the valuation</td>
<td>policies and the subsequent</td>
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<td>and collection of non tax revenues,</td>
<td>collection of tax and non tax</td>
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<td>such as stamp duties, user fees,</td>
<td>revenue. A number of separate</td>
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<td>charges for services etc.</td>
<td>systems are involved in this</td>
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<td>group: for example, those</td>
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<td>supporting the administration</td>
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<td>and collection of income</td>
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<td>taxes, customs duties or</td>
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<td>VAT, and those supporting the</td>
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<td>collection of various types</td>
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<td>of non-tax revenues, such as</td>
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<td>stamp duties. The revenue</td>
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Figure 1: Information Systems Architecture for Government Fiscal Management

Legend:
- Arrows show information flows. Full lines indicate electronic flows; dotted lines, paper based flows.
- Key Information Systems Modules for GFM:

1. **Macro Economic Forecasting**
   - Systems for Macro-Economic Forecasting
     - Data on previous and current year's fiscal and spending patterns.
     - Budget Guidelines

2. **Budget Preparation**
   - Systems for Budget Preparation
     - Investment Budget
     - Current Budget

3. **Budget Execution, Accounting, and Fiscal Reporting**
   - Systems for Budget Execution and Fiscal Reporting
     - Budget Appr. & Transfers
     - Expenditure Status

4. **Cash Management**
   - Cash Management Systems
     - Agency Cash Requirements Forecasts

5. **Debt Management**
   - Debt Management Systems
     - Domestic
     - Foreign
     - Debt Service Payments/Loan receipts

6. **Revenue Administration**
   - Revenue Administration Systems
     - Tax Admins. Systems
     - Customs Admins. Systems

7. **Personnel Management**
   - Personnel Management Systems
     - Payroll & Pension Systems

8. **Audit**
   - Systems for Auditing

Key Information Systems Modules for GFM:
- Spending Agency Systems
- Tax Systems (Policy)
- Customs Systems (Policy)

Legend:
- Arrows show information flows. Full lines indicate electronic flows; dotted lines, paper based flows.
IV. Systems for Government Budgeting and Accounting

The objectives of a well-performing budget resource allocation and management system (Public Expenditure Management Handbook—World Bank, 1998) are to:

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

Management of these three objectives is integrated through a perspective that goes beyond the annual budget cycle. This is achieved by linking policy, planning and budgeting in a medium-term expenditure framework at both the overall government and sectoral levels.

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 operating the various component modules of the system network consists of the following elements:

- the control structure;
- the accounts classification; and
- 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 into the design of component system modules.

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 that 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)$^2$, 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:

- document and transaction level controls to ensure correct processing, full and correct recording, and audit trails;
• access controls to ensure that only authorized personnel can record, change, or report information; and
• overall system controls to ensure that the system embodies established processing standards.

Formal regulatory frameworks in 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, however, 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 the definition of the control structure. It is necessary, however, 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 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.

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; and
• 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 of 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 of expenditure classification should serve both administrative and economic classifications and be divided into sub-categories for control purposes. It should also be consistent with economic classification codes used for generating national accounts or government finance statistics (GFS).

Reporting Specifications

Governments must specify reporting requirements and objectives in two areas:

• external reporting—to provide information to the legislature and the public, as well as other countries, international organizations, overseas investors, and financial markets; and
• 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 ac-
Functional Processes for Budgeting and Accounting

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. 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 (MOF)) is to ensure that the control framework is properly applied throughout government. The functional processes cover two interrelated areas: macro fiscal forecasting, budget preparation and approval; and budget execution, cash management; and accounting. The first set of processes supports the objectives of setting fiscal policy and strategic priorities. The second set of processes supports the objective of optimizing the use of budgeted resources and ensuring accountability.

Macroeconomic 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 which 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 in the following ways:

- by type of expenditure—as per budget classification and, at the broadest level, distinguishing recurrent from capital expenditures; and
- according to whether they are continuations of programs approved under existing policy or new project proposals.

Since budget requests generally exceed resources, negotiations at the technical level between central and sector agency staff are required to review costings for existing programs and new project proposals. Cabinet level (or cabinet committee level) discussions are often required to set intersectoral priorities and priorities among the program and project proposals to ensure that the selected proposals 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 the degree of change that can be introduced at this stage vary considerably among countries.

This approved budget 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—authorized to be spent on approved programs and projects. It usually contains data on past expenditures. It may also contain descriptions of programs and projects and data on expected performance expressed in terms of outputs and/or outcomes expected from program 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).
Figure 2
Functional Analysis, Control Framework, and Functional Processes

Control Framework | Central Processes | Ministry/Agency Processes
---|---|---
Budget and Cash Management | Public Sector Work Program Management

- **Macroeconomic Policy** → **Macroeconomic Framework** → **Budget Circular**
- **Budget Classification**
- **Fund Structure**
- **Organic Budget Law**
- **Appropriation Law** → **Approved Budget** → **Draft Budget**
- **Supplementary Appropriation Law**
- **Financial Regulations** → **Consolidated Cash Flow Forecasts**
- **Warrant Releases to Ministries** → **Revenue Projections Proposed Work Programs**
- **Consolidated Cash Flow Forecasts** → **Financial Regulations**

- **Accounting System**
  - **Purchase Orders**
  - **Purchase Contracts/Commitments**
  - **Goods Receipt and Verifications**
  - **Payment Vouchers**
  - **Check Vouchers** → **Issue Payment Orders to Bank**

- **Treasury General Ledger System**
  - **Tax/Nontax Receipts & Loans**
  - **Receipt Transfers to Treasury Account**
  - **Tax and Nontax Receipts**
  - **Issues and Redemptions of Govt. Securities**
  - **Reconciliation with Bank**

- **Agency General Ledger System**
  - **Receipt Transfers to Treasury Account**

- **Budget Reviews & Fiscal Reports**

- **Budget Proposals**
  - **Recurrent**
  - **Capital**
  - **Existing Programs & Projects**
  - **New Proposals**

- **Revisions to Revenue Projections & Work Programs**
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 are based on 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 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 (AG) office, or its equivalent) that is the custodian of the Consolidated Fund (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. The alternative institutional settings for banking arrangements are discussed more fully below.

Budget Execution

Upon 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 2.4. 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, a check or payment order is issued. 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 expenditure does not exceed the sum approved by parliament for specific purposes and 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 mentioned above. At step three, the issuing of the payment order, many of the processes described above have to be scrutinized again. This may include the following verifications:

- the identity of the spending officer;
- the availability of budget provisions;
- the exact budgetary imputation;
- the verification of receipt of goods and services; and
- the observation of financial regularity.
Receipt (tax and non-tax) transactions are also shown in Figure 2 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. These revenues are 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 prisons) are also managed by the collection agencies and transferred to the CF.

**Accounting**

The basic processes involved in government accounting are:

- maintaining records of spending authorizations at the appropriation and funds-release (warrant) levels;
- 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;
- maintaining ledger accounts to monitor and control actual spending and receipts against budget and warrant controls; and
- reporting.

**Information Systems for Budget Execution, Accounting and Fiscal Reporting—The Treasury Ledger System**

These systems form the centerpiece of the GFM systems network. They are the primary repository of financial data and serve as the basis of the government's Financial Management Information System (FMIS). These systems are used 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.

Systems support is focused on four main systems:

- budget and warrant control;
- accounts payable;
- accounts receivable; and
- the treasury general ledger system (TLS) or the financial general ledger (FLS) system.

Together these systems constitute the government's Core Accounting System (CAS). The first of these is concerned with maintaining data on spending authority. 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. The second and third group of systems are used to process transactions as soon as possible after they occur, and record data on commitments and actual expenditures against budgeted allocations. The TLS/FLS is used for compilation of summary records for control and analysis. The term Treasury Ledger System (TLS) is also used to refer collectively to the systems for budget execution, accounting and fiscal reporting. The TLS would normally be used by:

- the Treasury and its regional offices to perform the basic accounting functions and to undertake budget implementation;
- the budget department of the MOF to obtain the status of actual expenditures and perform the processes associated with budget preparation and monitoring;
- the Treasury cash management department to provide the information it requires for cash management and implementation of cash limits;
- line agencies to cater to their accounting and financial information needs; and,
- the Government auditing organization to access financial transaction data for auditing purposes.

In a fully automated accounting system as it exists in most developed countries and several middle-income countries, the basic accounting processes are automat-
ed and data captured only once as an accounting transaction progresses through the system. Such a system, introduced along with a modern budget classification system and an appropriate chart of accounts, enables expenditures and revenues to be recorded at a very detailed level and related to specific programs and projects. Data recorded at this level can be used directly for program and project management. These data also would be easily amenable to cross-classification in other ways as required for financial analyses. In the absence of an automated accounting system, data recording would not be accomplished at as detailed a level. More important, cross-classification of data to other schema would be very cumbersome and therefore seldom done. The introduction of an automated accounting system ensures completeness of data capture (that is, no transaction would be processed outside the system) and rigorous application of appropriate financial controls to all transactions processed by the system. The information contained in the system databases would provide the MOF and other core financial agencies with comprehensive management information related to the country's financial resources. In addition, the system would provide useful financial information to the ministries and other spending units (in their respective areas) to enable them to better manage their work programs.

**Policy Framework and Institutional Reforms**

As mentioned above, the institutional and policy framework associated with budget preparation and execution must be in place—possibly reviewed and modified—before productive work can commence on the design of computer systems to support budget execution, accounting and fiscal reporting. The IMF and the World Bank have been involved extensively in advising Governments developing policy and institutional reforms how to enable the systems for budgeting and accounting to be set up and function in accordance with international best practices. These reforms are especially important in transition economies where the legal and institutional infrastructures need to be set up ab-initio. Some of the key actions and policy reforms needed prior to the implementation of new computer systems for budgeting and accounting are detailed below:

(i) Development of a comprehensive Budget Management Law which will provide a framework for the proper management of public funds and property, with specific emphasis on: (a) the receipt and custody of public funds (including banking arrangements); (b) public expenditure management (including control processes and linkages with appropriations); (c) the accounting system; (d) the role and responsibilities of the Treasury, MOF, and other departments; (e) asset management and control; (f) borrowing and investment (specifically management of the public debt); and (g) reporting and audit.

(ii) Adoption of a budget classification system consistent with the IMF's Government Finance Statistics (GFS) methodology, and final design of a treasury chart of accounts embodying this classification system for implementation. The structure of the budget classification system would need to have elements that support a breakdown of budget appropriations by function (consistent with the IMF's functional classification), organizational unit, programs/projects, and line items consistent with the IMF's economic classification.

(iii) Setting up appropriate institutional arrangements for processing payment transactions. In a number of transition and developing economies, the IMF has recommended centralization of all Government payments through the Treasury and consolidation of bank accounts to a single account at the Central bank. This model has been recommended by the IMF because:

(a) Under the former system in practice in transition economies, the Ministry of Finance (MOF) periodically distributed funds to spending agency bank accounts, and the spending units directly processed payment transactions against these accounts. This resulted in a situation where sizable idle balances could build up in spending unit bank accounts, while the MOF was in deficit in overall terms. This, in turn, necessitated additional government borrowing and/or caused arrears in payments.

(b) The MOF could not exercise any control to ensure that public expenditures incurred by spending units were in accordance with budget appropriations.
(c) The MOF did not receive timely information on public expenditures or receipts from line agencies. In this environment, centralizing all Government funds in the Treasury Single Account (TSA) and channeling all expenditures through the Treasury was necessary to ensure efficient cash management and adherence to budget appropriations. However, several alternative institutional arrangements to manage government payment processing and banking are often put into practice. These arrangements are discussed in a following section. A choice needs to be made amongst these alternatives keeping in view the local circumstances.

(iv) Implementation of systems for and development of detailed regulations and operating manuals covering TSA-based budget execution processes (spending limits, cash allocations, commitment and payment control, payment processing, accounting and reporting).

(v) Establishment of a cash management unit in the Treasury and formulation of procedures for its operations, which will cover cash flow forecasting and monitoring, and day to day management of funds distribution among spending units and field treasuries. The cash flow forecasting and monitoring function is of central importance to the system of monthly spending limits and commitment control. The cash management unit will be responsible for making realistic forecasts of likely cash inflows and spending requirements based on actual trends. This unit should work very closely with the budget department of the MOF to advise on the appropriate levels for spending ceilings.

Key Characteristics of the Treasury Ledger System (TLS)

The core functional processes and information flows associated with the TLS are shown schematically in Figure 3. The TLS is normally implemented at the Treasury head offices and at each of the regional and district branches of the Treasury to process and control central government payments in their respective areas. Local government payments are not normally part of the system. Nevertheless, the implementation of the treasury system would not preclude the installation of a similar system for local governments.

The system encompasses the functional requirements for the budget implementation and accounting processes and would normally cover the appropriation, commitment, funds allocation, and payment processes for both the investment and current budgets. The details of the functionality of the TLS are given below.

The Treasury Ledger System would have the ability to:

- Record initial budgets and distribute the budget appropriations, as approved by the legislature, to spending ministries, and keep a record of initial budgets, revised budgets, and budget transfers for a typical government spending unit.
- Distribute appropriation and commitment authorizations to spending units and record commitments incurred by a spending unit against the approved limits and the appropriation during the course of a year.
- Distribute funds allocations to spending units and keep a record of the amounts of funds allocations against the appropriations and any changes there-to.
- Record expenditure against commitments and funds allocations (e.g. due to purchase orders or other payments). The system will have facilities to check availability of appropriation, commitment and funds allocation prior to payment approval.
- Print consolidated payment instructions for action by the banking system.
- Record revenue and other receipts against appropriate account heads.
- If required, print checks against payment instructions and/or make arrangements for the electronic transfer of payment information to an external paying entity (e.g. a bank).
- Consolidate data from all ministries and regional offices as necessary. The system will have good report writing facilities and support easy retrieval and reporting on data in the system databases in a variety of formats. The system would be able to produce commonly required accounting and management reports.
- The system would have facilities to restrict access to duly authorized staff only.
### Core Functional Processes

**Central Processes**
- Develop Macro Economic Framework (with Sectoral Ministry Input)
- Issue Budget Guidelines
- Receive Budget Proposals (Ministries send consolidated proposals to MOF)
- Consolidate Budget Proposes & Finalize Budget
- Enter Budget Appropriations (original and revisions) into System & Inform Ministries
- Monitor Overall Budget Execution

**Expenditure Management/Control Processes**
- Obtain Expenditure Figures and Cash Balances from TLS
- Determine Only Limits on Commitments (Enter in System and Inform Ministries)
- Determine Funds Allocation to Ministries (Enter in System, inform Ministries)
- Ministries Determine Budget Appropriations and Commitment Limits for SU
- Financial Releases to SU Accounts (Enter into System and inform SU)
- Request for Expenditure, Administrative Approval & Budgetary Control (at Ministries)
- Commitments and Verifications (of Goods Receipt) Transactions
- Payment Orders to make Expenditure
- Budgetary Control at Treasury
- Payment transactions against TSA by Treasury
- Credit to Commercial Banks of Amounts authorized for credit to Govt. Creditors
- Daily File of payments from TSA and Reconciliation by Treasury
- Summary of Receipts (Tax and Non Tax) to the TSA
- Detailed Accounts of Ministries from System
- Detailed SU Accounts from System
- Information flows to/from Subordinate Units

### Regional and District Spending Unit Processes

- Request for Expenditure Administrative Approval & Local Budgetary Control
- Commitments and Verifications (of Goods Receipt) Transactions
- Payment Orders to make Expenditure
- Budgetary Control at Treasury (RTU)
- Payment transactions against TSA by Treasury
- Credit to Commercial Banks of Amounts authorized for credit to Govt. Creditors
- Daily File of payments from TSA
- Summary of Receipts (Tax and Non Tax) to the TSA
- Detailed Accounts of SU from System

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**Legend**
- Information Flows
- Agency Involvement in the Process

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**Figure 3. Core Government Fiscal Management Processes, Information Systems and Information Flows**

*Case 1a: Treasury is Responsible for Making Payments. Central Bank Directly responsible for Retail Banking Operations.*
Implementation of the Treasury Ledger System—Activities and Tasks

As mentioned above, implementation programs for information systems designed to support budget execution government-wide must be sequenced carefully starting with the specification and design of appropriate financial management processes and organizational arrangements to support these processes. This should be followed by development of functional and technical specifications for the information system to support these processes. Finally, the acquisition and implementation of the hardware and software should be completed. Annex II lists the main activities and tasks normally associated with the design, development and implementation of information systems for budget execution and accounting, as well as the procurement of related hardware and software. Quite often, government agencies will require the assistance of external consultants to manage systems implementation. The activities and tasks listed in Annex II would form part of the terms of reference for such consultants.

Training needs to be recognized to be a crucial element for project implementation. Training requirements for the project can be divided into several areas:

- Training in principles, concepts and methodologies of the subject areas covered by the project, namely, budget execution, cash management and treasury operations.
- Senior level management training/orientation in the use of computer based financial management information systems.
- End user training in the use of the computerized information systems to be set up under the project. This would include training for line agency finance staff and for Government auditors.
- Technical training in the use of the specific tools to be employed for developing and implementing the information systems under the project. e.g. the chosen RDBMS, the operating system-UNIX, application development and CASE tools, etc.
- More general training related to the design and development of information systems.
- Training in EDP project management and the provision of end user support to staff who will use the systems.

A TLS implementation project would typically provide financing for:

- Technical assistance for a training needs analysis and development of an overall training strategy and a schedule for training users in the light of the results of the training needs analysis; the design and specification of in-house training facilities and/or identification of suitable training courses within the country and abroad; the development/acquisition of training materials, technical documentation and end user manuals.
- Training courses to be arranged at site, or in local or foreign institutes to cover these areas. Staff to be trained under the project would include the MOF/Line Agency/Government Auditors/Treasury staff and technical staff of the MOF/Treasury who will be involved in the development and implementation of the systems.
- Study assignments for government officials in the budget execution and treasury operations areas to enable them to benefit from the experiences of other Governments in these areas. This would include financing of courses, discussion trips on specific topics by experts from these governments or agencies to the country where the project is being implemented.

Budget Execution Using the Treasury Ledger System

Specific details regarding 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 the budget are described in this section.

The various steps in the execution of budgetary expenditures are shown schematically in Figure 3. This figure lists in the first column the main processes performed by the central and line agencies involved. The diagram shows the major information flows that result as the different agencies involved in budget execution carry out the functional processes associated with budget execution.

Budget Appropriations: The process begins with the recording of the approved budget (and any amendments thereof) by the Ministry of Finance (MOF) in the TLS by individual appropriation item or revenue estimate. The budget department
of the MOF prepares and registers in the TLS 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 into the cash management system. As the year progresses, sector agencies prepare quarterly/monthly requests for funds by category of spending. These are also input into the system.

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

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 as previously advised to ministries. 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 the appropriate spending units of their budgetary appropriations commitment limits and fund allocations. These limits would be entered into the TLS.

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. This ensures that any necessary cuts in expenditures by agencies can be made in an orderly, rational and 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 in the system. In the case of spending units (SUs) located outside the center, the transactions will be recorded in the system through a Regional Treasury Unit (RTU).

Verification of Receipt of Goods and Payment Orders: Following verification of 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, which would check the payment order issued by the SU and register it in the TLS.

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: The banking system must be advised at the same time as payment orders are registered in the TLS 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 TLS 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 the appropriate account and debit the government account. The appropriate bank would confirm to the TLS (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 above, 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 expenditures, either administratively or by automated procedures in the TLS. 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 to 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 additional 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 payment. However, to prevent misuse, the system must know in advance which appropriation items allow such simplification.

**Commitments for the Investment Component of the Budget:** Commitment control for the re-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. 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 two years beyond the budget year. As long-term commitments are entered, the financial impact is recorded for budget and “later” years.

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

**Receipts:** Government receipts (e.g. taxes and duties) are often paid into accounts set up by the corresponding revenue collection agency in commercial banks. They are then transferred to the TSA at the Central Bank. A periodic report from the Central Bank informs the Treasury and the appropriate revenue collection of the details regarding the collections.

**Alternative Institutional Arrangements For Expenditure Processing**

**Responsibility for Payment Processing**

Previous sections and Figure 3 describe the commonly occurring institutional setting in which: (a) all payments from line agencies are channeled through the Treasury; (b) the Treasury is responsible for making payments from the Treasury Single Account (TSA), which is held at the Central Bank; and (c) the Central Bank is responsible for the retail banking operations associated with government payments and receipts.

However, in those countries where the institution of the Treasury and the necessary legal framework for budget preparation and execution is in place and the need for financial discipline is recognized government-wide, several alternative institutional arrangements are often put in place for managing the payment process. The first variation on the standard institutional setting is that in some countries the spending ministries/spending units are directly responsible for making payments from the TSA instead of the payments being channeled through the Treasury. The TSA is nevertheless still held at the Central Bank, which continues to be responsible for retail banking operations related to government payments and receipts. This system may result in a quicker response time for payment transactions since the payment authority resides in the agency itself. In this case the responsibility to ensure compliance with budget execution limits and procedures is delegated to the agency. For this system to be successful, the MOF needs to ensure that necessary controls are adhered to by the agency prior to making a payment. Budget control responsibility can be exercised by officers from the central treasury who are out-posted to the line agency, or by line agency finance and accounting staff.
It may be noted that if a computer-based system is used for controlling budget execution and for processing payment transactions and the system design incorporates the necessary controls, the location of the payment authority is not as important as it would be in a manual system. Prior to allowing a payment, the accounting system software would normally ensure that a budget appropriation exists, a warrant allocation (cash) is available, and a prior commitment has been made (in those cases where commitment accounting has been implemented). Manual intervention would normally be required only to override some of these restrictions. In these cases, the system would keep a log of the event, including the date, time, amount involved and the name of the authorizing officer. This ensures adherence to the controls prescribed for budget execution.

In a manual system, the finance personnel located at the spending agency or the Treasury would need to ensure that these controls are applied in each case. In a spending agency-based payment system, if the spending agency finance personnel are functionally and administratively responsible to the head of the spending agency, they may be subject to pressures to process payment transactions that do not comply with specified procedures. It may therefore become more difficult to ensure that prescribed controls and procedures are adhered to in a decentralized system as compared to a treasury-based central system.

Banking Arrangements

A further variation that is often implemented is delegation of retail banking operations to one or more fiscal agents (normally authorized commercial banks) by the Central Bank. This model is put in place in those cases where the Central Bank does not have an adequate network of provincial/regional branches or does not have the capacity to handle the large volume of transactions associated with government payments and receipts. In these cases, the fiscal agent(s) makes payments on behalf of the treasury, the Central Bank recoups all payments made by the fiscal agent(s) for government operations, and the fiscal agent(s) makes daily deposits of all government revenues to the TSA in the Central Bank. This model can be used in both situations described above, namely in the case where the payments are channeled through Treasury or where the agencies are directly responsible for authorizing payments. The arrangement has the advantage of providing more expeditious payments to government creditors in view of the greater capacity of commercial banks to process these transactions. Three processes are important for the efficient functioning of this system. First, the float of all payments to be transferred to the TSA should be as small as possible. Second, the bank accounts should continue to be under the control of the Treasury even though they may be operated by the agencies. Finally, their balances should be cleared to the TSA periodically to ensure that government has an accurate idea of the total amount of cash available in the system so that it can optimize its borrowing strategies.

The mechanisms required to ensure that the Ministry of Finance has the necessary information on bank accounts can be implemented more easily in an information technology-based environment. However, it is necessary to note that mere existence of an electronic connection is not sufficient. For the necessary controls to be implemented the Bank accounts would need to be under the control of the Ministry of Finance/Treasury so that it can obtain data on balances in these accounts and make transfers from them independently of the spending agencies.

The various alternative models for expenditure processing are shown schematically in Figure 4. Centralized payment processing through Treasury offices is used by the United Kingdom, Canada, France and Australia, amongst other advanced countries. The Government of New Zealand has put in place a decentralized payment system in which agencies directly process expenditure transactions and have direct access to bank accounts. The Treasury nevertheless has control over these accounts and they are cleared every night to the TSA in the Central Bank. This enables Government to get accurate and timely information on the total cash available in the system. Additionally, since the Government of New Zealand has put in place an output-based budget system, budget control and monitoring processes are not based on controlling inputs. Furthermore, in view of the strong systems that have been put in place at the agency level to ensure accountability, there are no major concerns that agencies would incur expenditures that are not
Table 2: Institutional Arrangements For Payment Processing As Implemented in Some Countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Payment transactions processed by:</th>
<th>Treasury single account held at:</th>
<th>Payment transactions processed by:</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hungary</td>
<td>Spending units send expenditures to Treasury units for processing</td>
<td>National Bank of Hungary</td>
<td>National Bank of Hungary makes payments to Government creditors</td>
<td>Prior to the establishment of the Treasury and setting up the TSA, MOF transferred cash directly to spending unit accounts. Government did not have access to accurate and timely information on the cash available in agency bank accounts. This led to generation of idle balances. There was little control over whether expenditures followed budget appropriations. To remove these problems, under IMF advice, the government has set up Treasury TSA-based payment arrangements.</td>
</tr>
<tr>
<td>Kazakhstan</td>
<td>Spending units send expenditure transactions to Treasury units for processing</td>
<td>National Bank of Kazakhstan</td>
<td>National Bank of Kazakhstan makes payments to Government creditors at the center and oblasts. At rayons, banking operations are handled by designated commercial banks</td>
<td>Kazakhstan has, under the advice of the IMF, moved from a decentralized payment system to one in which government funds are located in the Central Bank and payments are processed by Treasury units at the center, oblasts and rayons. This has enabled the government to implement more efficient cash management practices and exercise better control over expenditures.</td>
</tr>
<tr>
<td>Ukraine</td>
<td>Spending units send expenditure transactions to Treasury units for processing</td>
<td>National Bank of Ukraine</td>
<td>National Bank of Ukraine makes payments to Government creditors at the center and oblasts headquarters. At rayons retail banking operations are handled by designated commercial banks</td>
<td>Ukraine is also in the process of implementing a centralized payment system under IMF advice.</td>
</tr>
<tr>
<td>Turkey</td>
<td>Spending units send expenditure transactions to accountancies managed by MOF/General Directorate of Public Accounts for processing</td>
<td>Central Bank of Turkey</td>
<td>At the center payments are made by the Central Bank. In the regions/provinces by Ziarat Bank—a designated commercial bank</td>
<td>Government payments are handled by the Central Bank at the center. In the regions, the Ziarat bank acts as the Government’s fiscal agent.</td>
</tr>
</tbody>
</table>

within their approved mandate. These aspects nevertheless are important to assess the readiness of a country to move from a centralized to a decentralized system. Table 2 lists the institutional arrangements adopted by several countries for payment processing.
<table>
<thead>
<tr>
<th>Country</th>
<th>Payment transactions processed by:</th>
<th>Treasury single account held at:</th>
<th>Payment transactions processed by:</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pakistan</td>
<td>Spending units send expenditure transactions to the offices of the</td>
<td>State Bank of Pakistan</td>
<td>National Bank—a government-owned commercial bank</td>
<td>In Pakistan, government payments are processed by offices of the Accountant General. However, the central bank has designated the National Bank to act as its fiscal agent. The Accountant general has an account in the National Bank (NB), which is a government-owned commercial bank. The NB performs the retail banking operations on behalf of the Central Bank. This enables the government to maintain central control, but at the same time take advantage of the large network of National Bank branches to...</td>
</tr>
<tr>
<td>New Zealand</td>
<td>Spending units process expenditure transactions directly</td>
<td>Central Bank / designated commercial banks</td>
<td>Designated commercial banks.</td>
<td>New Zealand operates a decentralized system. However, agencies are held responsible for ensuring that all budgetary expenditures are in accordance with the approved budget. Moreover, agency bank accounts are cleared every night to enable the Treasury to get an idea of the total cash available in the system and determine appropriate borrowing strategies.</td>
</tr>
<tr>
<td>Jamaica</td>
<td>Spending units process expenditure transactions directly</td>
<td>The main consolidated fund account and its subsidiary accounts are held in designated commercial banks</td>
<td>Designated private banks. Foreign debt transactions are handled by the Bank of Jamaica</td>
<td>Jamaica has opted for a decentralized system. The government would like to give full freedom to line agencies to implement their programs and projects as approved by parliament. However, the agency bank accounts are not cleared on a daily basis. This can cause a build up of idle balances. The consolidation of expense data slated to commence soon is expected to address this problem.</td>
</tr>
</tbody>
</table>
Figure 4. Alternative Models for Expenditure Processing

Case Ia: Treasury is responsible for making payments. Central Bank directly responsible for retail banking operations.

Case Ib: Treasury is responsible for making payments. Retail banking operations carried out through a fiscal agent.

Case 2a: Ministries and spending units are responsible for making payments. Central Bank directly responsible for retail banking operations.

Case 2b: Ministries and spending units are responsible for making payments. Retail banking operations carried out through a fiscal agent.
V. Technology Architecture

The technology architecture defines the nature of the hardware, software, and communications technology required to support the information systems architecture. The elements of a technology architecture include descriptions of:

- the nature, size, and distribution of the computer-processing facilities and associated workstations;
- the nature of the communications interconnections between the computer processing facilities; and
- the nature and type of applications development and systems software, database management systems software (DBMS), office support systems software, and special purpose software to support analytical capabilities, text management, desktop publishing, etc.

Definition of the technology architecture provides the basis to:

- select appropriate technology to support the systems architecture;
- guide acquisition of hardware, software, and communication facilities; and
- ensure integration and compatibility of component elements of the architecture.

The different elements of the technology architecture will be country- and application-specific. This paper, therefore, restricts itself to a discussion of the factors which need to be kept in mind while making technology choices.

Application-Specific Factors

Technological requirements for the various systems modules described in the foregoing sections could vary quite significantly. Some of the application-specific factors that determine the choice of information technology are:

- the volume of data to be handled and the sizes of the databases required to be maintained;
- the volumes and rates of transactions that take place against the databases and the numbers of concurrent users of the system;
- the volumes and frequency of information flows between component parts of the system or with other systems;
- whether the information processing requirements are centralized to a single location or are distributed to a number of widely separated locations, and if the latter, how frequently the information maintained by the system is required to be aggregated at the center or referred to by other agencies of government;
- the type of data handled by the system: whether it is primarily alphanumeric or textual; and whether it pertains to a given time slice or, requires time series;
- the nature of output facilities required by the system: graphics, report writing, desktop publishing and imaging;
- the nature of analytical facilities required, e.g., modeling, statistical analysis tools, data warehousing and data mining etc.

The systems characteristics identified in Table 3 broadly define the information technology requirements of the systems modules. In general, the data volumes and transaction rates determine the computing power requirements at a particular node of the system and the degree of sophistication required in the database management software. High transaction rate systems with a large number of concurrent users require sophisticated database management software.

The data distribution profiles and the nature and frequency of information flows between component modules of the system or with other modules of the GFM network, determine the nature of the telecom-
Table 3: Technological Requirements for GFM Information Systems

<table>
<thead>
<tr>
<th>Systems for:</th>
<th>Requirement for distributed processing, data transfer and access facilities</th>
<th>Analytical processing, modeling, and statistical analysis facilities</th>
<th>Text management facilities</th>
<th>Report writing, desktop publishing facilities</th>
<th>Availability of off-the-shelf package software solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Macro-economic forecasting</td>
<td>Low</td>
<td>Operated by the core agencies at the center.</td>
<td>Economic modeling statistical analysis</td>
<td>Designated commercial banks.</td>
<td>Good report writing and graphics facilities</td>
</tr>
<tr>
<td>Budget Preparation</td>
<td>Moderate; involves annual submission of budget proposals from line agencies to MOE. The system should be able to support the data volumes during the peak period of budget preparation.</td>
<td>Some; budget proposals are prepared at line agency offices and need to be transferred to the MOF at the center.</td>
<td>Some analytical capabilities are required to perform cost-benefit analysis during budget preparation and developing alternative scenarios.</td>
<td>Budget proposals normally contain descriptions of agency programs and outputs/outcomes.</td>
<td>Good desktop publishing facilities. The systems should prepare a camera-ready version of the budget that is ready for printing after approval by parliament.</td>
</tr>
<tr>
<td>Cash Management</td>
<td>Moderate; cash requirements from agencies, and cash allocations to them are processed by system.</td>
<td>Some; cash requirements are received from line agencies and warrants allocations are distributed to them.</td>
<td>Some analytical capabilities to forecast cash requirements.</td>
<td>Good report writing and some graphics facilities are required.</td>
<td>Financial application packages can assist in this area.</td>
</tr>
<tr>
<td>Budget Execution Accounting and Fiscal Reporting</td>
<td>Very High; all budget transfer, commitment, verification and payment transactions need to be processed.</td>
<td>Major requirement; Budget execution transactions are processed at line agencies and/or regional/district treasury offices. Information needs to be transferred to the center periodically.</td>
<td>Mainly a transaction processing system. Some analytical facilities to determine expenditure trends etc.</td>
<td>Good report writing and some graphics facilities are required.</td>
<td>A number of financial packages are available to implement the general ledger, accounts payable, receivable, and procurement, modules. Examples are: packages offered by SAP, ORACLE, Peoplesoft, J.D Edwards, Agresso, etc.</td>
</tr>
<tr>
<td>Debt Management</td>
<td>Moderate; all loan receipt and payment transactions need to be processed. For a large loan portfolio this number could be substantial.</td>
<td>Some; agencies need to inform the center of debt utilization information.</td>
<td>Some analytical capabilities to analyze debt and borrowing strategies</td>
<td>Good report writing and some graphics facilities are required.</td>
<td>UNCTAD and the Commonwealth Secretariat have developed debt management systems. These systems are in use in a number of countries.</td>
</tr>
</tbody>
</table>
Table 3: Technological Requirements for GFM Information Systems (Continued)

<table>
<thead>
<tr>
<th>Systems for:</th>
<th>Relative data values and transaction rates</th>
<th>Requirement for distributed processing, data transfer and access facilities</th>
<th>Analytical processing, modeling, and statistical analysis facilities</th>
<th>Text management facilities</th>
<th>Report writing, desktop publishing facilities</th>
<th>Availability of off-the-shelf package software solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue Administration</td>
<td>High; all transactions relating to assessment/payments of various types of taxes need to be handled by the systems.</td>
<td>Major requirement—Revenue collection transactions take place at a network of offices. Information needs to be transferred to the center periodically.</td>
<td>Mainly a transaction processing system. Some analytical facilities to determine tax policy options.</td>
<td>Good report writing and some graphics facilities are required.</td>
<td>ASYCUDA developed by UNCTAD and SOFIX developed by the French Government are examples of systems for customs administration. In use in a number of countries.</td>
<td></td>
</tr>
<tr>
<td>Personnel Management</td>
<td>High; all personnel actions need to be handled by these systems.</td>
<td>Some; these systems are normally operated by line agencies. Information needs to be transferred to the center.</td>
<td>Mainly a transaction-processing system.</td>
<td>Good report writing and some graphics facilities are required.</td>
<td>A number of application packages are available.</td>
<td></td>
</tr>
<tr>
<td>Auditing</td>
<td>Moderate; these systems obtain sample transaction data from other GFM systems for analysis.</td>
<td>Some; auditing systems need access to other transaction processing systems of the GFM network.</td>
<td>Specialized transaction sampling facilities</td>
<td>Good report writing and some graphics facilities are required.</td>
<td>Several packages are available in the market to help in computer assisted auditing.</td>
<td></td>
</tr>
</tbody>
</table>

Communications facilities that will be required. The frequency of information flows between the nodes of the network determines whether the telecom link needs to be active all the time or whether information transfer at periodic intervals would suffice. Thus, for example, information systems to support tax administration would ideally have distributed processing facilities available at all important taxation centers, which would be connected with each other and with the center by telecommunications facilities. On the other hand, systems for macroeconomic forecasting or debt management, which are primarily operated by the MOF, would need only limited telecommunications access to other systems on the network.

It is important that in addition to the basic transaction processing facilities, the various systems modules also have facilities for ad hoc query, report writing and aggregating and correlating information from several databases so that managers can selectively query systems databases and obtain the information they require for decision making. These sort of facilities are often referred to as an Executive Information System (EIS) and would be a requirement for most GFM modules.

Systems that handle large quantities of text information, as opposed to alphanumeric information, require special text-management software. Similarly, systems that require image-processing capabilities have special hardware/software requirements. Systems that need special analytical or modeling tools, graphics, desktop publishing or report writing capabilities require the use of appropriate software for this purpose.
Requirement for a Multi-Tiered Network

Several elements of the GFM systems network, such as those used for budgeting and accounting and for tax administration, require 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. Data volumes can vary widely across the nodes of the network. These 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 and tax offices), and connected by a Wide Area Network (WAN).

Transaction processing and database management at each node are carried out by 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 in the systems. In the absence of good telecommunication facilities, data transfer between the nodes and the center could be periodic (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 data and number of transactions. They could be stand-alone microcomputers or microcomputers connected by a LAN in so-called client server technology, with fairly large capacity servers at the center and larger line agencies.

Systems Portability and Scalability

A key consideration when 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 scalable—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 multiple 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 largely interchangeable, which offers greater flexibility. It will be some time before there is a full set of products on the market that truly conform 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 by 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 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. Using 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.

Off-the-Shelf Application Software

It is important to choose an appropriate software strategy during project implementation. In-house development of application software often appears most attractive in terms of the resources required for developing a core or prototype application. However, such systems can provide only the most basic functionality and efforts at enhancing them to a full functionality system usually turn out to be very time-consuming and expensive. In general, it is advisable to opt for packaged
software solutions where feasible. Packaged software can be acquired for systems with relatively standardized requirements. Off-the-shelf application software packages originally designed for the corporate environment are now becoming increasingly popular in the public sector in areas such as financial management, accounting and personnel management. A few packages are available for use in more specialized areas such as customs administration and debt management. Though they may initially appear to be more expensive when compared to a modest in-house prototype, such packages can result in significant savings in the long run of both time and money. Use of off-the-shelf software facilitates faster implementation of a full-function system, continuing software support with periodic upgrades, good documentation and training. It is therefore suggested that possibilities of using such packages be always explored before embarking on an exercise of in-house development. However, systems with country-specific requirements may need to be custom-developed. The cost, time required for implementation and risks associated with such projects are higher.

While conducting a review of software packages, the project team will need to ensure the following:

- the software package provides the required functionality;
- access to technical support is available locally for the package, and it is possible to obtain and install upgrades and/or changes to the packages as they become available in that particular country;
- the package vendor provides customization assistance as may be required;
- the costs associated with any customization are identified clearly in the total price;
- the package runs on a range of hardware and operating software which is compliant with the technology architecture proposed for the systems;
- adequate documentation is available to support package installation and use, and
- licensing arrangements that can accommodate the use of the package at multiple sites in the country are available.
VI. Critical Success Factors

Government Commitment and Management Support

Improving the quality of fiscal management systems would increase the transparency of fiscal and resource allocation processes. This would affect those who benefit from existing systemic weaknesses. These interests may act to delay project actions or divert the project 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 satisfactory project implementation.

Introduction of a new institutional structure for budget execution requires reorganization 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. It also requires fundamental reforms of the functional processes that these agencies perform. Computer-based information systems should be viewed as a means to assist in the implementation of re-engineered business processes and procedures. Implementation of these changes would need government support at the highest levels to ensure that the change process is completed smoothly. A phased, gradual introduction of new policies and procedures, and a broad orientation program for public sector managers emphasizing the advantages offered by the new systems and processes would foster a wider appreciation of benefits and enhance ownership.

At the project level, ensuring sponsorship at the highest levels of the functional areas involved in the project and participation from the widest possible range of users is necessary. Steps taken to involve users in the design and implementation phases also ensure that the project is owned and adopted by the users once it is completed. Senior functional management input is particularly important during the early planning and design phases of the project. The main skill requirements for these phases are an in-depth knowledge of the functional area and a managerial capacity to ensure that the project is accepted by users within the functional area. The technical aspects become important only during the later implementation phases.

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 when done in a multi-agency environment. Forming 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 it is not necessary to resort to independent and duplicative initiatives. In this context the active participation and involvement of line agencies in the design and implementation of systems is especially important. It also establishes systematic data sharing arrangements, protocols, and schedules between the various systems so that all agencies have access to financial data as required. The lead responsibility for the different component modules of the overall system should rest with the organizations directly responsible for the corresponding functional process. This steering group would also be a vehicle to provide user input to the technical team responsible for implementing the project.
Organizational Capacity and Skills

Systems reform projects may need to cope with the organizational capacities of the agencies responsible for reform implementation and the management of project implementation. The numbers of finance and technical staff and multiple skill levels 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 from the private sector for specific assignments and outsourcing the technical maintenance and operation of some systems should be considered. In any case, an ongoing policy of training would need to be adopted in light of the 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 necessary skills and to manage systems planning, development, and operation. The following skills are required:

- High level project design and planning skills;
- Project management skills;
- Technical implementation skills to operate and use the hardware and software;
- User support skills to develop user and technical documentation, train end-users formally and hands-on, set up a hot line and organize ongoing training for end-users.

Setting Priorities for Systems Implementation

The systems for budgeting, accounting, revenue administration, payroll and personnel management constitute the basic transaction processing systems in the overall systems network required to support GFM. They are the repositories of most of the data required by other network modules and form the foundation for network modules that support fiscal planning and provide decision support mechanisms. These systems are characterized by high data volumes. Several of them require distributed processing facilities. The order of magnitude of effort involved in their implementation is much higher than for the other systems in the network. The nature of the business processes involved in these functions, and the high data volumes and transaction rates associated with these systems make them primary candidates for computerization. As a matter of fact, in the absence of some form of automation, these areas are liable to generate severe backlogs of data, which can result in major gaps in the information required for fiscal management. These core areas therefore present the major opportunities for automation. In view of their size, however, they also represent the systems most likely to encounter problems if the implementation process has not been planned carefully. Development of an overall framework outlining the nature and scope of the various information systems network modules and the interconnections between these modules would enable the project to be put in proper perspective. This would also focus attention on the specific parts of the systems network that are to be included in the scope of the project and their interfaces.

Formal Project Planning

The implementation of government-wide computer systems to support the GFM process is a substantial undertaking. It is very important that agencies involved in the exercise be aware of its magnitude. Formal project planning methodologies should be used to design, implement, and monitor the systems. It is advisable to implement such projects in a phased manner so that they can be put in place and adequately monitored in a controlled environment. A phased implementation also ensures that they do not exceed the absorptive capacities of the organizations where they are implemented.

Systems and Data Administration

Information systems support would normally be distributed among several agencies throughout government. Therefore, coordinating mechanisms should be created to ensure that a common set of policies, proce-
dures, and standards is in place for managing data and systems government-wide. 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 recovery planning, and technical and user documentation.

Local Technical Support

It is imperative that the hardware and software chosen be supported locally. The vendors must have a presence in the country in order to provide training, technical support and maintenance, including fulfillment of warranty obligations, throughout the life of the system.

Management of Change

Implementation of computer-based systems to support GFM requires an understanding not only of the business processes and information requirements, but also of the social, cultural, and political environment of the organization, and the country within which they are being implemented (Walsham, Symons, and Waema, 1988). It has been argued that computer-based systems are social systems in which technology is only one element. The organizational arrangements required to ensure a “social fit” therefore take on increasing importance.

Implementation of information systems is intimately connected with and normally has a direct impact on the way people do their day-to-day work. It is imperative that appropriate change management procedures are 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 because of misplaced fears of job redundancy, etc.

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

As an example of the types of issues involved, in the case of implementation of taxation systems, staff responsible for the processing of business transactions will need to learn a new way to perform their work. In view of the efficiencies in transaction processing made possible by automated systems, the numbers of staff required to process routine business transactions may decrease, generating fears of redundancy. A parallel program of retraining and re-deployment of excess staff may be required. At the management level, officials who are responsible for ensuring that all transactions pertaining to their areas are processed speedily and recorded in their books would normally be expected to welcome the installation of computer-based information systems to make their jobs easier. However, installation of computer-based information systems would also add transparency and thus accountability to government operations. In fact, installation of these systems can provide the systemic underpinnings for and give a major boost to anti-corruption efforts. For these reasons such projects could encounter resistance during project implementation. This is another reason why such projects need a sponsor at the highest levels who can overcome the social and political constraints and steer the project through its initial stages.
Annex I. Sample Information Systems
Architectures for Government
Fiscal Management—Pakistan and Turkey
Pakistan - Information Systems Architecture for Government Fiscal Management

<table>
<thead>
<tr>
<th>Function</th>
<th>State Economic Planning Div &amp; MOF &amp; PAD AG/DAO Agencies</th>
<th>Agencies Covered by PAD</th>
<th>Agencies with Departmentalized Accounts</th>
<th>Central Board of Rev. NBP, SBP, Treasuries</th>
<th>PAD Audit</th>
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<tbody>
<tr>
<td>Budget Preparation</td>
<td>Systems for Budget Preparation</td>
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<td></td>
<td>Systems for Budget Preparation (Capital, Current)</td>
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<td></td>
<td>Budget Guidelines</td>
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<td>Budget Proposals</td>
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<td></td>
<td>Revenue Estimates</td>
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<tr>
<td>Budget Execution, Accounting and Fiscal Reporting</td>
<td>Systems for Budget Execution, Monitoring &amp; Fiscal Reporting</td>
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<td></td>
<td>Systems for Monitoring Cap. Projects</td>
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<td>Financial Data on Projects</td>
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<td>Physical Data on Progress of Projects</td>
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<td>Cash Management</td>
<td>Cash Management Systems</td>
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<td>Debt Management Systems</td>
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<td>Debt Management Systems (Domestic, Foreign)</td>
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<td>Debt Management</td>
<td>Cash Management Systems</td>
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<td>Cash Expenditure Figures</td>
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<td>Cash Allocations</td>
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<td>Cash Forecasts</td>
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<td>Revenue Administration</td>
<td>Payroll System</td>
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<td>Personnel Management</td>
<td>Personnel Information Systems</td>
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<tr>
<td>Audit</td>
<td>Payroll System</td>
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</table>

Legend:
- Arrows show information flows. Some flows will be paper based, some electronic.
- Information Systems Planned Under the PIFRA Project

Feedback from Audit to different areas

- Paying & Receiving Bank Systems
- Systems for Auditing
- Revenue Receipts (recording) Payments
- Data for Bank Reconciliation
- Revenue Receipts (recording) Payments
- Financial Information on Approved Bills
- Line agency Budget Execution Systems
- Departmentalized Accounting Systems Railways/Defence, etc.
- Systems for Monitoring Cap. Projects
- Debt Service Payments/Loan receipts
- Debt Management Systems
- Cash Management Systems
- Debt Management Systems Domestic, Foreign
- Payroll System
- Personnel Information Systems
- Systems for Auditing
## Turkey: Information Systems Architecture for Government Fiscal Management

### Function

<table>
<thead>
<tr>
<th>Central Bank</th>
<th>Treasury</th>
<th>SPO</th>
<th>Ministry of Finance</th>
<th>Accountancies</th>
<th>Line Agencies</th>
<th>MOF</th>
<th>GDR</th>
<th>Custums</th>
<th>Paying/Receiving</th>
<th>TCA</th>
</tr>
</thead>
</table>

#### Macro Economic Forecasting
- Systems for Macro-Economic Forecasting
  - **Legend**
    - Arrows show information flows. Some flows will be paper based, some electronic.
    - Systems to be developed under the Public Finance Management Project
    - Systems to be developed under the Treasury Data Systems Project

#### Budget Preparation
- Previous Year Actuals
- Systems for Budget Preparation
  - Investment
  - Current
- Budget Guidelines
- Revenue Estimates
- Budget (Invest/Current)
- Systems for Budget Execution and Fiscal Reporting
- Systems for Budget Execution and Fiscal Reporting
  - Budget Appropriations
  - Expenditures
  - (payment orders)
- Financial Ledger System
  - Line Agency Bud. Prep. Systems
  - Payroll Systems
- Revenue Receipts (recording)
- Payments
- Paying & Receiving Bank Systems

#### Budget Execution
- Est. of Borrowings
- Systems for Budget Execution and Fiscal Reporting
  - Budget Appropriations
  - Expenditures
  - (payment orders)
- Financial Ledger System
  - Line Agency Bud. Execution Syst.
  - Payroll Systems
  - Revenue Receipts (recording)
  - Payments
- Paying & Receiving Bank Systems

#### Accounting and Fiscal Reporting
- Systems for Budget Execution and Fiscal Reporting
  - Budget Appropriations
  - Expenditures
  - (payment orders)
- Financial Ledger System
  - Line Agency Bud. Execution Syst.
  - Payroll Systems
  - Revenue Receipts (recording)
  - Payments
  - Paying & Receiving Bank Systems

#### Cash Management
- Cash Management Systems
- Cash /Expenditure figures
- Cash Allocations
- Debt Service Payments/Loan receipts
- Debt Management Systems
- Personnel actions
- Tax Admin. Systems
- Customs Admin. Systems
  - Tax Admin. Systems
  - Customs Admin. Systems

#### Debt Management
- Debt Management Systems
- Debt Service Payments/Loan receipts
- Personnel actions
- Tax Admin. Systems
- Customs Admin. Systems

#### Revenue Administration
- Systems for Post Management
- Post control
- Personnel Systems
- Pers. Actions

#### Personnel Management
- Systems for Post Management
- Post control
- Personnel Systems
- Pers. Actions

#### Auditing
- Input to Auditing Systems from Various Areas
  - Auditing
  - Feedback from Audit to Different Areas

### Annex

- Annex 1 35
Annex II. Activities and Tasks Associated with the Implementation of the Treasury Ledger System

The main activities and tasks associated with the implementation of the TLS are listed below:

Activity 1: Preparation of the detailed functional design, related manuals and procedures and systems specifications for the systems

The tasks involved in this activity would include:

a) Studying the existing functional processes, administrative procedures, transaction documents, forms and information flows—including data flow statistics—covering all organizations involved in the functional area for which the system is being designed. For example, in the case of budget execution this would include the MOF, the Treasury, the Central Bank and the budgetary institutions, etc.

b) Developing and defining, where necessary, a new set of functional processes, information flows, procedures, transaction types and associated documents and forms, and related organizational arrangements required to operate the proposed new systems.

c) Drafting the format of major statements and reports to be produced by the new system to satisfy users' needs and formal requirements.

d) Developing functional requirements and systems specifications for the application software required to support the functional processes and their interfaces with any external systems, such as those of the Central Bank.

The functional analysis and design of the various systems would need to be conducted jointly by one or more functional specialists such as accounting specialists, who will develop the functional design and define the overall system from the functional point of view, and systems development specialists, who will develop the systems specifications for the necessary application software required to automate the systems.

Activity 2: Design of the technology architecture required to implement the information systems

This activity would include developing a high level technical design for the operation of the system and drawing up hardware and software specifications required for the implementation of the systems modules and the specification of the technical interfaces between the system under development and other systems modules with which this system interfaces. This normally involves:

a) Surveying central, provincial/district offices of the agency responsible for the process, e.g. Treasury offices, for budget execution and those of any related agency such as the central bank, the budgetary institutions that are expected to transmit or receive data to the agency to determine the locations where the computer systems would need to be implemented; the associated transaction volumes (current and projected) and data requirements. This will determine sizes and configurations of the hardware and software to be installed at these nodes and the mode of the interconnection of the nodes to ensure accurate and timely data transfer between nodes.

b) Preparing the specifications for the hardware and systems software required at the various sites for each phase of the project, and for incorporation in tender documents.

c) Drawing up specifications for associated facilities required for the installation of the system, such as power stabilizers, Uninterrupted Power Supplies (UPSs), redundant power supply, telecommunication-
tion interfaces and environmental computer site requirements (air conditioning, dust protection, physical access security), for incorporation into the tender documents.

**Activity 3: Investigation of alternatives for application software**

On the basis of the functional analysis carried out in Activity 1 the project team will investigate whether one or more off-the-shelf software packages can meet the functional requirements of the system as defined above.

In case it is not deemed feasible or cost-effective to purchase an off-the-shelf package to satisfy the requirements of a particular system, the project team will need to develop a plan for the development of the application systems and estimate the resources required to carry out the development. In this case the team will also need to extend the functional and systems design described above and develop the full systems and program specifications for the various modules of those systems. These would then be used as the basis for the contract or in-house development of the application software. These documents should be detailed and specific enough to enable the software contractor or an in-house team to develop the software module without further recourse to the end-users except for ad-hoc clarifications and for mutual feedback required e.g. in prototyping or piloting stages of software development and implementation.

**Activity 4: Preparation of tender documents for and acquisition/development of hardware and software**

The tasks to be performed by the project team in the development and acquisition of hardware and software are:

a) Incorporating the hardware and software specifications prepared as part of earlier tasks into a Request for Procurement (RFP) of the hardware and software. The specifications for procurement must include provision for maintenance and support of the hardware, software, and consumables. Hardware requirements should also include associated facilities, such as UPSs, etc.

b) Developing criteria for the evaluation of vendor proposals.

c) Evaluating vendor proposals and select a preferred tenderer.

d) Acquiring hardware and software. In view of rapid technological advances the performance of hardware available in the market continues to increase very rapidly while prices continue to fall. To take advantage of these factors, hardware procurement should therefore be phased so that it is procured as close as possible to the time when it will be installed.

e) Drawing up specifications for monitoring the installation and carrying out quality assurance during the suppliers' testing of the hardware and software procured for the project. In the case of procurement of software packages (if this is found to be a feasible alternative), the project team would be required to monitor quality assurance of the suppliers' software testing to ensure the required functionality of the packages. In case a package requires customization to meet specified functional requirements, the team will specify the changes required and arrange for the changes to be implemented.

f) In the event that the systems modules are to be custom-developed, the team will contract with a selected software development firm, provide technical management and quality assurance, and plan and prepare for data conversion, user training and systems acceptance testing.

g) In the event that in-house development is preferred, the team will be expanded to include a team of local staff for the programming, testing and implementation of the system modules.

**Activity 5: Development/upgrading the agency data processing organization.**

The agency responsible for systems implementation may require the development/upgrading of its in-house data processing staff and facilities to maintain and operate the treasury and associated systems developed as part of the project. Project consultants should analyze the existing agency EDP staff resources and develop a plan to upgrade the DP organization. This would include assisting the agency in developing a
training program for its staff, including specialized training in the use of the various tools such as operating systems, DBMSs application development facilities, etc. It would also include more general training in EDP project management, maintenance and provision of end-user support and training for a country-wide treasury system, etc. The consultants should also assist the government in the procurement of training services from specialized vendors and in setting up appropriate schedules to train end-user department staff in the use of the system.

Activity 6: Pilot systems implementation

Normally it is best to install the selected hardware and software at a set of pilot sites to ensure that the system meets user requirements before it is extended to other sites. The tasks associated with pilot systems installation are:

a) Installation of hardware: This involves supervising the supplier in the installation and testing of the hardware procured. This would include supervision of site preparations for the hardware, including electrical power requirements, voltage stabilizers, telecommunications, and other elements as required.

b) Installation of application software: This would include installation and testing of the application software. In the event that package software has been procured, the team will need to ensure that any necessary software modifications have been carried out. The application software package would need to be installed on the hardware acquired. This would include setting up any code structures, files and databases that may be required by the software package. The project team will need to design and conduct any tests necessary to ensure that the package provides the required functionality.

c) The team will need to ensure that necessary documentation exists for the application systems modules and for training end-users.

d) A sufficient number of local staff will need to be trained to a level sufficient to operate and maintain the systems, and to provide necessary end-user support.

Activity 7: Replication of the systems across other sites

After a successful pilot the system will need to be replicated across all other agency sites. This phase will cover the replication of the system to other designated provincial and town sites. The process of replication across all sites may take considerable time depending upon the number of sites involved and the number of users requiring training. It is best to first develop a replication plan and schedule for the system for all designated sites. This is a document (checklist) detailing tasks—including training of end-user and technical staff—that need to be undertaken for system replication at a typical provincial or town site.
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.

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.

3. As noted, from a macroeconomic point of view, the concern is with general government rather than simply with the central government. 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 extra-budgetary components of general government.

4. It should be noted, however, that the processes are simplified substantially for expositional purposes. One complexity not shown 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.

6. In addition to the systems mentioned above, line agencies may also operate several subsidiary systems. These would include systems for cost accounting that provide facilities for accumulation of costs for products/services, systems for fixed asset accounting that maintain records of all government assets and make provisions for annual valuation and eventual disposal of these assets, inventory accounting systems that maintain inventory and stores accounts, etc. These systems would periodically transfer information to the TLS.

7. It may be noted that this system would not, necessarily undermine spending unit authority and responsibility for budget preparation or administrative and financial control of expenditures during the budget execution phase. These responsibilities would continue to lie with the spending agencies. Thus, the finance departments of spending agencies would continue to be responsible for budget preparation and ex-ante financial control (including commitment control) of transactions. The accounting departments of these agencies would verify receipts of goods and ensure that proposed expenditures are in accordance with budgeted appropriations prior to forwarding payment orders to Treasury for payment. The new system would, nevertheless, enable the Government to impose a second check and Treasury will ensure that proposed expenditures are in fact in accordance with the budget appropriations, as they should be under any well performing fiscal management system. It would also provide the MOF a means to exercise control over which payments need to be given priority in a situation in which there is a shortage of funds. Since all payments would be processed through Treasury, the system would also enable the Treasury to, simultaneously, compile overall information for the MOF on public expenditures and receipts. Therefore, in view of the need for central control over expenditures and idle balances in agency accounts, and for up-to-date information on public expenditures and receipts, a centralized system holds clear advantages over a decentralized approach in the circumstances described above.
References


