

# ENSURING BETTER PFM OUTCOMES WITH FMIS INVESTMENTS

An Operational Guidance Note for FMIS Project Teams  
Designing and Implementing FMIS Solutions

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## FOREWORD

Governments around the world are facing increasing constraints on resources, while citizen expectations on service delivery are rising in the age of social media. Corruption, mismanagement, and lack of transparency have led to a lower and declining trust in governments. Therefore, among other things, governments need to strengthen the arrangements for managing public finances. In fact, this is a necessary element of good governance.

As part of its support for good governance, the World Bank supports projects that aim to modernize public financial management (PFM) in client countries. Among these projects, support for implementation of financial management information systems (FMIS) remains the largest area of investment. The World Bank alone has invested around \$1.2 billion through 148 operations in 81 countries since 1985. Donor partners have also contributed significantly to these projects. FMIS helps ensure fiscal discipline and transparency, among other things.

However, despite the promise, the results of FMIS implementations have often been mixed. Frequently, implementation of FMIS systems is operationally difficult, prone to cost overruns and delays, and affected by difficult change management issues, which eventually lead to unsatisfactory project outcomes. Nevertheless, given the critical role of these systems, client demand for FMIS projects remains high.

In view of the above, I asked a team of experienced Bank staff and consultants to distill lessons from the design and implementation of FMIS projects over the years and produce a Guidance Note containing operational guidance summarizing the critical success factors for FMIS implementation.

This Guidance Note draws on the accumulated literature, case studies, studies from the World Bank's Independent Evaluation Group, Implementation Completion and Results Reports, the World Bank's experience, and emerging trends in technology to provide operational guidance to teams who are engaged in implementing, enhancing, or maintaining FMIS. A peer reviewer panel of leading experts from the World Bank, International Monetary Fund, and the private sector — representing both Big Tech and startups — also provided critical reviews and insights that enormously enriched this work.

Our goal is to ensure FMIS projects can result in improvements in PFM outcomes and better contribute to good governance.

**Ed Olowo-Okere**

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## Table of Contents

<b>EXECUTIVE SUMMARY</b>	<b>1</b>
<b>1. INTRODUCTION AND MOTIVATION</b>	<b>6</b>
<b>A Conceptual Framework: From FMIS Design to PFM Outcomes</b>	<b>7</b>
<b>2. CRITICAL SUCCESS FACTORS AND KEY FAILURE POINTS IN FMIS DESIGN AND IMPLEMENTATION</b>	<b>9</b>
<b>Diagnostic Phase</b>	<b>9</b>
<b>System Development Life Cycle</b>	<b>11</b>
<b>FMIS Coverage and Utilization</b>	<b>32</b>
<b>Budget Management Practices and Their Link with FMIS and PFM Outcomes</b>	<b>35</b>
<b>World Bank’s Role in FMIS Reform</b>	<b>37</b>
<b>Country Examples of Better FMIS Implementations</b>	<b>39</b>
<b>3. TECHNIQUES TO ASSESS THE ROLE OF BUDGET COVERAGE AND SYSTEMS UTILIZATION IN A FMIS</b>	<b>45</b>
<b>Transactions Database and Transaction Profile</b>	<b>45</b>
<b>Calculating Budgetary Coverage in FMIS</b>	<b>45</b>
<b>Developing an Expenditure Transaction Profile</b>	<b>45</b>
<b>Using the Results of Transaction Profile Analysis to Assess FMIS Implementation and Formulate Systems Deployment Strategies</b>	<b>48</b>
<b>4. GOVTECH, USE OF DISRUPTIVE TECHNOLOGIES, AND FMIS</b>	<b>50</b>
<b>Cloud Computing</b>	<b>51</b>
<b>Analytics and Artificial Intelligence</b>	<b>53</b>
<b>Robotic Process Automation</b>	<b>56</b>
<b>Blockchain or Distributed Ledger Technology</b>	<b>57</b>
<b>FinTech</b>	<b>57</b>
<b>Mobile Apps and Other Opportunities</b>	<b>58</b>
<b>5. CONCLUSIONS</b>	<b>58</b>
<b>APPENDIX A. BUDGET CLASSIFICATION AND CHART OF ACCOUNTS</b>	<b>64</b>
<b>APPENDIX B. GUIDANCE NOTE ON THE PROCUREMENT OF FMIS</b>	<b>68</b>
<b>APPENDIX C. QUESTIONNAIRE TO DETERMINE THE STATUS OF FMIS SYSTEMS AND THEIR UTILIZATION</b>	<b>78</b>

## EXECUTIVE SUMMARY

Financial management information systems (FMIS) are central to expenditure control, transparency, and service delivery. Recognizing the potential benefits, the World Bank and donors have invested significant resources into FMIS reforms around the world. However, the results have often been disappointing.

This is because the FMIS projects tend to be complex and prone to a wide range of implementation challenges. Despite their central role in supporting budget execution processes, the relationship between FMIS investments and public financial management (PFM) outcomes is often perceived as tenuous. Many analytical products aim to bridge this gap. This Guidance Note synthesizes this existing body of diagnostic and analytical work to provide practical and operational guidance for the design, implementation, and operationalization of FMIS systems to achieve improved PFM results.

### What Is an FMIS, and What Is Its Purpose?

**The FMIS should ensure budgetary control and that funds are only spent for their intended purpose as authorized by a legislature and embodied in the annual budget appropriations law.**

Progress toward macro-fiscal sustainability is one of the major functions of a government, which largely depends on its capacity to manage its public finances. Management includes adherence to fiscal rules as well as the ability to deliver essential services.

A government FMIS plays a central role as it facilitates fiscal discipline in government spending. The FMIS provides for core budget execution processes to ensure the budget compliance necessary to attain fiscal deficit targets.

**The FMIS also increases the speed of transactions and should ensure that service delivery agencies can implement their mandate efficiently.** Recognizing the potential benefits of FMIS, the World Bank and donor partners have invested significant resources into the development and implementation of such systems around the world.

**Figure ES.1. A Conceptual Framework: From FMIS Diagnostic to PFM Outcomes**



## Conceptual Framework

The conceptual framework used identifies the various stages necessary for aligning FMIS investments to PFM outcomes. The three major dimensions identified are: (i) the diagnostic phase to identify PFM weaknesses, including policy and institutional aspects; (ii) the systems development life cycle; and (iii) coverage and utilization. This note argues that reaching the FMIS production frontier requires optimization across all dimensions, and a focus on one alone may not be enough.

The lessons and operational guidance provided follow the structure of this conceptual framework. It is supplemented by guidance on how to assess the adequacy of FMIS budget coverage and utilization as well as a discussion on the potential of government technology (GovTech) and disruptive technologies for FMIS reform. Appendix B provides guidance on how to establish the state of the current FMIS and its ability to contribute to higher-level PFM objectives.

## Operational Guidance on the Diagnostic Phase

**It is important to clearly determine the rationale for implementing an FMIS and identify the problems the proposed system intends to address as the nature and scope of the investment will largely depend on this.** It is critical that the diagnostic is comprehensive covering all relevant aspects of budget management as a partial diagnostic could be misleading. A diagnostic focusing only on accounting issues, for example, may lead to solutions that do not adequately address larger budget management deficiencies. Overall, maintaining a focus on effective budget management is critical, even if the diagnostic points to other immediate deficiencies.

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**“The conceptual framework consists of: (i) the diagnostic phase, (ii) the systems development life cycle, and (iii) coverage and utilization.”**

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**The effectiveness of an FMIS as a budget management tool depends not only on its technical robustness, but also on the policy and institutional environment under which it operates.** In line with findings from the *2016 World Development Report*, FMIS systems also need analog complements to make the FMIS effective and protect against downside risks.

These factors should be considered in a diagnostic as they are often referred to as preconditions for FMIS effectiveness. Preconditions include a comprehensive treasury service account and accompanying banking arrangements for government funds, an appropriate budget classification structure, and control protocols that ensure budgetary compliance.

**Even advanced systems may not facilitate desired budget management improvements without these analog complements.** Similarly, a review of financial controls is essential. Setting up an automated FMIS without the necessary controls, including commitment control functionalities, could result in suboptimal results.

## Operational Guidance on the System Development Life Cycle

**Throughout this process, effective project management and strong government commitment, especially from the functional side, are critical.** Multiple stages are involved in operationalizing an FMIS, which are commonly referred to as the systems development life cycle. Stages include process and system design, system procurement, actual systems implementation, and system maintenance. Government commitment can be fostered through well-designed project management structures. Further, training and change management considerations during the FMIS reform have been widely acknowledged as important.

**Effective system design is one that is cognizant of larger budget management issues that follow functional and business process requirements of government.** System designs that follow predominantly technical considerations are found to be less effective for solving budget management problems. The procurement of FMIS systems is complex and warrants careful consideration of several issues. Systems specifications in tender documents, the design of the consultancy package, a consolidated systems implementation plan, and contract management experience are among the most important factors in the process.

**Carefully weighing the benefits against risks and costs is important to select an appropriate strategy for application software development.** If this includes changing technology platforms midway, it involves substantial risks, including loss of human capacity, diversion of reform focus, and neglect of potentially necessary improvements of the legacy system during the transition period.

**Experience suggests system implementation strategies that are strategic and take a phased approach tend to be more successful than simultaneously implementing a wide set of functionalities that may overstretch client capacity and dilute the reform momentum.** The literature suggests that modules necessary for execution and reporting should be prioritized. Some countries have experimented with taking a modular approach in systems implementation, which holds the promise of being more cost-effective.

**The implementation strategy may also benefit from prioritizing comprehensive transaction processing before investing in financial operations and management and reporting layers.** Transaction processing is foundational and a prerequisite for the proper functioning of the other layers. If all these are in place, policy makers can use FMIS reports to take strategic decisions regarding the allocation of resources and maintain a fiscally prudent stance. For this, however, the system requires full data integrity, which in turn necessitates a reliable transaction processing layer. The usefulness of the financial operations and reporting layer is contingent on this.

**An appropriate systems deployment strategy across levels of government is a critical phase in implementation.** This review found a striking pattern in the transactions profile — only a few transactions make up the bulk of the budget. This fact could be used strategically for early results in the implementation process.

**Once operational, adequate budgetary provisions for maintenance and updates are essential to sustain the investment. In some cases, a lack of maintenance has resulted in a failure to install timely upgrades, insufficient capacity to manage transaction requirements, and system exposure to various security risks.** Another important element of sustainability is the continuous availability of technical expertise, which may be difficult to keep or attract at regular government pay scales.

## Operational Guidance on FMIS Utilization and Coverage

**Governments can optimize the benefits from the FMIS for greater PFM outcomes by maximizing its coverage.** The share of the budget that is routed through the FMIS could serve as a good proxy for the contribution of FMIS to improved budget management.

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**“Benefits from the FMIS to budget management can only accrue to the funds that are actually routed through the system.”**

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**Analyzing actual transaction data reveals insights on how the FMIS contributes to larger PFM objectives.** Actual budget coverage can be determined by dividing the total value of transactions processed and paid through the system by total expenditure reported at year end by the government. Mapping the transaction profile helps identify high-value transactions. Targeting them in system deployment will strengthen fiscal discipline as these transactions will go through system-enabled controls. Similarly, diagnosing the transaction ecosystem can identify low-value transactions that are likely to stem from service delivery sectors. These payments could be routed through FMIS but disbursed through innovative FinTech products such as mobile money or smart cards.

## Linking FMIS to Overall Budget Management Practices

**The analysis shows that the effectiveness of a system can be undermined if budget coverage is not comprehensive or if budgetary releases are delayed.** Investing in advanced budgeting methodologies, such as program or performance budgeting without improving budget comprehensiveness, predictability of budget releases, and an operational budget execution system and FMIS, is likely to be only of limited benefit.

## GovTech, Use of Disruptive Technologies, and FMIS

Innovations in the GovTech space, including cloud computing, big data and machine learning, robotic process automation, and distributed ledger technology, hold tremendous opportunity in transforming government expenditure management.

**Critical key principles are identified.** They are: taking a citizen-centric approach, developing a whole-of-government platform rather than ministry-specific solutions, making sure the systems share information with other internal systems, and providing access to the private sector through open interfaces, a user-friendly system design, and a center of excellence.

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**“GovTech and use of disruptive technology hold tremendous opportunity to strengthen government expenditure management.”**

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## **World Bank’s Role in FMIS Projects**

The World Bank can play a substantial role across all these dimensions due to its global experience.

### **Key Takeaways for Success**

For PFM outcomes to have better success through a FMIS reform program, it is necessary to:

- Carry out a diagnostic of the existing systems and their usage
- Address policy and process issues
- Conduct a detailed analysis of the transaction ecosystem to determine their coverage and application of their controls
- Consistently manage political economy issues

## 1. INTRODUCTION AND MOTIVATION

A financial management information system (FMIS) plays a central role in Public Financial Management (PFM) as it facilitates the budget execution process. At its core, the FMIS enables the processing of budget execution-related financial transactions and a set of controls that ensure budget compliance. Compliance is required to attain the planned fiscal deficit targets necessary for ensuring macroeconomic stability (Diamond 2013). Adequate use of FMIS contributes to adherence to fiscal rules. The repository of these financial transactions also provides the basis for producing financial statements necessary for transparency and financial accountability. Conversely, inadequate and opaque processing and recording of government expenditure transactions dilute trust in government because it introduces an opportunity for fraudulent conduct and unreliable financial reports. Better fiscal controls and improved transparency lay the foundations for enhancing the efficiency and effectiveness of service delivery. Thus, FMIS systems are central to expenditure control, transparency, and service delivery.

The core elements or modules of an FMIS necessary to satisfy requirements are general ledger, accounts payables, accounts receivables, commitment control, and cash management. The integration of core with noncore modules, such as planning, budgeting, payroll, e-procurement, project accounting, and fixed assets, further enhances the controls, accuracy, and reliability of information for resource management. Such an integrated architecture, if adopted, could support the government's use of FMIS as a tool to manage the PFM cycle, from budget preparation, execution, accounting, to reporting. Integration with budgeting, which describes the "I" of the abbreviation IFMIS, is one of the most important aspects of this architecture for integrated budget execution, monitoring, and reporting.

Recognizing the potential benefits, many donors have invested significant resources into FMIS reforms. As of July 2019, the World Bank alone has committed over \$1.2 billion through 148 operations across 81 countries since 1985. However, the results have often been disappointing. Frequently, implementation of FMIS systems is operationally difficult, prone to cost overruns and delays, and subject to change management issues, which eventually leads to unsatisfactory progress. It was estimated that FMIS project completion duration, on average, is 7 years (Dener, Watkins, and Dorotinsky 2011) for all stages of development — diagnostic, assessments, procurement, implementation, capacity building, information and communication technology (ICT) infrastructure development, and change management. However, the average duration could be underestimated because it calculated for individual projects and could miss the point that it often takes more than one project to establish a functioning FMIS. The financial costs associated with projects are significant and range from \$5 million for small countries to \$100 million or more for mid- to larger-sized countries. The treasury system investment operations in Nigeria and the Russian Federation consumed \$200 million and \$663 million, respectively.

The suboptimal impact of many of these operations was due to several challenges during each stage of the project life cycle, from preparations through implementation to sustainability. A quick sampling of projects highlights cases where a lack of a proper diagnostic at the start of the project

to assess the specific issues at hand led to an ineffective engagement. Another critical element during project preparation and implementation is government commitment. Projects where this commitment guided the project to successful completion rendered better outcomes. This commitment was reflected in successfully addressing the massive political economy issues, which are the hallmark of any FMIS project.

Another challenge in many projects is system specification based on business process review. The projects in which systems specification is done well and what the system is supposed to do is described precisely encounter shorter procurement times and result in lower costs. In addition, systems phasing, sequencing, and deployment are critical elements that shape the implementation strategy. Lack of attention to budgetary and technical support requirements during the post-go-live phase are additional areas of critical vulnerability.

This section presents a quick sampling of the problems in these operations. Lessons from the World Bank's experience with FMIS operations are systematically documented in a study from the Independent Evaluation Group (IEG) published in 2018 (Hashim and Piatti-Fünfkirchen 2018). In addition, IEG developed a diagnostic framework to assess the effectiveness of a country's FMIS as a budget management tool. It can be useful to identify deficiencies in FMIS design and implementation and to target reforms to ensure that they contribute to the larger PFM objectives.<sup>1</sup>

These challenges suggest the need for a deeper analysis to establish the relationship between factors that characterize an FMIS implementation and associated PFM outcomes. Analog complements, political economy, and leadership are cited as key areas needing more attention. The choice of the FMIS tool — commercial-off-the-shelf (COTS), custom-developed, or open source software — is also seen as contributing to the determination of cost, complexity, and outcomes. In addition, inadequate use of installed functionalities undermines their potential contribution to better PFM outcomes.

Given the critical role of FMIS systems in PFM, country demand for FMIS support remains high despite the operational challenges. Significant conceptual, analytical, and operational work has been done in recent years that holds important lessons on how to make FMIS investments yield greater returns. This work includes World Bank reports and studies, International Monetary Fund (IMF) technical guidance notes, project completion reports, government white papers and guidance notes, and blog posts including from emerging private sector actors. This Guidance Note draws on the accumulated body of knowledge to provide practical guidance to task teams and practitioners who are engaged in ongoing operational work related to FMIS implementation. The goal is to ensure implemented projects can result in commensurate improvements in PFM outcomes.

## **A Conceptual Framework: From FMIS Design to PFM Outcomes**

A conceptual framework was developed to illustrate the various phases in FMIS reform and steps necessary to lead to improved PFM outcomes. It identifies three major dimensions:

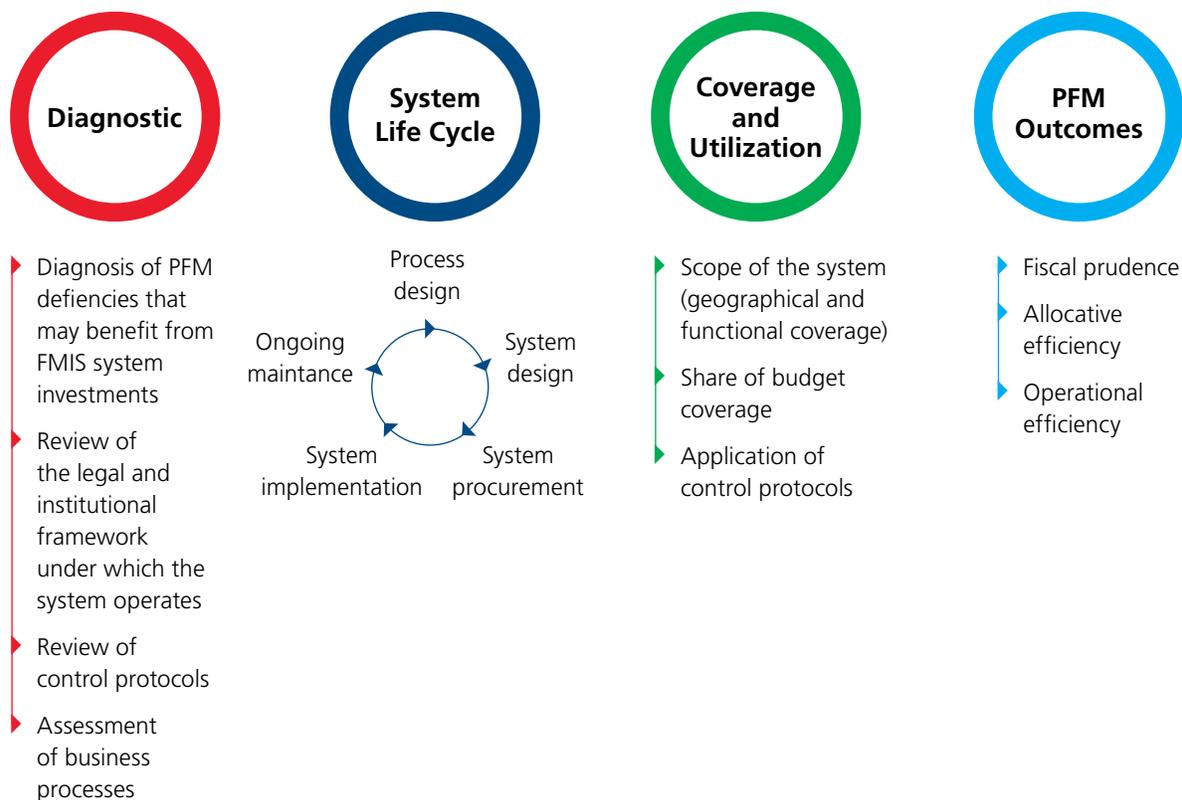
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<sup>1</sup> Access the diagnostic framework at <https://ieg.worldbankgroup.org/sites/default/files/Data/reports/IFMISDiagnosticFramework.pdf>.

- the diagnostic phase,
- the system development life cycle, and
- coverage and utilization.

The framework lists the activities and tasks involved in each stage and its link to the following activities and thereby establishes a results chain. This results chain forms the basis of a theory of change that can illustrate how it is expected to happen. The framework is depicted in figure 1.

**Figure 1. Conceptual Framework for Financial Management Information Systems**



Source: Hashim and Piatti-Fünfkirchen (2018).

Note: FMIS = financial management information system; PFM = public financial management.

The linkage between activities and phases shows how all dimensions and tasks and activities in each dimension are important. A programmatically coherent engagement is required to achieve the expected improvements in budget management. Conversely, it implies that outcomes are unlikely to be achieved if one or a combination of the dimensions, activities, and tasks within the chain is violated. The study then identifies a set of factors that are found to be critical for success or represent key failure points for each of the phases in the conceptual framework for FMIS implementation. A checklist is provided in appendix A, which is based on the FMIS diagnostic framework (Hashim and Piatti-Fünfkirchen 2016). The checklist will help practitioners to identify deficiencies across the various stages in the FMIS conceptual framework. This forms the basis for a targeted reform program and helps establish a credible link between FMIS investments and PFM outcomes.

## 2. CRITICAL SUCCESS FACTORS AND KEY FAILURE POINTS IN FMIS DESIGN AND IMPLEMENTATION

This section tries to identify the critical success factors and key failure points in FMIS design and implementation. The issues encountered and possible mitigation measures that could lead to improved PFM outcomes are given for each phase of FMIS reform as given in the IEG conceptual framework discussed earlier. These can be useful to identify deficiencies in FMIS design and implementation and to design a programmatically coherent reform program across all phases to ensure that they contribute to the larger PFM objectives.

### Diagnostic Phase

The diagnostic phase aims to identify the key issues on budget management in terms of institutional set-up, policies, processes, systems, people, and political economy. Technology could address some of these issues, but complementary policy reforms, capacity enhancement, and political economy measures to make the technology work better would need to be assessed.

Prior to procurement and implementation, it is important to determine the rationale for implementing FMIS and identify the problems the system is intended to solve. It is also important to identify whether legal and institutional prerequisites are in place. For countries that have an operational FMIS (which is most, but not all), this stage may involve identifying key system deficiencies before engaging in second- or third-generation reform. The diagnostic should facilitate cost-effective engagement by determining binding constraints across the various stages of the system life cycle and take into consideration coverage and utilization questions.

The diagnostic study will identify problems in budget management that FMIS investments can address and underpin the formulation of the wider PFM reform. If the FMIS design does not address these problems, investments could result in a system that does not meet actual needs. The diagnostic study would also form the basis of an FMIS implementation strategy and provide a blueprint for implementing the system, including sequencing, approximate costs and timeline, project management and technical capacity, and other requirements.

The diagnostic should focus on the following key aspects.

***The effectiveness of an FMIS as a budget management tool depends on its technical soundness and the policy and institutional environment under which it operates.***

Investments in FMIS yield the highest returns when appropriate policy and institutional groundwork has been done. These analog complements can be considered as preconditions for successful FMIS implementation. Without them, even advanced systems may not facilitate desired budget management improvements. On the other hand, even a basic FMIS can facilitate significant progress in budget management when an enabling environment is provided.

***A comprehensive treasury single account (TSA) is a critical enabling condition for effective budget management.*** From a cash management perspective, having all the public funds in a TSA

at the central bank is important to avoid large idle balances in commercial bank accounts being outside the control of the treasury and ministry of finance (MOF). If money is outside of the TSA and the central bank, the government cannot draw on these funds for investment (or for fund requests from other spending units) and must borrow money from the market. Furthermore, commercial banks that hold this money can use it to buy government borrowing instruments (such as treasury bills), which means they can lend the government its own money with interest.

***The budget classification structure used is important as it determines the type of information that can be derived from an FMIS.*** In principle, this structure should at least cover function, organization, spending unit, and object of expenditure (economic classifications). Function and economic classification codes should follow the IMF’s 2014 Government Finance Statistics Manual (GFSM) (IMF 2014a), which provides internationally accepted classification schemes. The structure could be tailored to the government’s financial and economic management needs so the system is capable of reporting in line with international standards, even if it does not rigidly follow the GFSM structure. Codes could be defined based on native requirements and added to track expenditures by fund sources and for specific programs and projects. The controller general or the MOF could ensure the budget classification and the chart of accounts are harmonized, uniform, and comprehensive as well as applicable to all levels of government to enable comprehensive government-wide reporting by the FMIS. More details are provided in appendix C on the chart of accounts.

***Financial reporting on International Public Sector Accounting Standards (IPSAS) is another key element of policy dimension.*** The repository of financial transactions in the FMIS provides the basis for producing financial statements, compliant with the IPSAS — at least the cash reporting standards — necessary for transparency and financial accountability. The government-wide consolidated financial reports provide a comprehensive overview of the financial picture of the government. The consolidation entity or the perimeter would be defined by law. The legislative definition of the consolidation entity determines which entities to consolidate for financial reporting.

The legislation in most jurisdictions is based on two complimentary standards: IPSAS and GFSM. IPSAS requires consolidation based on the concept of control — entities under the government’s control are to be consolidated (e.g., consolidation of state-owned enterprises with the central budgetary entities under the control of the central government). GFSM, on the other hand, requires consolidation based on the concept of sector (e.g., consolidation of subnational governments with the national government constitutes the general government sector and excludes state-owned enterprises). In some jurisdictions, budget-level consolidation — consolidation of all entities included in the budget — is required under the law. The consolidation requirements should be considered during the FMIS diagnostic and design for reporting purposes, as they constitute an important policy prerequisite for FMIS effectiveness.

***Due to increasingly tighter fiscal space and associated fiscal sustainability risks, it is of utmost importance to design mechanisms for disclosing liabilities, even while complying with IPSAS cash standards.*** Disclosure of financial liabilities could be prioritized, though the target

should be to achieve full disclosure of all liabilities in a phased manner. Key areas of prioritization could be loans and debt, loans from public-private partnerships (PPPs), pension obligations, and arrears and accounts payables, among others. To report liabilities, it is not necessary to wait for integration of FMIS with debt management and other systems or implementation of a reporting tool. Interim measures, such as file uploads and existing reporting tools, must be emphasized to achieve this disclosure early in the project.

**Controls framework for budget execution is another important policy aspect.** Setting up an automated FMIS without the necessary control functionalities could facilitate the loss of resources instead of controlling them. An automated system may increase the speed of disbursements. However, without the incorporation of appropriate controls (including commitment control), this result might enable doing the wrong things faster. Payroll automation illustrates this point. A payroll system automates and expedites the payroll process, but that system does not provide any budgetary controls if the payments are not routed through the financial module of the FMIS.

## System Development Life Cycle

The multiple stages of operationalizing an FMIS are commonly referred to as the systems development life cycle (SDLC). Stages include process review, system design, system procurement, actual systems implementation, and system maintenance. To manage these stages, it is critical that appropriate governance arrangements are put in place. Operational guidance on the stages in the SDLC follows.

## Governance

An overarching requirement that has been highlighted almost universally by World Bank project documents and is widely cited by the literature is that government commitment to the reform agenda is critical. This commitment should be operationalized through an appropriate governance structure to provide policy guidance and project implementation (figure 2). The key roles in this structure vary to suit the context, but typically include the following:

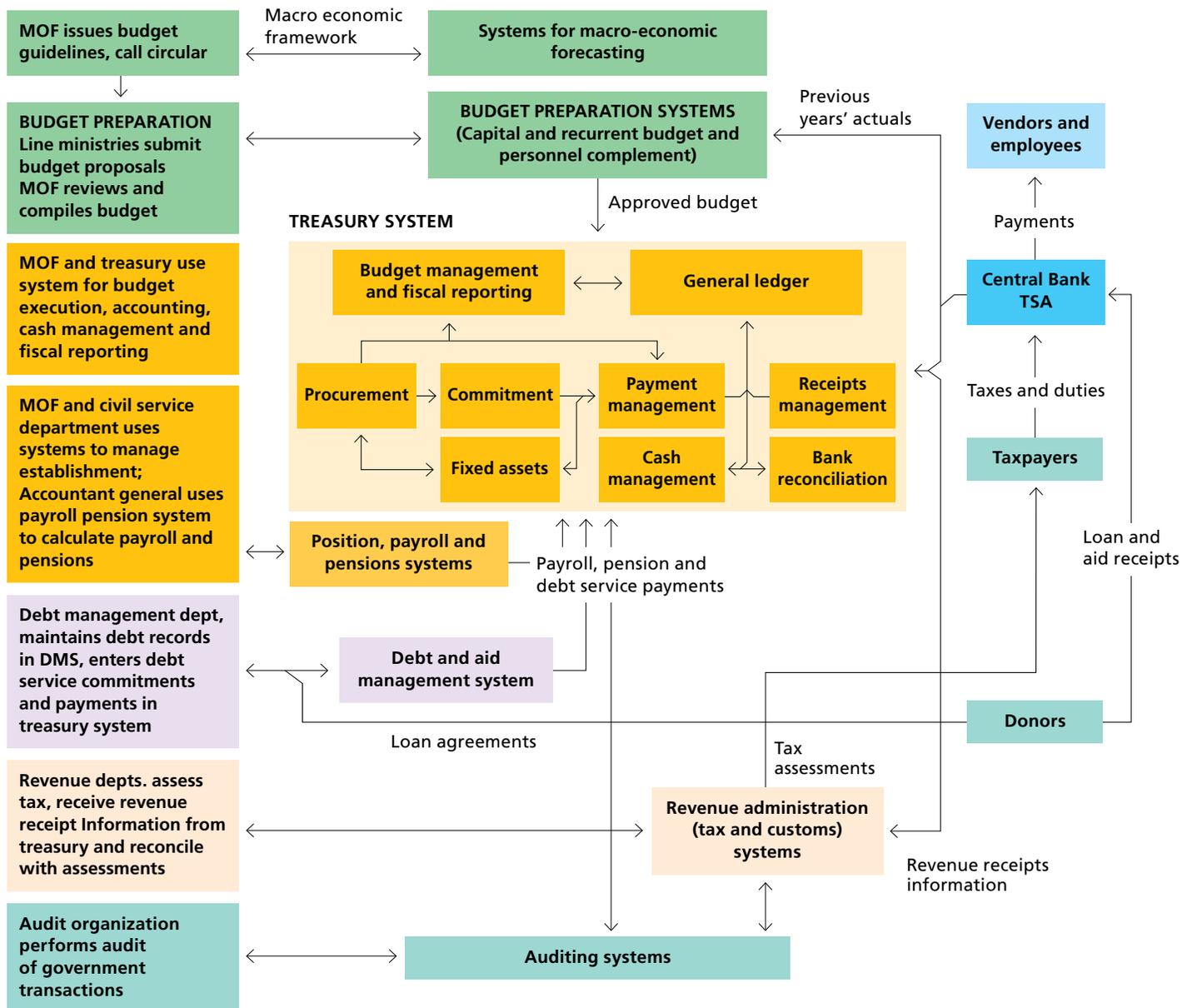
- **Project sponsor.** The sponsor must be a high-level government official such as the minister of finance, permanent secretary, or controller general of accounts. The implementation of such systems requires arriving at a consensus on various issues across a broad spectrum of stakeholders. It may also involve changing the underlying policy, legal, and institutional framework. These things require a considerable amount of government commitment. The appointment of a senior-level project sponsor is imperative to ensure this commitment.
- **Steering committee.** Representatives of all major stakeholders would include the MOF, treasury, budget, central bank, line ministries, and revenue collection agencies to provide policy guidance and ensure consensus across all stakeholders. This committee should have the authority and responsibility to resolve conflicts between various stakeholders and to make inter-institutional agreements (e.g., with the central bank).



## Systems Design

Functional requirements should drive system design. Designing a system that can support government financial management should start with an analysis of the functional processes involved; the overall regulatory framework underpinning these processes; their information requirements; the functional responsibilities of agencies commonly responsible for the processes; information flows between the agencies; the nature, volume, and frequency of these flows; and the data characteristics of the information the processes will use and create (figure 3).

**Figure 3. Functional Processes for Government Fiscal Management and Information Systems Architecture**



Source: Reprinted from Hashim (2014).

Note: DMS = debt management system; MOF = ministry of finance; TSA = treasury single account

The first phase of systems design is carried out through a business process review, which involves an analysis of current processes, including a study of business processes at present, the design of future business processes, as well as the development of the functional requirements document or functional specifications. This analysis produces an information architecture for the government's financial management systems landscape and can be a useful template to inform design.

FMIS projects are likely to be more effective if framed as budget management projects rather than accounting projects. Framing the project primarily as a budget management reform initiative raises the importance of the problem to a level where senior-level policy makers in the country and their counterparts in donor organizations could relate to it.

The system design should reflect on digital development principles. ICT principles<sup>2</sup> were developed to enhance the success rate of digital projects and avoid costly failures. These principles are equally applicable to FMIS projects. They include (i) design with the user; (ii) understand the existing ecosystem; (iii) design for scale; (iv) build for sustainability; (v) be data driven; (vi) use open standards and open data; (vii) re-use and improve; (viii) address privacy and security; and (ix) be collaborative.

## Systems Implementation

### *FMIS Procurement and Choice of Technology*

Appropriately designed systems, procurement strategies, and contract packaging are crucial to ensure the timely availability of quality consulting services and technology at competitive prices. FMIS implementation requires procuring complex technology platforms that include computer hardware, telecommunications, systems and application software, information security systems, and other components that work together to deliver a functional system. Specialized consulting services are also required for system design and implementation.

It is important for tender documents to specify exactly what is required and expected from the system. Lack of precise systems specifications in tender documents could cause suppliers to price the perceived risk into their offers, which can result in excessively high bids. The functional requirements or specifications should be developed through independent experts who have experience in developing such documents. Independence will ensure that the implementation firm does not define its own scope. These documents define the detailed scope of implementation. Testing or quality assurance of the FMIS should also be done independently and appropriately planned. It is critical to plan procurement strategies based on these considerations.

Some jurisdictions, for example, the government of Ghana, hired Oracle experts to help them parametrize the system for their use. In these cases, it is important that the business blueprint or systems design document be reviewed through third-party, independent experts to ensure any design weaknesses are addressed early. Consideration should also be given to testing and quality assurance of the systems.

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<sup>2</sup> Access the principles at <https://digitalprinciples.org/about/>.

## Application Software Strategy

Choosing an appropriate application software strategy for the FMIS is crucial when configuring the technology platform. Strategy options include using custom-developed application software, COTS software packages, or open source software. The ultimate choice of software will largely depend on the decision of the government, which should be made after carefully evaluating the pros and cons of each option (see table 1).

**Table 1. Pros and Cons of Commercial-Off-the-Shelf, Custom-Developed, and Open Source FMIS**

Software Option	Pros	Cons
Custom developed	Better acceptance, less resistance.	More user driven with limited best practices; automation of existing processes more likely.
	Initial capital cost low.	Total cost of ownership high due to higher maintenance. The savings in initial capital costs are often used up in repeated incremental developments, and total cost of ownership over an extended period are comparable.
	Initial limited functionality rapid; incremental approach.	More time to achieve optimal functionality. Integration and security risks higher. Technology obsolescence risk higher. Higher project management effort and capacity needed. Vendor or expert lock-in risk high.
Commercial-off-the-shelf	Best practices customizable to context.	Higher resistance due to changes driven by better practices.
	Lower total cost of ownership.	License and maintenance contract terms could be complex.
	Technology obsolescence low due to regular updates of the product by the vendor.	Requires regular upgrades every few years.
	Out-of-the-box integration and security in line with international standards.	
	Scalability to activate functionalities for future reforms path; e.g., line-item budgeting to program budgeting, cash accounting to accrual accounting.	
	Low cost of acquisition.	
Open source	Vendor support available for mature open source technologies.	Implementation, integration, and security enhancement costs could be higher.
	Customizable to local context and business processes; government owns the customized code.	Upgrades and enhancements depend on the open source community, product vendor, or in-house expertise.
		Requires higher capacity to implement and manage.
		Product maturity and mainstream usage could vary widely.

The applicability of these pros and cons could vary with the context, which should be the eventual determining factor for the choice of technology software.

Different strategies may be appropriate for different phases of systems implementation. The initial phases of the reform might require only a subset of features to support core FMIS elements, and a basic, locally developed system may suffice. A full-function system needing an advanced solution may be required after the initial reforms (including reforms of the legal and institutional framework) are in place and functioning. A brief description of pros and cons of various technology options follows.

### **Custom Developed Software**

Building in all COTS features into a custom-developed package requires extensive software development that can be costly and time-consuming. Any extensive in-house application software development effort requires significant work in creating very detailed technical specifications. In the absence of adequate specification of requirements, system projects can fail completely without delivering functional systems (Khan and Pessoa 2010). These requirements are often driven by users, based on existing business processes, who can improve acceptance and reduce resistance. However, this approach dilutes the opportunity for significant business process improvement and integration.

It also requires extensive technical and project management expertise, which is often not readily available within government or difficult to attract at government pay scales. Software development is a specialized business and not within the government's core competencies. Outsourcing options, either hiring a firm or individual expert, can be expensive and less reliable. Often, the full cost impact is not known during the planning phase. In addition, inadequate documentation of software code has often caused government lock-in — the government is obliged to maintain the system only through these experts, with a difficult transition to more self-reliance. However, some governments, including most in Latin America, have preferred this option, owing to higher capacity. Some risk mitigation strategies include linking payment of deliverables, among others, with the system design documentation, promoting staff certifications in relevant technical skills, and building future-proof design upfront to cater integration and other potential future reform requirements. In addition, the integration of different modules through a modular approach, as has been the dominant trend in Latin American countries, should be the main target of reforms once the core modules have been implemented.

### **Commercial-Off-the-Shelf Software**

It can be more practical, cost-effective, and less risky to use a COTS solution when software development expertise is not available. COTS supports good practices that are customizable to the local context. The potential range of functionality is extensive and can be enhanced as the reforms move to the next phase of advancements (e.g., from cash to accrual accounting, from line-item to program budgeting). The integration of the modules and advanced security features in line with international standards are integrated into the product.

About half of all governments use COTS solutions — 106 out of 192 (55 percent) — and the remaining 86 (45 percent) are based on custom-developed systems, as of August 2018.<sup>3</sup> Some governments are moving from custom developed to COTS, including Oman, the Philippines, and Sri Lanka. Table 2 presents an overview of the FMIS technologies used in various countries.

**Table 2. An Overview of FMIS Technologies Used Worldwide**

Popularity	FMIS Technology	Countries
1	SAP	Austria; Azerbaijan; Croatia; Estonia; Finland France; Malaysia; Maldives; Pakistan; Panama; Portugal (many ministries); Senegal; Slovak Republic; Switzerland; Zambia; Zimbabwe
2	Oracle	Albania; Ethiopia; Ghana; Indonesia; Kazakhstan; Kenya; Russian Federation; Saudi Arabia (many ministries); Uganda; United Arab Emirates; Vietnam
3	FreeBalance	Afghanistan; Kosovo; Kyrgyz Republic; Liberia; Mongolia; Philippines; Sierra Leone; Sri Lanka; Timor-Leste
4	Navision (Microsoft Business Solutions)	Congo, Dem. Rep.; Norway
5	Serenic Navigator	Malawi (local governments)
6	Epicor	Gambia, The; Lesotho; Malawi; Tanzania
7	PeopleSoft	Cambodia
8	Bisan Enterprise	Somalia (state level; cloud-based COTS)
9	LDSW and custom developed	Argentina; Armenia; Bangladesh; Bhutan; Brazil; Chile; Colombia; Ecuador; El Salvador; Gabon; Georgia; India; Iran, Islamic Rep.; Korea, Rep.; Kosovo; Mozambique; Nepal; Oman; Rwanda; Madagascar; Mali; Mauritania; Turkey; Ukraine; East Caribbean countries: Dominica, Grenada, St. Lucia, St. Vincent and the Grenadines
10	Open source	Comoros, Simba; Nigeria (some states) and Uruguay, Odoo Software

Note: COTS = commercial-off-the-shelf; LDSW = locally developed software; SAP = Systems, Applications, and Products in Data Processing.

It is relatively easy to develop the expertise required for operating such a solution through specific in-country training programs. Software maintenance is the supplier’s responsibility and is available with an annual license agreement. Complex technical support can be obtained through a service level agreement with a firm, with acceptable response time defined in the agreement. Routine and less complex technical support capacity can be acquired or developed in-house. To minimize the maintenance cost, the project steering committee should define the principles to minimize customization. They could include accepting standard functionality by default, requiring approval

<sup>3</sup> Access more information about the PFM Systems and EServices Global Dataset at <https://datacatalog.worldbank.org/dataset/public-financial-management-systems-and-eservices-global-dataset>.

from the steering committee for customization items, and approving customization in exceptional circumstances. The adoption of the standardized process may require a change in the legal framework.

### **Box 1. Global Experience with Commercial-Off-the-Shelf, Open Source, and Bespoke Development**

**United States.** U.S. government policy (Federal Acquisition Regulations, Part 12) requires its agencies to procure commercially available items as a preference. Procurement of services for custom development are only allowed when the agency has determined its requirements are not met using commercial products. In addition, the U.S. government, through an executive order (M-16-21: Memorandum for the Heads of Departments and Agencies) requires the federal agencies to carry out a three-step alternative analysis for procuring software. The agencies must give preference for (i) re-use of an existing software, (ii) commercial-off-the-shelf (COTS) solution, and (iii) bespoke software, in this order during the alternative analysis. Through market research, agencies must explore each option in this order before moving on to the next option in its decision-making process.

**United Kingdom.** The U.K. government requires agencies to implement the best possible overall solution, incorporating proprietary and open source options into the architecture during the procurement process. Vendors are required to provide evidence of this in bid submissions. Where no evidence exists that a proper consideration has been given to open source products in the overall solution, the bid could be disqualified (UK Cabinet Office 2010). In addition, the government also promotes the re-use of existing proprietary software, including the inclusion of a clause in the standard contracts that the government will re-use the software elsewhere in the public sector.

**Australia.** Agencies of the government of Australia “must use uncustomized COTS or government off-the-shelf solutions within the agreed Central ICT Governance areas” (Australia, Department of Finance and Deregulation 2011). Currently, these areas encompass information and communication technology solutions supporting human resource, financial, and records management.

**Latin America.** In Latin American countries during the 1980s and 1990s, FMIS was often developed in-house. This option was a consequence of rigid and lengthy national procurement and contracting processes that discouraged systems development outsourcing and procurement of COTS systems (Uña and Pimenta 2015).

## **Open Source Software**

Open source software applications that can meet many of the functional requirements of government financial management are now becoming available off the shelf. The open source software can be downloaded free from special sites such as GitHub. For FMIS, the fit between

package functionality and government functional processes needs to be established and assurance of continued and reliable availability investigated (including modality and responsibility of updates to the package) before choosing a specific package.

However, open source does not necessarily mean free. While the license fee is not charged on open source or is relatively inexpensive for the commercial version, the implementation, configuration, customizations, integration, security, and training-related costs must be considered. The liability for maintaining the software during its operations for issues such as security or bugs should not be underestimated and must be considered as part of the risk mitigation strategy. The total cost of ownership for the open source solution should be compared with proprietary software and COTS solutions during the competitive procurement process. In addition, it must be ensured that the critical mass of customer base, comparable in scale and complexity, exists before an open source system could provide assurance to client countries about its stability and sustainability. The open source software supplier should also demonstrate that it has passed the industry review process for being certified as an open source. Open source technologies have matured for some categories of software more than others. Examples of more mature technologies include interoperability (XRoad, Kafka), Portal (LifeRay) operating system (RedHat Linux), and data lakes and analytics (Hadoop, Pentaho). Their usage is rapidly growing.

The use of open source systems for FMIS is limited. Odoo Open Source is being used for budget management in Uruguay. It is also being deployed at the subnational government level in some states in Nigeria. Simba, developed mainly for French-speaking countries, is being used in Comoros for budget management at the central government level. SIOP (Sistema Integrado de Planejamento e Orçamento, Integrated System of Planning and Budget) is being used in Brazil for federal budget planning.

### ***A Phased Approach to System Implementation***

A phased approach to FMIS implementation is an important factor for success. Fundamental modules necessary for budget execution and reporting should be prioritized. Although each system in the information architecture performs important functions in a government's financial management process, the collection of modules that provides support to budget execution, accounting, cash management, and fiscal reporting (known as the budget execution or the treasury system) is regarded as the core elements of this architecture, considering their central place in the government's financial management cycle.

These systems are the centerpiece of the government financial management systems network and are used to conduct the budget execution process and monitor and evaluate overall budget implementation. They are the primary repository for financial data that form the basis of government financial management.

Other systems, such as e-procurement, fixed-asset management, debt management, tax and customs administration, payroll, and pensions systems, are of vital importance to government financial management. They support the core system by maintaining a detailed chart of accounts

and transaction data related to specific areas and by providing these data to the core according to specified requirements for timeliness and detail. For significant progress on budgetary control and cash management early in a project, it is essential to implement modules catering to core budget execution processes first. Such a modular approach facilitates the iterative systems development necessary to reduce complexity and facilitate change management.

### ***Module Sequencing***

For practical systems implementation, it is crucial to sequence and develop various system elements in a modular way. Simultaneously implementing all systems modules is in most cases neither practical nor required, and instead likely to overstretch client capacity. After the initial framework is established and the integration prerequisites and criteria are detailed and incorporated into the implementation plan, actual implementation and module integration could be sequenced and phased according to requirements.

In some contexts, where an FMIS is already deployed but is not working, a different variation of the modular approach could be considered. Under this approach, upgrading or replacing a core module rather than implementing FMIS from scratch could be considered as an option (Uña, Allen, and Botton 2019). This context includes the following circumstances: i) there is an existing FMIS, and ii) 75 percent of one or more core modules have the functionality or technical deficiencies, as opposed to the coverage or interoperability issues, and iii) intermodular connectedness is low. This approach is typically more suited to custom-developed environments, where the intermodular integration is not as tight as in the COTS. In COTS, where the core modules are heavily integrated and dependent on each other for performing functionalities, this approach will have limited relevance.

### ***Sequencing Systems Deployment***

The deployment of FMIS is costly and logistically complex. Taking a sequenced approach and utilization of web-based technologies could help. The sequencing will depend on whether a treasury-centric or spending-unit-centric approach to FMIS deployment is adopted, which in turn depends on the intuitional arrangements for payment processing in the government.

Under the treasury-centric approach - which is suitable for those contexts in which payment processing is done at the treasury - the sequencing order should be to implement a treasury-centric system first, and then decentralize to spending units at a later stage, as necessary. Choose a systems deployment architecture that enables comprehensive capture of all payment and receipt transactions at the treasury and application of ex ante control to these transactions. Limit the deployment to nodes that are essential for this task. A deployment across the treasury offices (or out-posted treasury staff in line ministries) through which these transactions are routed from the spending units could be enough for this purpose.

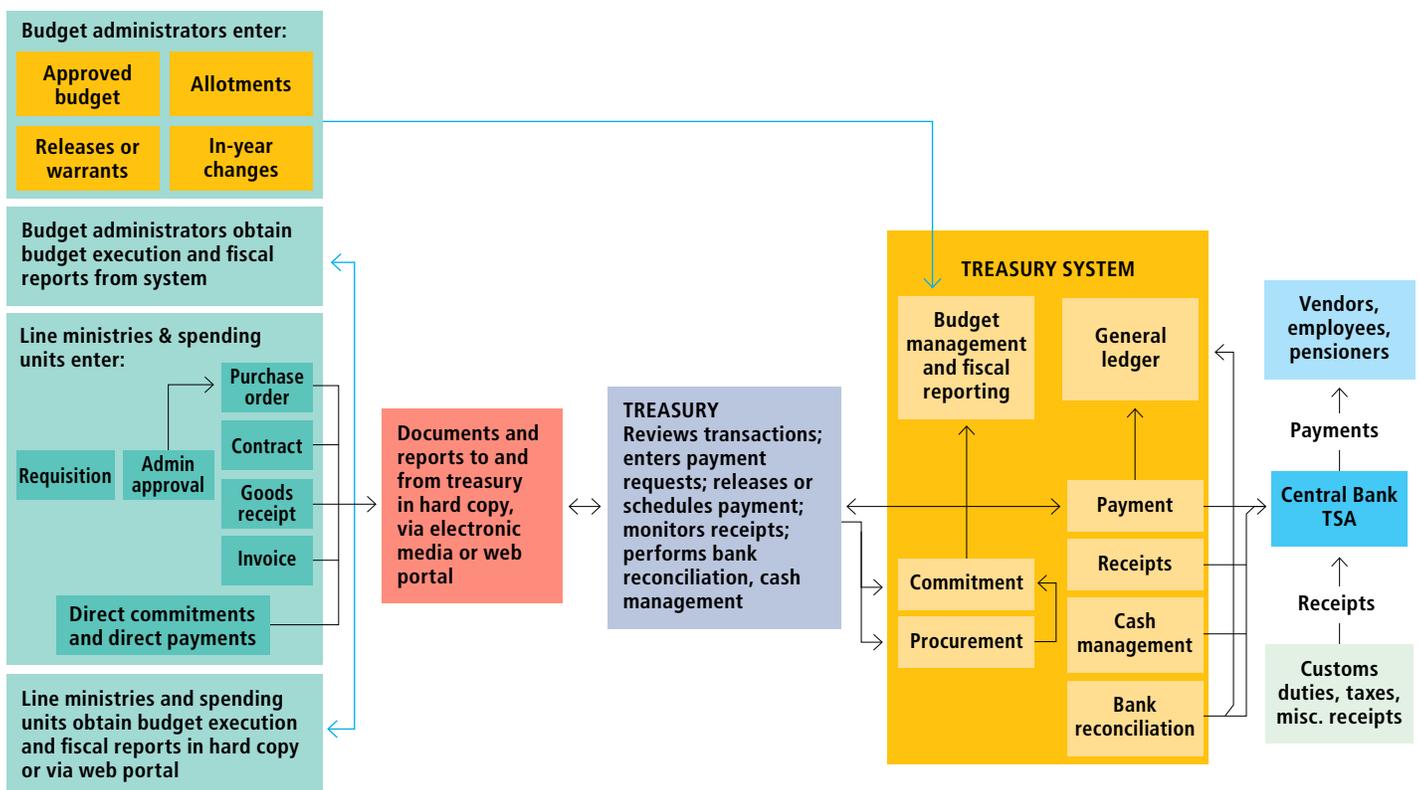
Under the spending-unit-centric approach — which is suitable for those contexts in which payment processing authority is decentralized at the spending-unit level — FMIS deployment should be

prioritized at large spending units before being rolled out to smaller spending units. Under these arrangements, every spending unit has the authority to execute the budget, approve payments, maintain its accounting records, and produce financial statements. The final payment is routed directly through the bank without any treasury control. The bank exercises cash control by ensuring the payments are made within the ceilings/allotments issued by the treasury office. Typically, the retail banks have implemented some system with the support from the treasury to ensure cash/budget compliance during the disbursement of payments. The treasury is not responsible for ensuring ex ante commitment control to ensure budget compliance, though the treasury or the budget office issues budget releases or allotments on a monthly or quarterly basis.

### Use of a Web Portal to Reduce Licensing costs of COTS

A spending-unit-based system deployment is preferable in principle, but it can be costly for COTS deployment. To lower the license cost, a hybrid model has been adopted by some governments, which combines the deployment of COTS at large ministry, treasury, and budget offices with web applications or portal access for smaller spending units.

**Figure 4. Use of a Web Portal to Connect Spending Units to an FMIS**



Source: Hashim (2014).

Note: FMIS = financial management information system; TSA = treasury single account.

The web portals or web-based accounting system interfaces with COTS and exchanges information

in a batch processing mode. A web portal can give spending units access to the system while containing costs and retaining the treasury’s role of exercising control overpayments. Web portals can also give budget administrators direct access to the system to perform their budget management responsibilities, and line ministries can access budget execution figures and reports. France has implemented such an architecture. Out of the total 5,700 users, 2,300 users have direct access to the system through SAP user license, while the remaining are connected to SAP through a web-application developed on LifeRay, an open source portal technology (Streicher 2019). In Indonesia, the deployment of FMIS, called SPAN (Oracle E-Business Suite [EBS] COTS) is limited to 3,000 plus users from the treasury and budget department, while the users from the 24,000 plus agencies and spending units use Online Monitoring SPAN, which is a web-based application that allows the line ministries and agencies to download the data from SPAN, monitor their transactions, and produce various financial reports (World Bank 2019).

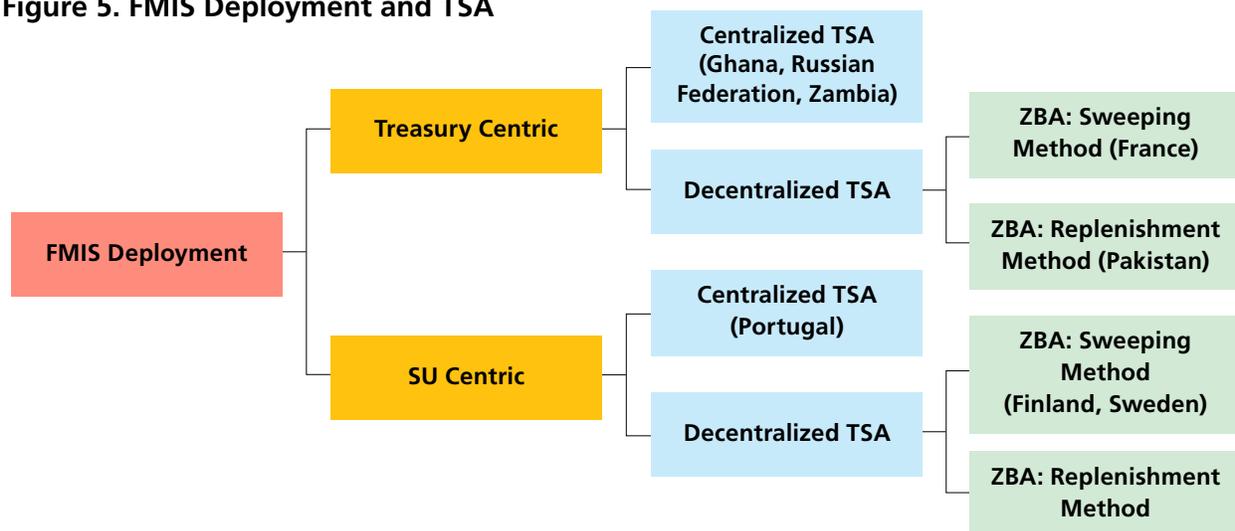
### Government Banking — TSA Arrangements

TSA arrangements are an important complement to the FMIS design and must be analyzed to configure the system for payment processing. A detailed discussion of them can be found in Pattanayak and Fainboim (2011) and Hashim (2014). TSA could be centralized, decentralized, or a shared-service arrangement depending on the context.

### Centralized Arrangement

Under the centralized TSA structure, as is the case in Brazil, France, and Pakistan, all payments are made through the treasury, which controls a central bank account. Spending units do not have a separate bank account. The TSA is held in the central bank. Some exceptions also exist where it is held in a commercial bank, but this approach requires a stronger control environment and is not preferred. The treasury-based FMIS deployment is more suited to these arrangements.

**Figure 5. FMIS Deployment and TSA**



Note: FMIS = financial management information system; SU = spending unit; TSA = treasury service account; ZBA = zero-balance account.

## Decentralized Arrangement

Under the decentralized TSA account structure, the TSA design consists of the main account of the government and sub-accounts for spending units. These accounts are linked in a hierarchical manner. The sub-accounts could be either ledger accounts or discrete operational bank accounts. If the sub-accounts are in the central bank, as is the case in Ghana, the sub-accounts could be ledger accounts linked to the main account. The aggregate balances in these accounts constitute the balance of the TSA, or these accounts are netted daily in the TSA.

However, if the sub-accounts are held in commercial bank accounts as discrete operational bank accounts for spending units, as is the case in Sweden and Finland, these accounts should be held as zero-balance accounts. The balances in these accounts should be zero at the daily close, as all cash balances should be made part of the main TSA overnight. This could be operationalized through two methods: sweeping method, and replenishment method. Under the sweeping method — for example, in Australia, Finland, Sri Lanka, New Zealand, and Sweden — the operational accounts in the commercial banks are pre-funded from the main TSA with cash equivalent to the released budget. The FMIS would control expenditures against the released budget or allotment ceilings. Ceilings are shared as credit ceilings with the commercial banks who clear the payment requests from the spending units against these ceilings to prevent negative balances. These arrangements are more suitable for settings in which the banking sector is technologically more advanced.

Under the replenishment method — for example, in India and Pakistan — the commercial banks make the payment from a zero-balance account. They incur negative balances and are reimbursed in the evening from the central bank through the TSA. Credit ceilings issued from the FMIS should be sent to the commercial bank to ensure compliance with allotment ceilings.

## Shared-Service Model

In Estonia and Finland, TSA is decentralized. Transaction banking is done through pre-selected commercial banks in which each agency has its bank account, but the payment processing is centralized through a shared services center, called the Shared State Service Center, and Palkeet (i.e., the Finnish Government Shared Services Center for Finance and Human Resources), respectively. Under this model, the government centralizes accounting, personnel and payroll services through the implementation of a common enterprise resource planning system (e.g., SAP)<sup>4</sup> for financial accounting, human resources, and payroll. This is supported by an employee self-service portal and e-invoices for fast processing and automatic transmission of data from the agencies. This model is relevant in a specialized context under which the Estonian government aimed to reduce the workforce (40 percent less employee), among other efficiency and quality targets, through a centralized unit, a common technology platform, and standardized processes for all the state agencies (Leppoja 2019).

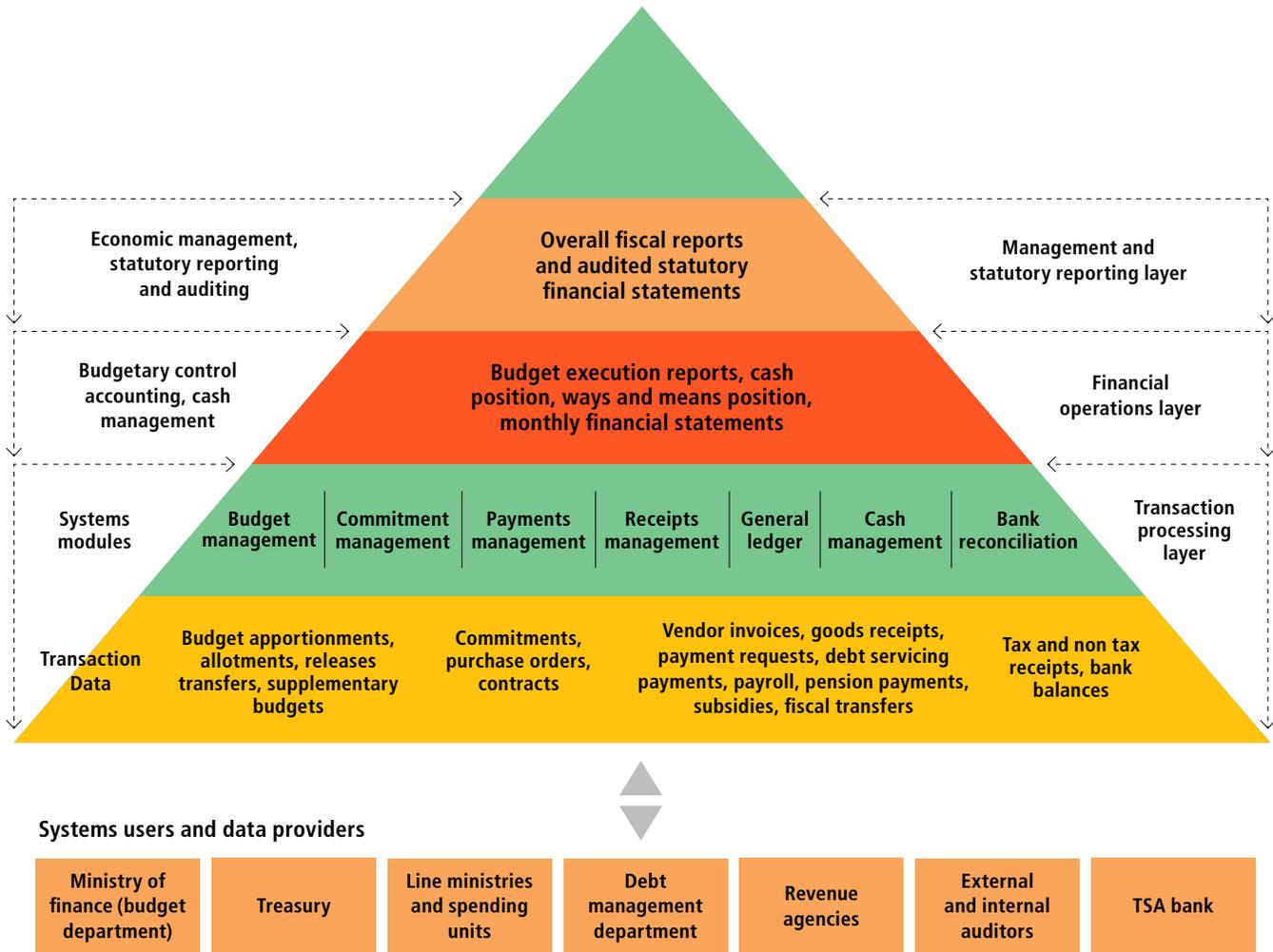
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<sup>4</sup> SAP stands for Systems, Applications, and Products in Data Processing. SAP was founded in 1972 in Walldorf, Germany, and now has offices around the world. Originally known for leadership in enterprise resource planning software, SAP became a market leader in end-to-end enterprise application software, database, analytics, intelligent technologies, and experience management.

## FIMIS Implementation - A layered approach

FMIS implementation can be viewed as a layered approach used to process basic transaction data, which constitutes the first layer. Reliable transaction processing is fundamental to the integrity of a system. It provides the data used for financial operations and management reporting (figure 6). It is important to implement the transaction processing layer first to get credible and complete information for financial operations and management reporting.

**Figure 6. Budget Execution and Treasury Systems: A Layered Implementation Approach**



Source: Hashim (2014).

A financial operations layer is next for producing budget execution reports, determining the government bank accounts' cash position and the ways-and-means position, and producing monthly financial statements. The top layer is the management and statutory reporting layer, which produces overall financial reports, audited financial statements, and statutory financial reports.

## *Training, Political Economy, and Change Management*

The importance of training is among the most widely cited lessons in the FMIS projects portfolio. The literature and project documentation suggest that staff should receive training in these categories: (i) comprehensive technical training for a select group of technical staff who are or will be responsible for maintaining and operating the system's technical aspects; (ii) end-user training, which requires the most attention because of the large number of staff involved in systems operations; and (iii) training managers to use the system and help them understand the system's capabilities and use them adequately. Setting up a help desk, conducting hand-holding clinics, and thoroughly training a group of power users are also important for end-user training.

Political economy issues, rather than a lack of technical knowledge or funds, are often at the heart of FMIS failures or suboptimal outcomes and reflected in several ways. Political commitment, which is an essential condition for success, could be more symbolic than real. It could be high but opportunistic at the same time — leaders seeking an opportunity for personal gains while remaining committed to reforms. Typical corruption issues include single-source procurement to expedite but circumvent the process, bid-rigging, vendor-driven variation orders, and procurement of unnecessary hardware and licenses. In an extreme case, collusion to steal treasury funds using the FMIS was confused with FMIS weaknesses. The collusion involved those charged with accountability, among others. In addition, there may be higher ulterior motives that require the freedom to work in an unstructured environment that enables flexibility. Some of this could be due to a desire of the executive to be able to transact some expenditures without the necessary controls or transparency. The latter is typically motivated by a desire to hide or camouflage some type of expenditures, e.g., military expenditures, from public scrutiny.

Often, the commitment level is multilayered, and its consistency dynamic. A high commitment at the political level and low commitment at the technocratic level, or vice-versa, could change with time. Key government champions may complete their tenure and be replaced by less enthusiastic officials or policy makers. Even within each level, not all people may have the same degree of commitment. Donor relationships add to this complexity — sometimes donors cooperate and compete at the same time.

Once a system is operational, it may not be used to its full potential. This is an indication of revealed preference and inherently a political economy question. For example, the government may not wish to subject itself to FMIS internal controls for certain expenditure items such as wage or debt payments. This was the case in Ghana and Zambia, where unbudgeted wage and debt payment increases brought the countries to the brink of default. Mapping out which items are subject to FMIS internal controls and which are not can provide a revealed preference proxy to the political preparedness to adhere to fiscal expenditure rules. This is discussed in more depth in chapter 3.

Resistance to change is often the tip of the iceberg. There could be several deeper issues. The overall environment of endemic inertia, weak incentives, and general tolerance for noncompliance could reflect systemic civil service issues. Individual vested interests in supporting the legacy systems or vendors could add an additional layer of complexity. This may not just be that the architects of the

old system want their system to continue, but they may be benefiting from its usage (e.g., monopoly on information, in addition to the classic fear of losing one's job).

Legitimate lack of understanding and knowledge, due to insufficient communication and involvement, should also be acknowledged as factors contributing to political economy issues. South-South knowledge exchange visits, to learn lessons from other countries, could improve understanding and knowledge of the key stakeholders.

A reason for failure in many cases has to do with the absence of clear political economy analysis (PEA) upfront and, therefore, the inability to pay attention to critical issues in change management. Even if the PEA has been carried out, which will provide a snapshot at a given point in time, it will still require attention as an ongoing work, requiring constant and informal mechanisms to understand shifting dynamics. Sometimes informal dynamics are difficult to publish or share in a formal PEA document.

To address many of the political economy issues, effective change management programs are important. There is voluminous literature available on change management and its application to organizational change in public sector organizations in general. Central to this literature is the role of political leadership, outreach, and communication to mitigate opposition to reform.

The literature identifies the following 12 key areas needing attention: high-level political support; developing adaptive leadership skills; stakeholder mapping; development of a shared vision; an effective communications strategy; readiness of reform teams and project leaders; a well-defined deployment plan; a capacity building plan and appropriate institutional framework; system integration and transition capacity; managing resistance; assessing risks, and taking into account the political context.

Staff in implementing agencies must recognize the inevitability of change and phase out the legacy system entirely. Management, including the project sponsor and the senior responsible officer accountable for the project's success, needs to ensure that only the new system will be used going forward. Clear and consistent signals are of vital significance. This consistency should be both at the formal and informal levels — in some jurisdictions, informal signals differ from the formal guidance targeted toward getting legitimacy with the donors. For example, for payroll, staff will process payments only through the system and pay only staff whose data are on the payroll file. Similarly, staff will process all bills only through the system.

Another key consideration in the system deployment strategy could be understanding the tenure of the committed champions at the policy level, with a view to getting in place a workable part of the system implemented within this time period.

In summary, political economy issues are at the heart of many FMIS failures or underperformance. FMIS is a tool and not a magic wand that can solve all problems. The political commitment of the government would eventually determine the performance of the system in terms of using these systems for improving controls, transparency, and decision making.

## Ongoing Systems Operations and Maintenance

Systems operation and maintenance is a key stage in the framework. Without careful attention to this process, gains made during the implementation phase may be eroded. This poses a critical risk. In Malawi, negligence to this aspect was a contributing factor to a major corruption episode (World Bank 2016a).

### *Budgetary Provision for Recurrent Costs*

Along with the investment costs incurred in first setting up an FMIS, provisions should be made to cover expected recurrent costs to keep the system operational. Governments often make adequate provisions for capital investment for an FMIS but do not provide enough budget for maintenance and support. Maintaining and upgrading the technology infrastructure (software and hardware) can be costly, but it is important from a security and continuity perspective. The main recurring cost elements are estimated at about 15–20 percent of the initial investment, which includes hardware, software, and other implementation costs

### *Technical Expertise*

Nonavailability of technical expertise has become a key vulnerability for system sustainability in some countries. The FMIS becomes indispensable for budget management once it is operational and widely applied. It underpins the day-to-day functionality of all government accounting and budget entities. Therefore, any disruption in the system operation can cause significant disruption in the government's financial operations. Establishing and staffing the supporting organization is crucial for the system's long-term operational sustainability and the continuity of the government's budget and financial management operations and reporting.

Technical expertise is critical for systems operation, but it is often difficult to attract at regular government pay scales. Countries have used several options to address this issue. Option A involves establishing an organizational unit within government, and staffing it with employees paid at special market-based salary scales (for external personnel and qualified civil servants) to attract professionals on long-term contracts.

Option B involves hiring those with technical skills directly from the market on year-to-year contracts and managing them through regular, mainstreamed civil servants. However, this is a short-term measure and can leave serious gaps in the skills and expertise required to run a stable, mission-critical system and plan for its future growth and enhancement. Under option C, technical maintenance and operations are outsourced to specialized firms. Countries with a developed market for services and firms that regularly cater to these needs (such as the United States) mainly use this option. It could be the easiest to implement, but it could also be the most expensive.

Cloud-based options are becoming increasingly attractive because they are readily available and reduce the need for technical staff within the government agency. Cloud technology makes it possible to house primary- and disaster-recovery servers on external sites. Many firms host cloud services, but application

development and maintenance are still the government agency's responsibility. An advantage is that cloud service firms will upgrade or replace the technology periodically to respond to changing needs or outdated technology. They can supply the necessary computing power, memory and disk storage, and bandwidth when needed, freeing the government agency from this responsibility. A more detailed discussion on government technology (GovTech) and disruptive technologies is found in chapter 4.

## Data Governance

It is of utmost importance to institute a data governance mechanism to ensure optimal benefits from FMIS. The data governance will define authority and control over the data assets and includes policies, processes, standards, definitions, and exchange arrangements. Typical data domains relevant to FMIS include not the only chart of accounts codes in FMIS, but also detailed codes in the other PFM systems (e.g., vendor master data, tax codes, and nontax).

### Box 2. Data Governance

FMIS will record data that will grow immensely over time, exchange data with other systems, such as banking, and payroll tax revenue, and feed data into data repositories for analytics and reporting. Sharing digital data from multiple PFM systems would become a critical differentiator for effectiveness of MOF and treasury functions in the future. Therefore, managing these data will become critical to ensure integrity, accuracy, efficiency, transparency, and compliance. One of the most important aspects of managing data is data governance. Key principles and good practices of data governance include:

- **Transparency.** Transparency involves how data are created, produced, stored, shared, and owned. This should be ensured through documented procedures with clear responsibilities.
- **Accountability.** Formally designate data stewards responsible for supervising or taking care of the data. Typically data stewards are subject matter experts in a particular domain, such as taxes, pay and allowances, debt, vendors, ministry, and spending unit.
- **Governance.** A data governance board or committee should oversee governance, including policies, procedures, quality measures, monitoring, and collective accountability. The board should represent participating departments at the management level, such as the directors of debt management, payroll, and treasury; deputy collector; deputy accountant general; and deputy director of budget. The data governance framework should also include local governments and other entities outside of the ministry of finance relevant to data exchange, analytics, and consolidation. Policies will ensure data integrity, accuracy, reliability, timeliness, ownership, monitoring, and quality measures (e.g., policy on creating and maintaining vendor master data).
- **Incrementalism.** Start data governance from a limited number of critical data domains, such as vendor, spending unit, and tax codes, and expand incrementally. Eventually, data governance within the MOF should collaborate with a government-wide data governance and interoperability framework as seen in many governments (e.g., Estonia and New Zealand).

## *FMIS and the Big Picture of PFM: Overall Technology Architecture*

The technology architecture for government financial management can provide a roadmap to transition from a core budget execution system to a broader integrated system. This architecture will define how FMIS core modules will interact with noncore modules and other PFM systems to maximize the business benefits. The FMIS core modules include commitments, including multi-year commitment control, accounts payables, accounts receivables, general ledger, cash management, and reporting. The noncore modules include budgeting and planning, payroll, Public Investment Management, and asset management, pensions, among others. In addition, FMIS will interoperate with other PFM systems — discrete, independent systems relevant to overall PFM — such as banking, debt management, e-procurement, tax administration, customs, nontax revenue (in some contexts), and others relevant to context such as e-health and social welfare payment systems.

Sharing of data across these systems through an interoperability layer and Application Programming Interfaces (APIs) could immensely improve consolidation, reporting, analytics, visualization, and decision support systems. However, the initial focus should be on the core modules. Once the core functionality of the FMIS is in place, it is easier to implement noncore modules and other PFM systems, such as budget formulation system, human resources and payroll, debt management, fixed-assets management, e-procurement, integrated tax administration system, social welfare payments systems, and auditing.

The sequencing and scope of these modules vary with the context. In some jurisdictions, these modules and systems are developed as part of the FMIS or in parallel as stand-alone systems to be interfaced with FMIS. Descriptions of a few key interfaces follow.

Budget preparation could occur outside the system. The approved budget can be loaded into the system from an external application and used to control expenditure. For this arrangement to work:

- the two modules should use the same budget classification structure and chart of accounts;
- the finalized budget (finalized in the budget preparation module) should be loaded into the budget execution module, and all in-year changes to the budget, including budget releases, virements, and other changes, should be made directly in the budget module and synched with the budget execution module; and
- all operational reporting should be done from the budget execution module's databases, which are the FMIS's primary databases, while government-wide consolidation, analytics, and performance monitoring should be done through the budgeting module, which is part of the consolidated module in modern architectures — SAP's Business Planning and Consolidation (BPC) tool, Oracle's Hyperion module, and FreeBalance's Government Performance Management module.

The payroll and pension management systems should interface with the treasury system. However,

all payments should be routed through the financial modules of the FMIS, which then performs a budget check before releasing payments.

The debt management system maintains a record of all government borrowing and the associated repayment schedules. The system calculates debt service payments, but these should route through the financial modules of the FMIS. All debt and grant receipts should be recorded in the treasury system on receipt.

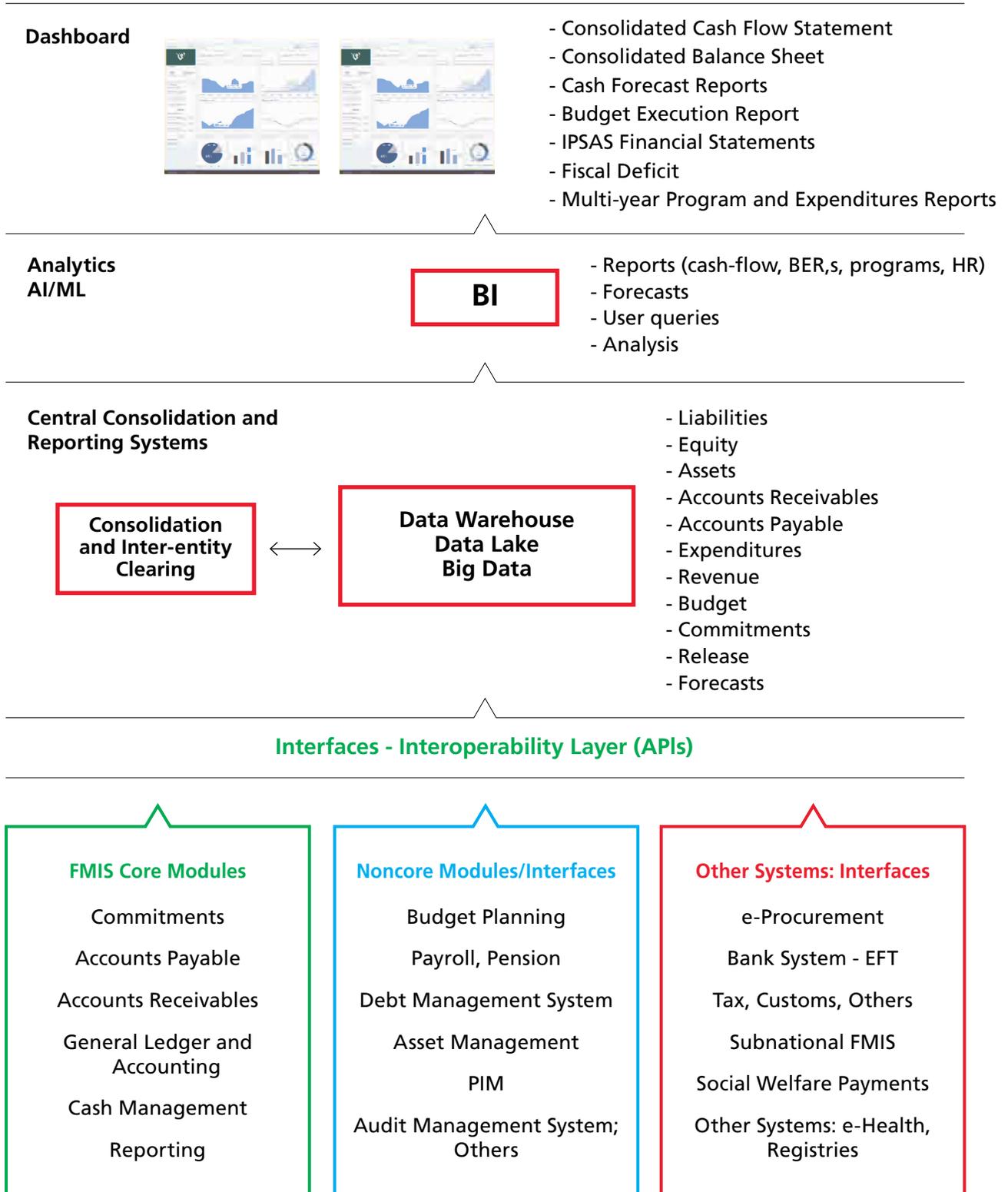
Revenue receipts should be deposited directly to the TSA bank account and recorded in the appropriate subaccount. The amounts recorded in the TSA represent the official receipt figure. Revenue agencies need to reconcile the amounts with the figures from taxes and duties that their systems show as assessments.

E-procurement systems should be interfaced with FMIS. In many jurisdictions, an e-procurement system has been implemented as a separate system to support major stages of the procurement life cycle, such as planning, e-tendering, e-evaluation, e-awarding, and monitoring. A typical FMIS does not support these stages as its scope is limited to the procure-to-pay cycle from commitment to payment.

Therefore, it is important to ensure key data exchanges between the two systems. They could vary according to the context, but typically involve checking budget availability in FMIS before issuing contracts, synchronizing with FMIS on chart of accounts and vendor master data, and sharing information with FMIS on commitments, among others.

Other interfaces include those with the banking, auditing management, and social security payment systems. An important, critical element of architecture is to determine the interoperability mechanism to develop APIs. As an option, open source software such as Kafka could support streaming and open APIs to support interoperability for data analysis, analytics, and artificial intelligence (AI).

**Figure 7. FMIS Architecture and Broader PFM Context**



Note: AI = artificial intelligence; APIs = Application Programming Interfaces; BER = budget execution report; BI = business intelligence; EFT = electronic fund transfer; FMIS = financial management Information system; HR = human resources; IPSAS = International Public Sector Accounting Standards; ML = machine learning; PIM = Public Investment Management.

## **Consolidation Module**

The consolidation of financial statements should be done in a consolidation module, separate from FMIS but integrated with it through standard adapters. This module should have additional functionalities to support the consolidation process, including intragovernment transactions (IGT) clearing. The IGT transaction volume could be quite large, and handling them through spreadsheets could be daunting, if not impossible. This module maintains the trading partner and clearing entity accounts, configures the matching rules, and based on these rules, matches the clearing transactions and creates the adjusting entries automatically to a large extent, leaving only the exceptions to be handled through a greater in-depth analysis involving accounting staff. The accounting staff of each ministry could be part of the workflow to approve the eliminations and other adjustments and produce their consolidated statements.

In addition, the consolidation module will protect the FMIS from performance bottlenecks related to the high computing load of report processing and consolidation. Due to this reason, large technology vendors have architected a separate consolidation module in their solution stack. This includes the BPC tool by SAP, Hyperion by Oracle, and Government Performance Management module by FreeBalance, among others. The best of the breed consolidation, planning, and performance management modules by smaller vendors can also be implemented if they have standard adapters for integration with the main FMIS.

## **ICT Security**

IT security is another important dimension of implementation. Not only security should be implemented from the ground up through implementation and tested thoroughly before deployment, but also governments should conduct regular assessments of their security readiness leveraging recognized industry frameworks. The International Organization for Standardization 27002 and the Cybersecurity Framework of the National Institute of Standards and Technology could be used to carry out assessments. Maturity level could be scored through maturity frameworks such as Capability Maturity Model Integration. These assessments could inform the various security areas and their maturity levels on a range from 1 to 5, with 1 being the weakest. Security assessment could help identify areas of improvement and develop a near- to mid-term (1 to 3 years) prioritized implementation roadmap.

## **FMIS Coverage and Utilization**

The coverage and utilization stage in the conceptual framework underlines the importance of budget coverage, ex ante and other controls, and the system rollout (geographical and functional). Benefits from an FMIS only apply to the funds routed through it. The share of the budget subjected to FMIS ex ante controls could be used as a good proxy for the contribution of the FMIS to effective budget management.

Transactions related to all budgetary, extra-budgetary, and internally generated funds need to be routed through the system in ex ante mode, in order to benefit from the system. This step is necessary to ensure treasury's control over all government financial resources; the application of control protocols, such as budget checks; and commitment and cash control of all expenditure transactions before they are paid, and to promptly capture and recognize all receipts in the treasury books.

## FMIS Control Protocols

Benefits from an FMIS will accrue only if the system's control protocols are diligently applied. Application of control protocols in the FMIS needs an underlying government commitment to managing public expenditures efficiently and with integrity, accountability, and adherence to the budget law.

## Commitment Control

Commitment management is essential for budgetary control. Satisfactory budgetary control cannot be exercised only by checking for budget availability at the payment stage of an expenditure transaction. The payment stage is too late to be effective as goods and services were already received, and the government is legally obligated to pay the vendor. Commitment control moves budget checking control from the payment process to the time when goods and services are requested and ensures that spending units do not enter into contractual or other binding liabilities beyond their authorized budget (Hashim 2014). Along with the recording of all accounts payable transactions, commitment control ensures the government has complete information on its total expenditure liabilities and any buildup of arrears. However, effective commitment control requires closing all the avenues often used to undermine it.

Commitment and expenditure patterns associated with budget execution follow the 80–20 rule. That is, 20 percent of the commitments by number (and associated expenditures) account for 80 percent of the budget amount. The remaining 80 percent of the transactions (by number) amounts to only 20 percent of the budget by amount. The high-value commitments determine the bulk of the cash requirements in the future and are most important for budgetary control and cash forecasting purposes. Some governments have instituted a policy that records in the system only the commitments above a specific threshold value. To determine the threshold, it is necessary to profile the contractual patterns. The threshold should ensure that most of the commitments by the amount (80-90 percent) are recorded in the system and associated expenditures are checked against these commitments before payment.

## Internal Controls

Even with an advanced FMIS in place, adhering to internal control procedures continues to be important. Adhering to prescribed internal control procedures normally specified for financial transactions is crucial when transitioning from a manual or semi-automated system to an automated

system platform. There have been incidences of reduced rigor in internal control as countries have migrated from manual systems to automated systems (e.g., Kazakhstan and Malawi).

## Bank Reconciliation

Bank account reconciliation is critical for gaining control of government finances. It enables organizations to detect errors and irregularities, including fraud committed by government or bank officials. The procedure is to reconcile the bank statement balance with that in the entity's cashbook, clearly identifying the checks and deposits recorded in the books, but not yet cleared through the banks.

FMIS coverage of bank accounts should be comprehensive. It needs to include:

- All centrally managed bank accounts in the central bank.
- All bank accounts at the central bank used for transacting budgeted revenues or expenditures.
- Revenue deposit accounts including tax revenue accounts held in the name of the revenue authorities.
- Project holding accounts. Donors generally require project monies to be held in separate bank accounts. The government often centralizes donor project funds within the central bank through a series of project holding accounts. It establishes cash-ceiling authority mechanisms that perform retail banking operations through parallel bank accounts held in commercial banks. Balances of cleared payments are reimbursed from the respective project holding account at the central bank. The holding account and its linked account in the commercial bank need to be included in the FMIS.
- Extra-budgetary funds (EBF). Disbursements from the TSA into EBF bank accounts should be routed through FMIS either as advances or expenditures. When treated as advances, to be executed by the EBF through their own systems, mechanisms for settling the advance through submission of detailed accounts must be put in place and monitored strictly before disbursing the next tranche of the advance. In many jurisdictions, practitioners need to pay attention to several areas of weakness — the next tranche is issued without settling the previous advance, the budget execution of the advance is not fully transparent at the detailed expenditure category level, there are considerable delays in settling the advance, and bank reconciliation of the payment made out of the advance is not done diligently or done with delays. In cases where the controls in the EBF are more reliable and governments treat the disbursements to the EBF as expenditures, these expenditures should be eliminated during the consolidation process at the end of the period to avoid double booking.
- Partially budgeted ministries, departments, and agencies (MDAs) and internally generated revenues (IGRs). In some jurisdictions, the MDAs, hospitals for example, generate IGRs, which they can retain, either partially or fully, and spend out. This is often an area of weak controls and must be addressed to ensure that all the IGRs collected into and spent from the MDAs bank accounts

is captured in the FMIS. This will enhance transparency of these funds and improve expenditure management.

- Special accounts, trust funds, and PPPs. The payment modalities for each of these fund types need special attention during design to ensure that FMIS captures all the expenditures to improve controls and reporting. In some jurisdictions, such as Nigeria, they may constitute part of the EBFs.

Direct payments from government accounts that bypass the FMIS should be avoided. They diminish accountability and transparency. Rather, all payment requests should go through the FMIS.

## **Budget Management Practices and Their Link with FMIS and PFM Outcomes**

Investing in FMIS needs accompanying improvement in general budget management practices to bring significant benefits.

### **Budget Credibility**

A primary pre-condition for the effectiveness of an FMIS as a budget management tool is that it operates against a realistic budget. An FMIS is designed to control expenditures so they do not exceed budgetary allocations. However, if the budgetary allocations are unrealistic, then these controls would become meaningless. In such situations, the budgetary allocation loses its importance and the MOF institutes a system of budget and cash releases, which instead becomes the limits against which expenditures are controlled. However, this affects the budget execution process at the line ministries in so far as they can no longer predict how much money will be made available to them during the year. Therefore, they cannot plan their operations effectively. In this mode of operation, the FMIS becomes a means of expenditure control, but the link between budgetary allocations and expected outcomes, as presented in the budget document and approved by a legislative body, is critically damaged.

### **Budget Comprehensiveness**

The budget should present a complete picture of the government's fiscal operations. Any gaps in this picture will reflect on the effectiveness of FMIS as a budget management tool. Budgets should be comprehensive and cover all sources of financing available to the government including own resources and donor funds. The use of EBF and other earmarking methods should be given special attention for reporting and full disclosure. Estimates of internally generated funds, such as fees, that may be used to partially finance operational expenses in, for example, the health sector should appear in the budget document and monitored during the budget execution process. Similarly, trust funds, PPPs, transfers to subnational governments and state-owned enterprises, and contingent and other financial liabilities should be marked as special areas to design mechanisms for promoting budget comprehensiveness and reporting through FMIS.

## Timely Budget Releases

Delayed budget releases may cause spending units to bypass the system to avoid budgetary controls. Procedures to ensure budgetary releases from the first day are important to maintain confidence and utilization of the system. Procedures for budget release and warrants should be improved so that allocations are available to line ministries to start their programs from the first day of the new fiscal year. A partial release system, based on historical trends in previous years, could be put in place so that line ministries can proceed with their day-to-day operations at the start of the fiscal year.

Evidence has shown that without timely and efficient budget release procedures, managers develop informal arrangements to bypass the FMIS commitment and budget control procedures (e.g., Ghana and Malawi). Line ministries reportedly entered into informal credit agreements with suppliers for goods and services delivery for which payment was made after the release took place. Then the FMIS produced a purchase order, and commitment and invoice transactions were entered. This defeats the commitment system's purpose. Sometimes payment is made from funds from other sources, such as internally generated funds, that are not banked in the TSA and are not under control of the treasury.

In some jurisdictions, the budget release process is inefficient as the MOF exercises cash control at an unnecessary level of detail. In one case, cash releases for the ministry of health were distributed over about 3,000 activities, with at least 5 subheads each — a total of 15,000 line items across all the departments and units of the ministry. The MOF could exercise control at a higher level — e.g., at the level of Program and major Expenditure category — instead of exercising it at the level of Activity and Sub-items categories for expenditure — to grant greater autonomy to the program managers and ensure efficiency in budget execution and reporting. A laxity in budget release procedures also builds up resistance in line ministries for including these funds in the TSA.

The treasury should have enough funds to cover the invoices generated once a budget release takes place (e.g., a warrant was issued). If the treasury does not have enough funds to cover budget releases, this may lead to delays in payment of invoices and accumulation of arrears.

Implementing FMIS in cases with late budgetary releases or insufficient funds at the treasury would involve implementing only the mechanics of these systems and give the appearance of improved budget management without substance.

## Implementing Advanced Budgeting Methodologies

Implementing advanced budgeting methodologies without an operational budget execution system is of only limited benefit. Implementing a functioning FMIS is an essential prerequisite for implementing advanced budget methodologies. Program budgeting facilitates tracking the budget resources allocated to government programs, subprograms, and activities, rather than against inputs (line items) only. Including program, subprogram, and activity codes in the budget classification structure can accommodate this. However, if codes are too detailed and budget control is exercised

at this level, the number of transactions associated with budget apportionment and allotment will increase and raise the numbers of budget releases and transfers to unmanageable levels. The transaction traffic related to budget management and budget execution could increase tenfold, compared with a system that allocates and controls budget at a line-item level. This would be difficult to manage without an automated FMIS.

As a result, implementing a budget execution system is an essential prerequisite for implementing an advanced budgeting methodology such as program budgeting. Under these methodologies, policy reforms should also focus on budgeting and apportionment or releases at the higher aggregate level — for example at the program level and major expenditure category level — while keeping the budget execution controls at the detailed line-item or activity level. It may not be possible to achieve the full benefits of program budgeting without a fully functioning FMIS.<sup>5</sup>

Implementing a medium-term expenditure framework requires the treasury system to provide access to budget and expenditure data for more than a year, which requires controls and reporting against the multi-year totals instead of individual years. The FMIS horizon can be expanded to a multi-year time frame to accommodate this.

## World Bank's Role in FMIS Reform

FMIS projects can be costly and lengthy. World Bank projects should be realistic during the appraisal and choose adequate lending instruments.

### Taking a Multi-Phase Approach

FMIS projects in medium and large countries have had slow disbursement rates in the early years. Some have taken 10 years or more to complete because of complex procurement, implementation, and rollout procedures. The standard investment project financing (IPF) lending instrument is not well suited for FMIS projects. The IPF instrument requires a relatively short completion period and a frontloaded disbursement schedule. This does not cater well to FMIS realities. Thus, a task manager may consequently make unrealistic projections, which undermines project performance.

A multi-phase approach (MPA), or programmatic approach, might be an attractive option to cater for the medium term. An appropriately phased project could deliver a usable part of the system at the end of each phase, which is necessary to maintain the project's credibility during the long development period. An MPA approach, however, carries the risk that financing may not materialize in later stages, and it is important to take appropriate precautions to prevent the loss of the initial investment.

Adequate costing is important, and project design should draw on the wealth of costing information

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<sup>5</sup> The importance of sequencing in public financial management reform and the paramount role of budget execution are broadly recognized by the literature. For example, see Schick (1998a), Diamond (2013), and Peterson (2011).

already available. FMIS implementation costs vary with the implementation's scope and scale. However, it is possible to estimate FMIS implementation costs with a given scope by using existing data on completed projects to plot the contracted cost of actual systems implementation against the number of end-users connected to the system (a proxy for system scale). It is necessary to use comparable numbers. Thus, the cost elements should cover the same elements for all projects. If this expense was incurred in different project phases (e.g., pilot, implementation, and rollout), then these costs should be summed. The estimated costs for the World Bank-financed FMIS projects involving implementation of COTS software is about \$15,000 per user (Hashim 2014; Dener, Watkins, and Dorotinsky 2011). This cost covers hardware, software, implementation services, wide area and local area networking, and training.

The World Bank team needs to have experienced specialists available to advise the client on important technical issues during the design and implementation phases. The specialists should also be familiar with procurement practices and procedures for IT procurements and the World Bank rules under which they will need to be applied. Continuity of World Bank staff from project design throughout implementation is a crucial success factor.

### *Instrument Options*

Development policy financing, Program-for-Results, and(IPF) instruments with disbursement-linked indicators can provide critical leverage to address the policy, political economy, and usage constraints. Investment lending supplemented with technical assistance has been the main lending instrument type for supporting FMIS and TSA infrastructure. However, in cases where the infrastructure is not adequately used, these instruments and indicators could be an effective accompanying measure. They could incentivize countries to adopt measures that would make the FMIS infrastructure investment more effective for budget management through policy actions.

A few potential indicators could be formulated to promote policy actions:

- Improved coverage of budget executed through FMIS (percentage)
- Improved timelines for publishing budget execution reports (days)
- Disaggregated by function, economic classification, project, program, ministry, and district
- Downloadable in a machine-readable format for social accountability
- Visualized through dashboards accessible to citizens
- Web publication of fiscal and financial data on debt, deficits, budget, spending, accounting, cash, and public investments
- Improved coverage of TSA (percentage of budget executed through the TSA)
- Number of agencies getting a clean audit report

- Improved user satisfaction with the fiscal transparency portal on FMIS-related data access, ease, timeliness, and comprehensiveness to be measured through surveys
- Improved timeliness of web publication of program results disaggregated by ministry, program, and district (days)

FMIS projects have often had high-level objectives along the lines of improved service delivery, improved public sector effectiveness, better expenditure management, or improved transparency and accountability. Monitoring and evaluation (M&E) frameworks of FMIS projects tend to be inadequate. The IEG considered M&E of 77 percent of all closed FMIS projects to be of modest or worse quality. This gives little confidence that progress in investments can adequately be tracked to intermediate or final outcomes. This is problematic from a reputational perspective as it makes it difficult to attribute improvements in outcomes to the FMIS investment. On the other hand, there is evidence that good M&E design and utilization can support the project during implementation and lead to better results.

The attribution to improved PFM outcomes can be facilitated through good M&E frameworks. This can be guided by the questionnaire in appendix C, which will help identify which areas in the framework need attention and the evidence progress against it.

## Country Examples of Better FMIS Implementations

### FMIS Implementation in Vietnam

The Treasury and Budget Management Information System (TABMIS) was set up to address weaknesses related to fragmentation, overlap, and conflicting functionality in systems that resulted in a lack of integrity in overall fiscal data, transparency, and control.

Policy and institutional reforms included (i) amendments to the legal framework to clarify institutional roles responsibilities for financial management; (ii) a uniform budget classification structure and chart of accounts across all levels of government that conforms with international standards such as the IMF's Government Finance Statistics; and (iii) consolidation of government bank accounts into a TSA at the central bank.

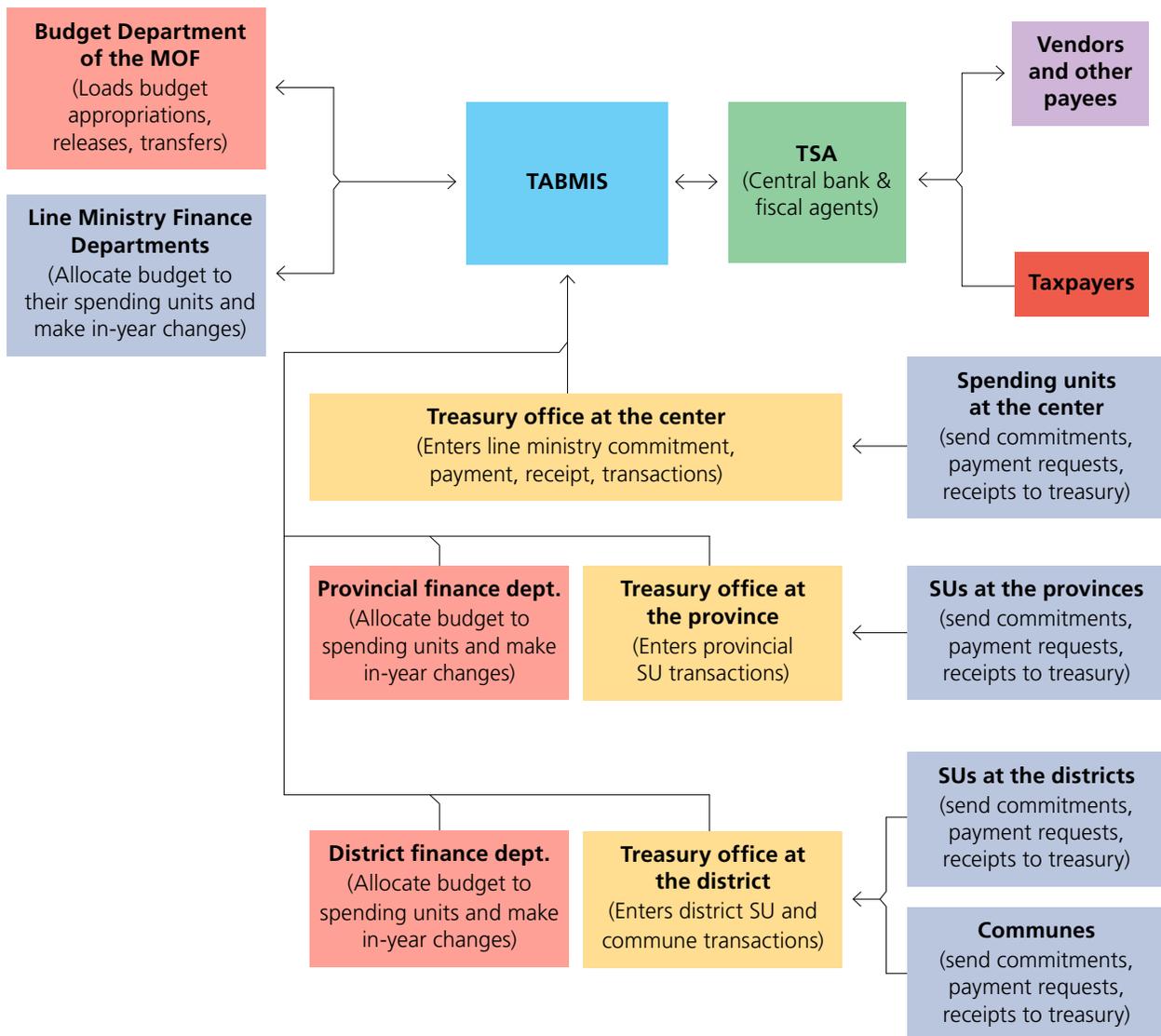
Regarding technical features and costs, TABMIS is based on a COTS application (Software Oracle EBS version 11.5). It is a full-function system. Modules implemented are for budget allocation, accounts payable, accounts receivable, general ledger, purchase order, and cash management. The total capital cost was about \$70 million. The time taken for implementation was about 10 years.

TABMIS is fully operational in all 1,500 treasuries and financial agencies across all 63 provinces, 37 spending ministerial organizations, and 3 major departments of Hanoi since October 2012. At present, about 11,000 users connect to the system countrywide. Approximately, 30 to 40 million transactions are processed by the system in a year. Its scope covers 85–90 percent of the financial resources available to the government. Its geographic coverage extends across the country and

across all four levels of government. The system functionality implemented includes effective ex ante budget control for government financial resources (and commitment control above specified thresholds). Systems functionality covers core budget execution processes.

As to outcomes, the system has enabled the government to allocate, execute, and monitor the state budget through a centralized FMIS on a transparent and real-time basis. Data on government receipts and expenditures, cash, and fund balances are available in TABMIS in real time. The treasury and finance offices can produce instant reports for management purposes. Payment processing through TABMIS has helped enforced compliance and enhanced transparency in budget execution throughout all levels of government (see figure 8).

**Figure 8. Vietnam FMIS Architecture**



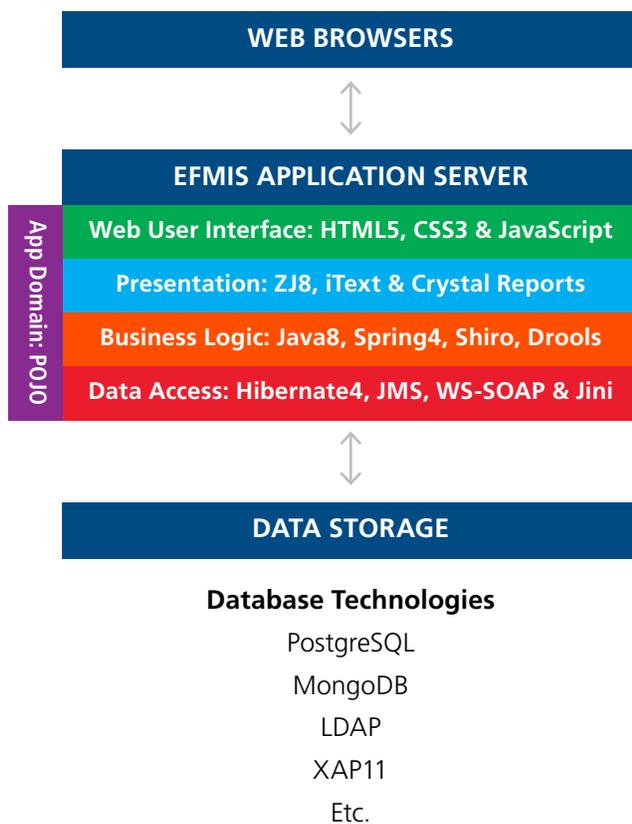
Note: MOF = ministry of finance; SU = spending unit; TABMIS = Treasury and Budget Management Information System; TSA = treasury single account.

## FMIS Implementation in Rwanda

Rwanda is a good example of a successful implementation of a custom-developed system. Figure 9 shows that the FMIS intends to provide end-to-end coverage to all government budgeting accounting and reporting functional processes starting from budget planning through budget execution to financial reporting and auditing. The accounting basis of the system is modified cash, but it envisaged to move to accrual accounting in 2020.

The system is integrated into so far as the core budgeting and accounting modules are interfaced with key subsidiary systems such as payroll, procurement, and tax. In addition, it includes an interface with the banking system that enables payments being made to government payees, including suppliers and vendors. Receipts were recorded in the general ledger. The e-procurement module enables tracking of government tenders through the tendering to the goods receipts process. The e-tax systems enable matching of payments with tax declarations.

**Figure 9. Rwanda FMIS Technology Architecture**



Systems design commenced in 2014. At the end of Phase I in June 2014, the system had been rolled out to 173 budget agencies in the central and local governments. Phase II, which started in 2005 and is ongoing, covers 364 budget agencies and more than 1,270 sites with over 3,000 users across the country. This coverage is expected to extend to more than 4,000 entities and 10,000 users as the system rollout continues. The system's estimated cost is \$25 million.

Unlike many FMIS systems implemented in Africa, the penetration of the system is very deep and intends to cover most entities at the central government and local government levels that generate government transactions. Another key aspect of the Rwanda FMIS is that it makes extensive use of Executive Dashboard to alert managers on issues or problems in specific business or operations areas. Alerts are triggered by measurement or performance to a given level of initially defined, business key performance indicators. The system operates in a centralized architecture.

It is noted that the system uses modern tools and technologies for its implementation. Key questions related to the sustainability of the system, therefore, are whether the government anticipates any issues in the retention of qualified personnel familiar with these technologies. It is noted that the government would like to move to accrual accounting, which may require significant changes to the system. Another question related to its operation and maintenance is how well it has been documented.

### Other Country Examples

Ghana and Zambia faced problems associated with fiscal discipline and cash management at the time of FMIS implementations. However, the projects did not focus on establishing a TSA or centralizing the payment function. These projects opted for a technology-driven approach that assumed that a comprehensive off-the-shelf enterprise resource planning package would meet government and user requirements. On the other hand, a detailed diagnostic assessment led to effective engagement in Kazakhstan, Pakistan, Russia, and Ukraine. These projects recognized the importance of the policy and institutional underpinnings of an FMIS and focused on establishing a comprehensive TSA, an appropriate budget classification structure, and a control framework to ensure that the provisions of the PFM act are adhered to. The political economy issues were addressed by higher-level political commitment over a sustained period.

### FMIS Failures

Single-source procurement — Ethiopia (Oracle), Lao People’s Democratic Republic (Free Balance), and Malawi (Coda software) — have been associated with excessively high bids and suboptimal results. In Malawi, the Epicor software, after Coda was abandoned, was also procured through a single source, without detailed specifications, hoping that the Tanzania Epicor solution could be replicated. This also resulted in disappointing results.

In Cambodia, the first effort at implementing FMIS resulted in failure due to generic scope, unrealistic sequencing, over-ambitious deployment strategy, and insufficient preparation. These inadequacies were addressed in the next implementation effort, which was successful.

## FMIS in Special Contexts

### *FMIS at Subnational Levels*

The spectrum of FMIS deployment options at the subnational levels is broad, depending on the institutional context. These options include a centralized model, decentralized model, hybrid model, and some variation of these models.

#### Centralized Model

Governments have deployed a uniform, centralized FMIS for both the national and subnational levels where a central agency has the legal mandate, authority, or coordination leverage to prescribe the accounting standards and systems for the subnational levels. They include, for example, France, Pakistan, Mozambique, Nepal (in progress), and Rwanda.

#### Decentralized Model

At the other extreme, some subnational governments have implemented their own stand-alone systems. Reasons can involve their constitutional autonomy or lack of a central coordination authority's leverage to influence their decisions on choosing technology, even if the central authority has a standard-setting or coordination role in standardization. Examples are Brazil and Nigeria. This option is typically costlier, as it does not leverage the economies of scale to reduce implementation and maintenance costs. It also requires additional overheads to ensure compliance with standards.

#### Hybrid Model

A middle approach has been adopted by some governments. Under this approach, the central authority either developed or acquired a standardized FMIS, separate from the national FMIS, for the rollout at the subnational levels. For example, in Malawi, the Serenic Navigator solution for subnational governments was deployed as stand-alone installation at most of the municipalities, though some municipalities with better connectivity share the central system and data center. A slight variation of this approach is adopted by the government of Uganda, under which a standardized FMIS is deployed through a tiered approach:

- Tier 1 uses an Oracle application
- Tier 2 uses Microsoft Dynamics NAV
- Tier 3 focuses on improving manual systems

The pros of a centralized FMIS deployment are several. These include lower cost of implementation and maintenance, standardization of processes for improved controls and transparency, lesser capacity challenges, and reduced information silos. The pros of a decentralized approach include better ownership due to the increased support for localized requirements and lesser coordination challenges.

Under the decentralized settings, standardization through strong institutional arrangements for coordination is key. It is necessary that local government systems use the same accounting standards and the same chart of accounts as the systems at the national level to enable countrywide consolidation of data. Manual systems are not an option anymore for any level of a local government entity including the lowest service delivery units.

### ***FMIS for Small and Island Economies***

Small economies, such as those of some Pacific and Caribbean island countries, have unique challenges. Populations are typically small and can be spread across multiple islands. The economies heavily depend on overseas assistance. The capacity is extremely stretched to implement and maintain the systems. Climate disasters, such as cyclones and hurricanes, could potentially destroy infrastructure investments on data centers. Implementation of a common, simpler, low-cost FMIS for the region offers a good opportunity to harness the economies of scale and lower the capacity challenges. FMIS implemented across small economies offers an interesting example of such a joint approach.

Under this approach, six of 12 Caribbean countries have implemented SmartStream to assist them in budget preparation, budget execution, and fiscal reporting areas: Barbados, Belize, Dominica, Grenada, St. Lucia, and St. Vincent and the Grenadines. The SmartStream modules in use are purchasing, payables, funds control, human resources, payroll, and general ledger. The budget functionality is supported by an additional application known as the Infor Corporate Performance Management (CPM) Planning and Budgeting program and some custom-developed modules. Infor CPM Planning and Budgeting supports spending agencies in online submission of budget proposals and the MOF in consolidating and finalizing the national budget. Budgets approved in the CPM application are transferred to SmartStream for budget execution.

The system was developed under the Supporting Economic Management in the Caribbean program, known as SEMCAR and financed through Canadian assistance. Its deployment is decentralized. Each economy has deployed a stand-alone installation of the common application.

The system could not get the optimal utilization or benefits due to several reasons. Most significant among these was the lack of standardization across jurisdictions. Member countries insisted on country-specific requirements. In addition, each country had its local systems for which integration of a common system was challenging. The reform path also varied across the countries, further necessitating country-specific customization of the common system. A much stronger coordination mechanism, orchestrated through deep donor engagement, could maximize the potential benefits under these settings.

### **3. TECHNIQUES TO ASSESS THE ROLE OF BUDGET COVERAGE AND SYSTEMS UTILIZATION IN A FMIS**

A comprehensive diagnostic and successful design, procurement, and implementation are all important steps in the reform process. Ultimately, however, the usefulness of the FMIS to achieve PFM objectives will depend on its budget coverage and usage. In many jurisdictions, the coverage gaps are substantial and limit the system used as an effective fiscal discipline tool.

To optimize PFM outcomes, governments need to close some of the major loopholes. These include: (i) single-line budget transfers to subvented or self-accounting entities; (ii) revenues that do not flow through the TSA; (iii) EBF processed through stand-alone systems; (iv) recording an incomplete chain of budget execution transactions, with gaps on recording commitments (both in-year and multi-year commitments), and goods receipt note details; (v) delayed recording of invoices (due to no availability of funds and as a result, lack of information transparency on arrears).

The FMIS would only be effective if the budget execution is subjected to expenditure controls applied through the system. Used in this manner, FMIS systems can render high returns by providing the backbone for effective public expenditure management. If not used properly, the system could give the illusion of prudent expenditure management and legitimacy without providing for the improved PFM performance.

#### **Transactions Database and Transaction Profile**

The actual transactions database underpins coverage and utilization. The foundation of expenditure data comes from the transaction profile. Harvesting and analyzing it provides critical insight into the governing political economy and an opportunity for a more targeted engagement.

#### **Calculating Budgetary Coverage in FMIS**

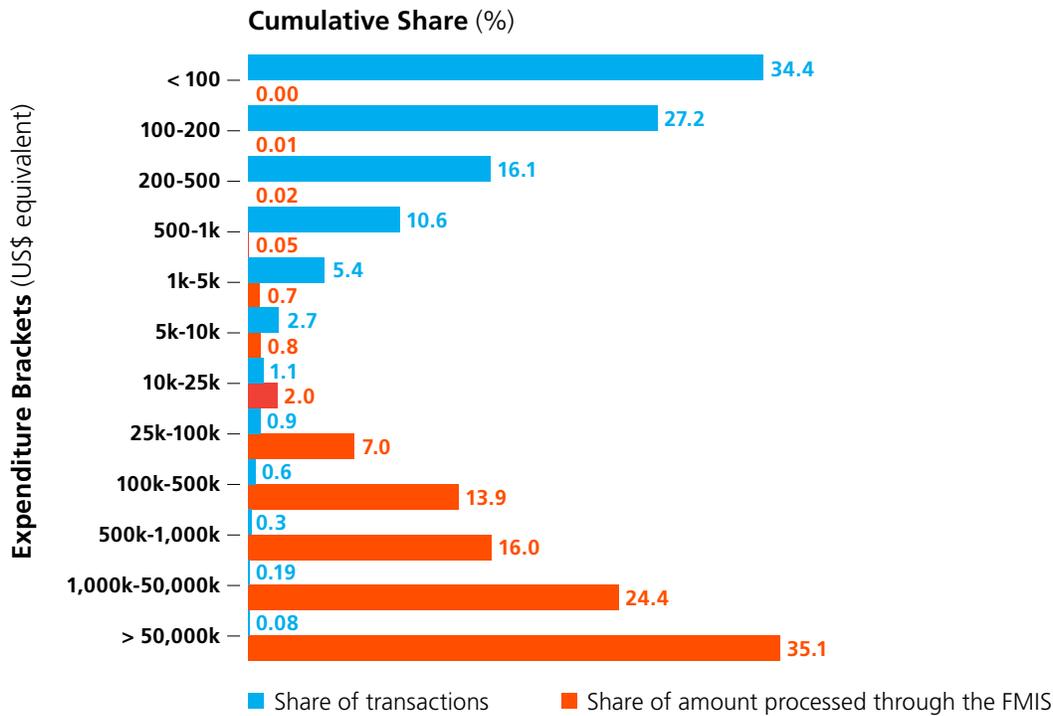
Calculating FMIS budget coverage requires the summation of the value of all expenditure transactions routed through the FMIS in a given fiscal year, and subsequently dividing these by the total approved budget reported by the government.

These figures can be calculated for the general government as well as provinces or other subnational levels of government separately. They then give an idea of the geographic spread in coverage of the FMIS and the distribution of the usage of budgetary resources across the country, allowing the analyst to assess what percentage is spent at the center and what at other levels of government (e.g., provinces).

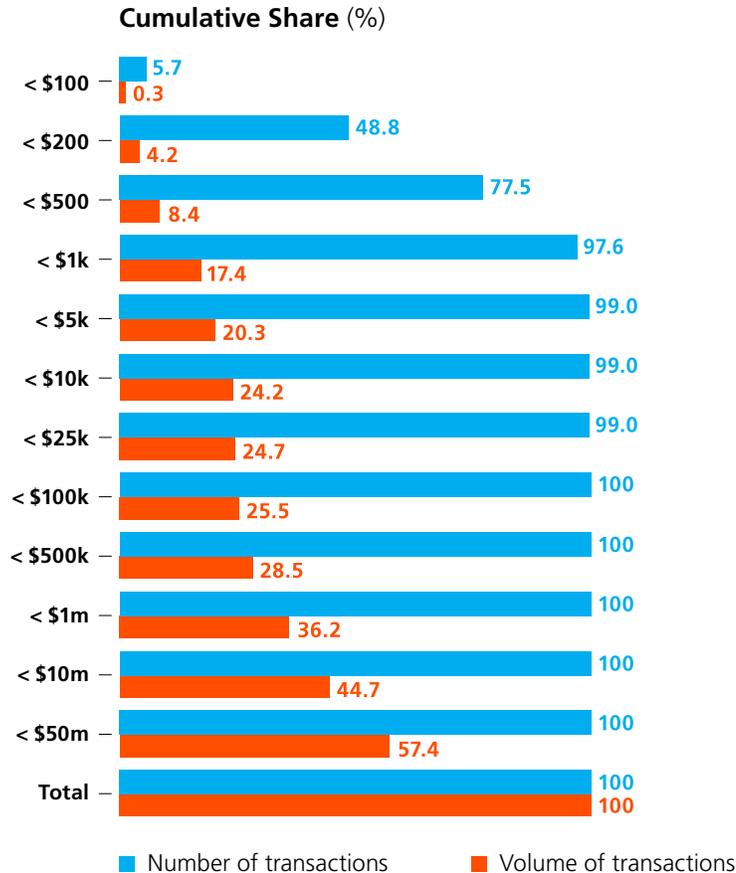
#### **Developing an Expenditure Transaction Profile**

The transaction profile is a measure that gauges how all government expenditure transactions are distributed by size. This requires the calculation of the number of transactions, percent of transactions, the cumulative share of the number of transactions, and the cumulative share of the amount processed through the FMIS for specific sets of transaction ranges (see figures 10 and 11 and table 3).

**Figure 10. Typical Expenditure Transaction Profile**



**Figure 11. Sample Transaction Profile by the Number of Transactions and Volume of Budget**



**Table 3. Characteristics of Transaction Profiles for a Select Group of Countries**

Country or Province	Fiscal Year	Transactions (number)	High-Value Threshold: Transactions Greater than (US\$)	Share of Transactions (percent)	Share of Total Amount Disbursed through FMIS (percent)	Low-Value Threshold: Transactions Less than (US\$)	Share of Transactions (percent)	Share of Amount Processed through System (percent)	Budget Coverage: High > 80%; Medium 70%; Low <20%
China, central government	2015	8,299,405	15,650	7.6	86.4	1,564	69.0	2.70	High
Ghana	2015	<b>13,210</b>	<b>285,700</b>	7.2	91.8	1,450	44.5	0.16	Low
Vietnam	2015	N.A.	21,900	7.7	88.1	2,190	78.6	4.25	High
Pakistan, federal government	2016–2017	625,596	4,000	3.6	87.3	170	53.0	1.16	Low
Balochistan, province	2016–2017	239,708	4,000	3.7	85.8	170	48.0	1.90	Medium
Khyber Pakhtunkhwa, province	2016–2017	339,248	4,000	5.8	87.1	170	54.0	1.93	Medium
Punjab, province	2016–2017	861,031	4,000	3.9	73.8	170	52.0	2.42	Medium
Sindh, province	2016–2017	571,189	4,000	9.1	89.2	170	43.0	6.70	Medium
Afghanistan	2017	343,550	25,000	8.6	86.0	500	42.2	0.51	Medium
Cambodia, central government	2017	<b>19,004</b>	<b>100,000</b>	<b>19.1</b>	90.7	1,000	7.8	0.02	High
Cambodia, provinces	2017	198,470	5,000	<b>15.5</b>	89.3	1,000.00	46.8	1.71	High
Lao PDR, central government	2017	41,805	25,000	<b>20.0</b>	88.1	1,000	30.8	0.40	Medium
Lao PDR, provinces	2017	79,103	25,000	<b>18.2</b>	85.4	1,000	43.4	1.26	Medium
Philippines	2017	3,074,343	10,000	8.0	93.6	200	41.0	0.24	High
Sierra Leone	2017	<b>9,678</b>	<b>100,000</b>	<b>11.4</b>	86.1	1,000	24.5	0.11	High
Somalia	2017	<b>12,347</b>	25,000	<b>30.7</b>	91.0	1,000	17.1	0.31	High
Bangladesh	2017–2018	5,728,357	5,880	4.8	87.0	353	73.0	4.86	Low

These techniques can be incorporated in a methodology that investigates how to estimate overall FMIS budget coverage for a given country, and how to develop an expenditure transaction profile for the government.

For many countries, a few transactions comprise a large proportion of the budget expenditures. A rough estimation of this proportion is 20:80 (i.e., 20 percent of the transactions make up 80 percent

of the budgetary expenditures). In some large countries, this distribution was found to be even more skewed (i.e., 8–12 percent of transactions totaling 90–95 percent of the budget). The remaining larger percentage of the transactions typically falls in the lower amount ranges.

## Using the Results of Transaction Profile Analysis to Assess FMIS Implementation and Formulate Systems Deployment Strategies

An analysis of the transaction profile for a country over a defined period can point toward deficiencies in utilization practices that could be strengthened and have a real effect on improved expenditure management in a short period of time. The results of the analysis could be used to identify specific steps that need to be taken to focus on further reform efforts.

Specifically, the characteristics of the transaction profile for a country can be used to formulate systems deployment and control strategies that focus initially on these high-value transactions. Such a strategy would yield useful results early in an FMIS rollout phase. This could be done by stressing that transactions above this amount be routed through the treasury system directly. It is important to recognize that maintaining accountability for low-value transactions and capturing them in the treasury system continue to be important. For fiscal discipline, capturing high-value and risk-prone transactions is key. But to produce comprehensive financial statements, full transaction coverage (including low-value transactions) is necessary. However, the modality through which these are captured may differ with the country context and the reliability of the internal control environment in the ministries.

The transaction profile also can be used to investigate the granularity of the transactions. This enables an assessment of whether the system is being used for retail transaction processing or just for drawing out advances from the treasury, which are then processed offline and not through the system. In this way, the transaction profile can indicate whether there is a wider control problem with the payment approval process in a country. Thus, if the FMIS does not capture some of these transactions (as was the case in some of these countries, such as Pakistan), the FMIS will forgo the opportunity to control such high-risk expenditures at a very low cost.

Similarly, the number of low-value transactions routed through the FMIS is revealing. If the number of low-value transaction is few, as was the case in Cambodia, it raises the question of how they are executed. Large projects or program advances routed through the FMIS will still give expenditure control at the aggregate level. But the FMIS does not provide for the integrity in expenditure data it otherwise would and cannot guarantee funds were spent according to appropriations. Low-budget capture was also identified as a problem in Bangladesh and Ghana. In many jurisdictions, a large proportion of funds are disbursed through FMIS as advance payments into the commercial bank accounts of the spending units and spent outside FMIS controls. Reforms in these practices would improve effectiveness of FMIS controls. These issues were identified in Liberia, Oman, Sierra Leone, and Somalia.

In practice, if one can determine the threshold of transactions that would yield high budget

coverage (e.g., 90–95 percent), then it would be possible to target stricter ex ante control to those transactions. This would ensure high coverage and provide confidence in a government’s commitment to fiscal expenditure rules.

The following provides two examples of how this information could guide an effective expenditure management reform: risk-based and sequenced deployment strategies and a differentiated risk-based control strategy.

### **Risk-Based and Sequenced Deployment Strategies**

Risk-based and sequenced deployment strategies that focus on high-value transactions could enable expedited results during the implementation of FMIS systems early in the rollout phase. Once the principle of this selective control is agreed the following steps could be pursued:

- Ensure all transactions generated at the central MOF, such as fiscal transfers, subsidies, and debt service payments, are routed through the central FMIS system.
- Ensure all receipts are recorded in the system.
- Ensure all payroll, civil service pensions calculated by the respective central systems are routed through the FMIS. These would likely constitute some 30–40 percent of the total budget.
- Ensure all payments from line ministries or spending units above the transaction threshold are routed through the central system following an ex ante commitment control process.
- Ensure all other government-to-person payments, including social welfare payments calculated by the social welfare payment system, are routed through the FMIS to be paid out of TSA, irrespective of the channel of payment delivery — mobile payment, direct transfer to the bank account of beneficiaries, or debit card.
- Process lower value transactions through the systems with less stringent controls designed according to the context. Such a deployment strategy would take less time and a fraction of the cost of a traditional deployment strategy that aims at comprehensive coverage. This focused, risk-based strategy could be the first phase of a more comprehensive FMIS reform engagement with tangible results early in the process. It would also be useful for audit departments in developing a risk-based audit methodology. Donors could support such a phased implementation process and secure financing of the second phase conditional on the successful completion of the first.
- In some contexts, where controls are weak, a no-exception policy on commitment control would be more suitable.

### **Differentiated Risk-Based Control Strategy**

A differentiated risk-based control strategy can target resources for maximum impact. A purposeful decision is made to subject low-value transactions to less stringent ex- ante control than high-value

transactions. This would enable easier access to small amounts of money that spending units need for their day-to-day operational needs. This strategy could be most useful for service delivery sectors with rapidly changing needs, such as health or education. It would preempt a situation where health clinics or schools struggle to access small amounts of funds in a timely manner because of excessively rigid controls. The calculation of the expenditure transaction profile for a country would enable a method to propose a low-value threshold for such operations and to assess the total “exposure or risk” of processing these transactions on an ex post control basis. Various methods could be used to facilitate access to small amounts of money to service units and the processing of low-value transactions. For example:

- Issue of purchase cards, with limits on the total amount and the size of individual transactions, to selected staff and managers of these units. This preferred modality would not compromise the integrity of the transaction if interfaced appropriately with the FMIS.
- Leveraging the banking system whereby small amounts of money can be transacted through designated banks that are reimbursed ex post. This would be a modification of the classical imprest account process.

These techniques can be incorporated in a methodology that investigates how to estimate overall FMIS budget coverage for a given country, and how to develop an expenditure transaction profile for the government.

For many countries, a few transactions comprise a large proportion of the budget expenditures. A rough estimation of this proportion is 20:80 (i.e., 20 percent of the transactions make up 80 percent of the budgetary expenditures). In some large countries, this distribution was found to be even more skewed (i.e., 8–12 percent of transactions totaling 90–95 percent of the budget). The remaining larger percentage of the transactions typically falls in the lower amount ranges.

#### **4. GOVTECH, USE OF DISRUPTIVE TECHNOLOGIES, AND FMIS**

Disruptive technologies can potentially transform governments. The exponential pace of disruptive technologies is creating unprecedented opportunities and challenges for governments around the world. Technologies such as cloud computing, big data and machine learning, analytics, robotic process automation, AI, mobile apps, internet of things, blockchain, and portals have the potential to accelerate development outcomes in every area of government activity.

In this context, governments should maximize opportunity by exploring the potential use of these technologies within an overall FMIS architecture. These technologies should not be seen in isolation as MOF-specific initiatives. Instead, a whole-of-government approach is needed to maximize opportunity and reduce risks.

To promote this approach, the World Bank has launched the GovTech Global Partnership to convene stakeholders for more concerted action. GovTech is a whole-of-government approach

to digitalization that supports core systems, service delivery, and citizen engagement. It envisions human-centered service delivery using traditional and disruptive technologies. Instead of ministry-focused systems, systems like FMIS should facilitate and promote service delivery, including government to business payments and online payment for e-services linked to backend systems. These systems should support citizen engagement through sharing public financial information and providing channels for citizen feedback in policy decisions, including budget formulation. GovTech provides an overarching framework for digitalization across the government, including core systems like FMIS. This will require a new approach. Key principles of this approach, which are equally applicable to FMIS development, are:

- **Citizen-centric approach:** The system design should be citizen-centric, rather than ministry-centric, as exemplified above.
- **Platform approach:** Instead of acquiring ministry-specific systems like FMIS, a whole-of-the-government platform for financial management, payroll, accounting, and other digitization should be adopted to leverage the economies of scale.
- **Open data:** Systems should share information with other internal systems and give access to the private sector through open APIs. This will promote the development of local ecosystems of IT startups which can use these data for developing products and services for citizens. Countries that rank high on the United Nations e-Government Index (e.g., Australia, Denmark, Singapore, United States, and United Kingdom) have successfully adopted open data standards and share data with the public in a machine-readable format through the open APIs.
- **Center of excellence:** Instead of creating ministry-specific IT units, a whole-of-the-government center of excellence should be created to promote economies of scale and standardization. Application-agnostic IT components, such as servers, operating systems, networking, storage, security, and disruptive technologies, can be assigned to the center, while business process, application-specific support could continue to reside in the MOF.

One key element of GovTech is the promotion of disruptive technologies, as the World Bank supports its client countries in backend systems like FMIS. Short descriptions of potential use cases of these technologies within an FMIS architecture follow.

## Cloud Computing

Many elements of the technology architecture are now available as cloud-based services from independent service providers, which can obviate the necessity of procuring these items separately for each project. These include the hardware platform and infrastructure and application software. The availability of these services and any government restrictions on their use need to be explored in detail for specific projects.

Key benefits of cloud computing include cost, elasticity, and security. Cloud computing could be significantly less costly than purchased hardware. The cost per unit decreases almost every year as

computing power gets cheaper. From 2014 to 2017, Amazon cloud cost dropped from 57 percent to 73 percent (Rallo 2018). The computing power is elastic — it is adjusted automatically according to the need. Unlike for purchased servers, the government does not need to buy upfront computing power that will be needed only in a few years. The security software and hardware could be very expensive and unaffordable beyond a certain point if purchased. Software and hardware also require frequent updating. Cloud computing can implement these security features, affordable to the clients, as the cost is distributed over multiple clients.

A key feature of security implementation under these arrangements is the shared responsibility concept. Under this concept, the security responsibility is shared with the vendor. The government or the client takes responsibility for aspects that fall within their domain — security policy, policy monitoring, user access, and oversight — whereas the cloud provider takes responsibility for the rest, including server-side encryption, hardware, software, patches, and other protocols and standards.

Besides cost and security, the potential use of machine learning (ML) and AI is another motive for private firms and governments to adopt cloud computing. Stand-alone data centers in most legacy environments are not optimized to support requirements for large data sets required for cross-domain analysis enabled through ML and AI, which provides an additional justification for adopting cloud computing.

Cloud applications and services are grouped into three types: Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS).

- **IaaS.** Simply put, it is like renting the servers. The government could host its FMIS on the cloud-based server. The cloud vendor charges the government based on the use of computing resources, e.g., \$70 per 70 terabytes per month. The government does not need to estimate or size the servers, as the computing resources are automatically adjusted according to the requirements.
- **PaaS.** This is renting the application development and testing platform. The government does not need to buy the programming languages or libraries to develop custom software.
- **SaaS.** The government could rent an FMIS or any application software package such as the customer relationship management software. Due to customization requirements for FMIS and payroll in most governments, this option has not been widely used for these applications.

Some governments are reluctant to embrace cloud computing, not because of technical issues, but mostly because of nontechnical issues. These include a mindset change from capital expenditures (CapEx) to operational expenditures (OpEx), job security concerns of IT staff, trust in the country of jurisdiction of the hosted solution or cloud data center, and legal issues. The legal issues in most of the settings are presented to abstract the other nontechnical issues. Key concerns on legal issues are data residency and sovereignty.

Some countries have identified the risk under which the U.S. government puts sanctions on a country or a U.S. court issues subpoenas and demands information from the cloud vendor which the

client government does not allow to be shared, and the applicability of laws of the country on the data hosted on the cloud. This reflects the fact that the largest cloud vendors — Amazon, Google, and Microsoft — are based in the United States.

The Clarifying Lawful Overseas Use of Data Act or CLOUD Act, promulgated in the United States in 2018, has helped clarify some of these issues. The act provides mechanisms for the cloud vendors to reject or challenge if the U.S. government or court requests data pertaining to a foreign country and the request violates the privacy rights of the foreign country. If the data center of the cloud vendor is located outside the United States, the applicable local laws will apply regarding data privacy and access. The U.S. government, through a bilateral data-sharing agreement with foreign governments, could request any relevant data directly from the foreign government. Such a request would be governed by the bilateral agreement.

Some governments are following a hybrid approach to cloud computing. The hybrid approach is adopted in two different ways — data classification and containerization. Under the data classification design, the confidential data is hosted on-premise while nonconfidential or lesser sensitive data is hosted on the cloud. Under the containerization approach, the data are hosted on premises in low-cost data containers, while major data processing and services load is shifted to the cloud. These arrangements should be tailored to the context to maximize the opportunities mentioned above. The U.S. government has saved more than \$1 billion, since the Data Center Optimization Initiative was launched in August 2016, to shift the focus to optimizing agency data centers by requiring, among other things, that agencies consolidate inefficient infrastructure, optimize existing facilities, and transition to more efficient infrastructure, such as cloud services (GAO 2018).

For cloud computing to be mainstreamed, a mindset change from a CapEx model to an OpEx model is needed in the World Bank's project designs and client support. The operational expenditures for cloud fees could be paid in advance using project funds. Some vendors, including Amazon, accept advances up to 3 years, which are adjusted in their periodic invoices according to usage. Opportunities for a longer-term advance of up to 5 years could be explored to support the client's needs. Cloud services should be built into the turnkey contract for FMIS implementation. The vendors could be asked to submit a proposal based on cloud computing, and invoices paid based on actual usage of the service.

## **Analytics and Artificial Intelligence**

The AI revolution offers immense opportunities for the public sector to harness its potential. To embrace this revolution, many advanced digital governments, such as China, Germany, the Republic of Korea, Singapore, United States, and United Kingdom, have issue AI strategies to maximize the opportunity and improve their performance and effectiveness. Use of AI in most public sector settings would mean human-machine interaction, rather than replacing humans. Governments can use AI in three different ways:

- efficiency — perform repetitive or effort-intensive tasks;

- controls — reconcile data from multiple source systems to identify corruption, fraud, and control weaknesses; and
- analytic reporting and transparency — combing and cross-referencing information from multiple sources and presenting them for better resource management and transparency.

The discussion in this chapter narrowly focuses on the areas only relevant to FMIS. FMIS can be the backbone of a wider PFM architecture (figure 7) that enhances efficiency, strengthens controls, and promotes management reporting and transparency. MOF could deploy analytics and potentially AI tools on top of a common repository of all the relevant information from multiple data sources, including FMIS. All the systems do not necessarily need to interface directly with FMIS. This data repository could be a data warehouse, big data, or data lake and gather information through the streaming APIs.

### **Efficiency of Accounting**

AI applications embedded in modern enterprise resource planning systems can increase the efficiency of accounting in many ways. They can automate the closing of the books much faster by converting data into accrual entries — converting purchase order data into posted accruals. They could automate journal entries through mass posting. They could also auto-suggest economic classification based on the description of the item in the purchase order. In Brazil, in an hour, the government was able to identify 10,000 suspicious reimbursement vouchers out of the total 2 million vouchers using AI (Cordova and Gonçalves 2019). Some governments use chatbots to provide user support for broader service delivery, but the potential of chatbots to augment the technical support and helpdesk for FMIS should also be underlined.

### **Analytic Reporting for Service Delivery, Resource, and Performance Management**

Data from multiple systems could be aggregated to get policy insights for data-driven policy decision making. The sources of data for big data could be FMIS, e-invoices (unstructured data), debt, assets, geography or district information, service delivery data (from the health and education sector, for example), social and environment sector data, and any other data sources. The data from multiple systems could be cross-referenced to produce spending analysis reports together with program performance reports. Analytics applications can cross-reference program performance data from service delivery systems with the FMIS data on spending — number of children vaccinated (e-health) and district-wise spending comparison on vaccination or facility-wise comparisons of the per-unit cost of malaria screening — to produce compelling reports that enable data-driven management. Specialized analytics applications (e.g., Zenysis) have developed standardized adapters to integrate multiple service delivery systems in the health sector, FMIS, and payroll systems to deliver analytics and dashboards with support.

For higher management, some of these reports — tracking public investment project execution, fiscal deficits, borrowing, cash position, and budget execution report, for example — could

be visualized through the dashboard as part of the decision support system. For operational management, these reports could be shared with line ministries and agencies (e.g., budget execution report). The auditor-general could be given access to these reports and the capabilities to identify abnormal transactions that look suspicious and can be investigated.

## Transparency and Citizen Engagement

These reports could be used not only for internal resource and performance management but could also promote transparency and citizen engagement. MOF could publish these reports on the government portal - as open data and open government initiative - in a machine-readable format to strengthen citizen engagement and social accountability. Citizens in many countries, such as Israel, Kenya Mexico, United Kingdom, and United States, have access to open data.

Without good data, it is impossible to hold governments accountable for the decisions they make, the policies they pass, and the money they budget and spend (Open Data Barometer 2017).

## System Controls

Fraud and corruption-related red alerts and reports could be generated to combine data from FMIS, payroll, e-procurement, and other systems. (See box 3.)

### **Box 3. Anti-Corruption, Fraud Detection, and Artificial Intelligence**

A financial management information system (FMIS) can strengthen anti-corruption efforts in different ways. It can promote fiscal transparency, strengthen a controls framework, and support detection, investigation, and prosecution of corruption. However, their effectiveness will largely depend on analog components: institutions, policies, regulations, and political economy. Underpinning all these technical interventions is the commitment that can drive a coordinated effort to curb corruption.

FMIS generated fiscal reports and data should be open, published as part of open government, and made downloadable and machine readable. Civil society, media, academia, citizens, and nonprofits can use these data to trace spending, outcomes, and possible illicit transactions. Fiscal transparency is associated with less perceived corruption, according to a study using empirically tested data from 95 countries from 2006 to 2014 (Chen and Neshkova 2019). It also found that the fiscal transparency of budget execution and audit has a more significant effect on corruption perception than budget transparency.

### **Controls**

FMIS should be configured to support segregation of duties and mark changes in the master data. These areas are among the most critical for preventing and detecting fraud and corruption. FMIS could send alerts or produce reports on spurious activities to the relevant authorities. A few alert scenarios involve changes to vendor and invoice data.

- Vendor. New vendor or dormant vendor with a sudden spike in large payment activity associated with approval by one or very few employees; vendors whose bank accounts or alternate payee field information changed and reverted to the original within a short period; manual payments to vendors outside the FMIS leading to unreconciled payments; direct payment method to pay large amounts to vendors without a purchase order, goods receipts, or invoice.
- Invoice. Duplicate invoice numbers with the same vendor ID, tax ID, or value-added tax number; invoices from the same vendor having large payments with rounded amounts or with sequential invoice numbers; invoices without a corresponding purchase order number; split payment of invoices.

Other alerts could include multiple approval steps by the same employee or by different user IDs using the same IP address, unusual quicker payments, and mismatches of invoices, goods receipts, and purchase orders.

Access descriptions of these scenarios at [https://help.sap.com/doc/saphelp\\_fra120/1.2.1.0/de-DE/27/46eb53bf7ca647e10000000a4450e5/content.htm?no\\_cache=true](https://help.sap.com/doc/saphelp_fra120/1.2.1.0/de-DE/27/46eb53bf7ca647e10000000a4450e5/content.htm?no_cache=true).

### ***Analytics***

Artificial intelligence tools and analytics offer immense opportunities for anti-corruption. These tools can process large data sets from multiple systems and reconcile, cross-reference, aggregate, and present them to identify spurious patterns.

## **Robotic Process Automation**

As one type of AI application, robotic process automation (RPA) can perform repetitive tasks to enhance efficiencies and free up human resources for higher value tasks. For example, some governments (e.g., Portugal) share-service centers where vendor invoices from line ministries are processed in FMIS. RPA tools can do invoice processing and many other tasks previously done through data processing staff. These tools act like humans — log into FMIS, open the invoice processing screen, open the invoice, and copy and paste the invoice information into FMIS, after ensuring an invoice is posted against a valid purchase order. The data processing staff could be deployed to focus on more complex invoices or carry out more value-added tasks. Similarly, bank reconciliation or data back-up tasks can be performed through RPA tools.

RPA can also extract or pull information from multiple data sources, such as the financial systems and FMIS of state-owned enterprises, to post it on the government website in a user-friendly format to promote transparency and citizen engagement. Similarly, the cash management unit can carry out cash planning better if the RPA tools are used to pull up information — commitments, invoices, and expenditures — residing in multiple data sources in some settings, and upload it in the cash management module on a weekly basis. This task is too onerous in some settings where numerous

stand-alone systems at the ministry and agency levels are storing this information. It is very difficult to constantly follow up to obtain information manually at this level of periodicity.

## Blockchain or Distributed Ledger Technology

In many jurisdictions, assets recording is done in entity-specific systems. These systems could number in the dozens if not hundreds. Assets are transferred from one entity to another, but full asset tracking is not available. Each entity keeps asset information needed for its own operations, but an overall asset picture is not available for better asset tracking, recording, and managing. Integrating multitudes of asset management systems is economically and technically not viable. The asset information is needed in FMIS, especially in accrual accounting settings, as stock flows need to be reflected in FMIS.

Blockchain technology offers potential opportunities to overcome these problems. It is based on distributed ledger technology (DLT), in which each entity shares a copy of the ledger, e.g., asset ledger. The recording on the ledger is based on consensus, which can be designed based on the business requirements, unless consensus among all parties is not needed. The DLT could be private — only authorized users can have access to the DLT. The U.S. Department of the Treasury's Bureau of Fiscal Services is piloting the use of DLT to monitor the movement of physical assets to overcome these problems.

Another use case for DLT is IGT clearing. Agencies carry out functions on behalf of each other and record the related accounting transactions in their siloed systems. These transactions are needed to be cleared to eliminate double booking and reflect accurate accounting. Due to the difficulties of siloed and fragmented systems, and lack of process clarity, this process is either not performed or performed inconsistently, leading to financial reports that do not give a fair presentation of government statements. Using DLT and SmartContract, the government can explore establishing an automated IGT clearing process. While FMIS could be the main system of record for the government, DLT could provide the clearing ledger, linked to the financial statements consolidation systems.

## FinTech

Innovations in the financial technology (FinTech) sector, such as the use of mobile money or smart cards, hold potential to send funds digitally to lower-level service providers, without compromising accountability or transparency. These could be funds for small operational expenditures that are typically sent as advances. The use of mobile money or smart cards would expedite these transactions, while providing central oversight and ensuring there is integrity in spending and reporting. Funds executed through such vehicles could automatically be integrated with the FMIS at the next level of the administration, thereby ensuring comprehensive budget execution reports.

## Mobile Apps and Other Opportunities

Mobile apps can be developed to collect information on program performance — children vaccinated, malaria screenings done, site surveys carried out, and road works completed — and link it to FMIS performance management modules for program budgeting. Apps can also be developed for managerial needs — online reporting on cash balances or budget execution. Many other opportunities exist for more citizen-centric FMIS usage. FMIS can send text message alerts to vendors when the payment has been processed. Employees can be sent salary slips en masse as email attachments in their inbox. Tax authorities can be sent information on vendor payments to enhance tax compliance.

## 5. CONCLUSIONS

There are several critical success factors and key failure points in the design and implementation of FMIS reform. Specifically, a fully functional FMIS, from a technical standpoint alone, is not a sufficient condition for it to serve as a good budget management tool. In many cases, reforms would be most effective if they pertained to expanding the comprehensiveness of treasury single account, budget, and FMIS coverage (and its associated controls), rather than additional technological investments. A programmatically coherent engagement across all cycles in the conceptual framework is required to achieve the expected improvements in budget management. Outcomes are unlikely to be achieved if one or a combination of the dimensions, activities, and tasks within the chain is violated.

The integration of existing solutions merits special attention. Most countries have invested heavily in digital solutions for budget management over the past two decades, largely through World Bank funding. Here, second- or third-generation reforms may be necessary. Implementation teams need to consider existing levels of FMIS investments and provide guidance on how to leverage these investments using emerging technologies while keeping a focus on the basic reforms like expanding usage to maximize budget coverage. Therefore, before embarking on an FMIS reform program, it is necessary to:

- carry out a diagnostic of the existing systems and their usage to highlight areas of deficiency and to develop a more targeted program for further improvement; and
- conduct a more detailed analysis of the transaction ecosystem to determine FMIS coverage and application of its controls.

A set of questionnaires have been developed to conduct an analysis, which could be useful to task managers to assess the baseline status of the FMIS ecosystem in a country, identify specific areas of weaknesses that require special attention, and assist them in project design and implementation. Questionnaires are found in appendix C.

To put lessons learned into practice, the operational note provides the prerequisite checklist and some standard narrative, which task teams and project managers can use to review, design, appraise,

and evaluate FMIS projects. The note aims to incorporate new thinking in the approach by World Bank teams to FMIS implementation and contribute to improved integration of existing, fragmented budget management solutions. Greater use of emerging technologies, such as data analytics and cloud computing, leveraging of the banking network, and the use of digital payments using credit cards or mobile money, are some of the emerging areas of interest for stakeholders.

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## APPENDIX A. BUDGET CLASSIFICATION AND CHART OF ACCOUNTS

Budget classification (BC) is one of the most fundamental building blocks of a budget management system. It provides a cohesive framework for classifying and recording transactions in a financial management information system (FMIS). Aggregation of these transactions provides multi-dimensional views/reports on the budget management, central to enhancing transparency, macro-fiscal analysis, policy decision making, controls, and comparability.

It is pertinent to make a distinction between BC and the chart of accounts (COA). While BC refers to the coding structure for budgetary purposes (entity, functions, programs, and fund), the COA refers to the coding structure for financial accounting (wages and salaries, goods and services, transfers, grants, interest, and others). It is important for BC and the COA to be integrated to present a coherent picture of the budget. It should be noted that it is the economic classification that links the budget and accounting classification. This integration is developed through a comprehensive code, which varies in each jurisdiction, ranging in length from 24 digits to 70 digits, containing all the segments of the BC and COA.

The key principles for designing the classification system and chart of accounts are adapted from International Monetary Fund publications (Cooper and Pattanayak 2011; Jacobs, Héris, and Bouley 2009) and include:

### Comprehensiveness

Comprehensiveness should be both in terms of entity as well as accounting transaction type. COA and BC should be applicable to all the entities within the scope of the “reporting entity.” If some entities — for example, local governments, subvented entities, and revenue agency — need detailed codes for their own reporting requirements, these detailed codes should still be defined within the broad structure of the central BC and COA. If these entities are using a central FMIS, the COA should meet the requirements of all these entities. If these entities are using separate systems and need to provide information to the central entity for consolidated financial statements, the local chart of accounts in these separate systems should align with the broader structure of the central COA.

To comply with the reporting requirements of the International Public Sector Accounting Standards, the coverage of the BC and COA could be extended beyond the budgetary entities, at least at the higher levels of the chart of accounts.

The COA should also cover all the accounting transactions — revenues, expenses, assets, liabilities, and equity — to produce financial statements.

### Integrity

Internal consistency among the various segments and within a segment of the BC and COA is

extremely important to ensure integrity of information to produce coherent and reliable reports. Each segment should represent a unique concept, and each code within a segment should be used to capture discrete information, which should not be duplicated elsewhere. Table A.1 summarizes the segments or categories representing the key information perspective.

**Table A.1. Segments or Categories Representing the Key Information Perspective**

<b>Accountability</b>	<b>Purpose</b>	<b>Type</b>	<b>Objective</b>	<b>Where</b>	<b>Source</b>
Organization	Function	Economic	Program	Location	Fund

Integrity could be ensured through the concept of independence of classifications categories. Each segment is independent of each other. No code should reside in a classification category to represent a different category. A spending unit cannot be a detailed function, a program activity, or an economic classification code. This is one of the most fundamental principles, which must be ensured during the design of the BC and COA. In many jurisdictions, designing activity-based budgeting as part of the program-based budgeting (PBB) reforms, has been problematic due to the lack of independence, leading to incoherence in the COA. Many economic classification codes — training, meals, stationery, and equipment — have been defined as “activity” under the PBB structure, which compromises coherence of information and integrity of the COA and BC.

COA integrity also requires ensuring consistency with the local chart of accounts in subsidiary ledgers or systems to be integrated with FMIS. These subsidiary systems could include payroll, debt management, integrated revenue management, and asset management systems, for example. While the central COA in these areas could become a tool to control and report budget execution at the macro level, the subsidiary COA could classify and report information at a much more granular level. The alignment of the two charts would enhance the integrity of the COA. Some areas are given in table A.2.

**Table A.2. Areas Where the Integrity of the Chart of Accounts Could Be Enhanced**

<b>High-Level Chart of Accounts in FMIS<sup>a</sup></b>	<b>Local Chart of Accounts in Subsidiary PFM Systems<sup>b</sup></b>
<p><b>Compensation of Employees</b></p> <ul style="list-style-type: none"> <li>• Wages and salaries               <ul style="list-style-type: none"> <li>o Pay                   <ul style="list-style-type: none"> <li>■ basic pay</li> <li>■ personal pay</li> <li>■ special pay</li> </ul> </li> <li>o Allowances                   <ul style="list-style-type: none"> <li>■ dress allowance</li> <li>■ dearness allowance</li> </ul> </li> </ul> </li> </ul>	<p><b>Payroll System</b></p> <ul style="list-style-type: none"> <li>• Detailed codes for payments and allowances</li> </ul>

<p><b>Goods and Services</b></p> <ul style="list-style-type: none"> <li>• General <ul style="list-style-type: none"> <li>o Stationery</li> <li>o Office equipment</li> </ul> </li> </ul>	<p><b>E-Procurement System</b></p> <ul style="list-style-type: none"> <li>• The item list codes in the e-procurement system should align with the broad structure of “Goods and Services”</li> </ul>
<p><b>Revenue</b></p>	<p><b>Integrated Tax Administration System</b></p> <ul style="list-style-type: none"> <li>• And other revenue systems, depending on context</li> </ul>
<p><b>Assets</b></p> <ul style="list-style-type: none"> <li>• Nonfinancial assets <ul style="list-style-type: none"> <li>o Fixed assets <ul style="list-style-type: none"> <li>■ buildings</li> <li>■ dwellings</li> <li>■ other structure</li> </ul> </li> </ul> </li> </ul>	<p><b>Asset Management System</b></p> <ul style="list-style-type: none"> <li>• Detailed codes for each of the categories in the main FMIS</li> </ul>
<p><b>Liabilities</b></p> <ul style="list-style-type: none"> <li>• Long-term liabilities <ul style="list-style-type: none"> <li>o Loans — foreign</li> </ul> </li> </ul>	<p><b>Debt Management System</b></p> <ul style="list-style-type: none"> <li>• Will have detailed codes for each loan, for example</li> </ul>

- a. Aligned with the structure of the International Monetary Fund’s Government Finance Statistics Manual 2014 at levels 1-4, depending on country context.
- b. Detailed codes aligned at higher level with the FMIS structure.

## Flexibility

The BC and COA should be flexible to reflect local context and evolving requirements. Even for the classification categories — where standardization with the 2014 Government Finance Statistics Manual of the International Monetary Fund is expected in the two segments of economic classification and functional classification, called Classification of the Functions of Government (COFOG) — the existing functional or economic classification codes in a country can be mapped within the broad structure at the last detailed level.

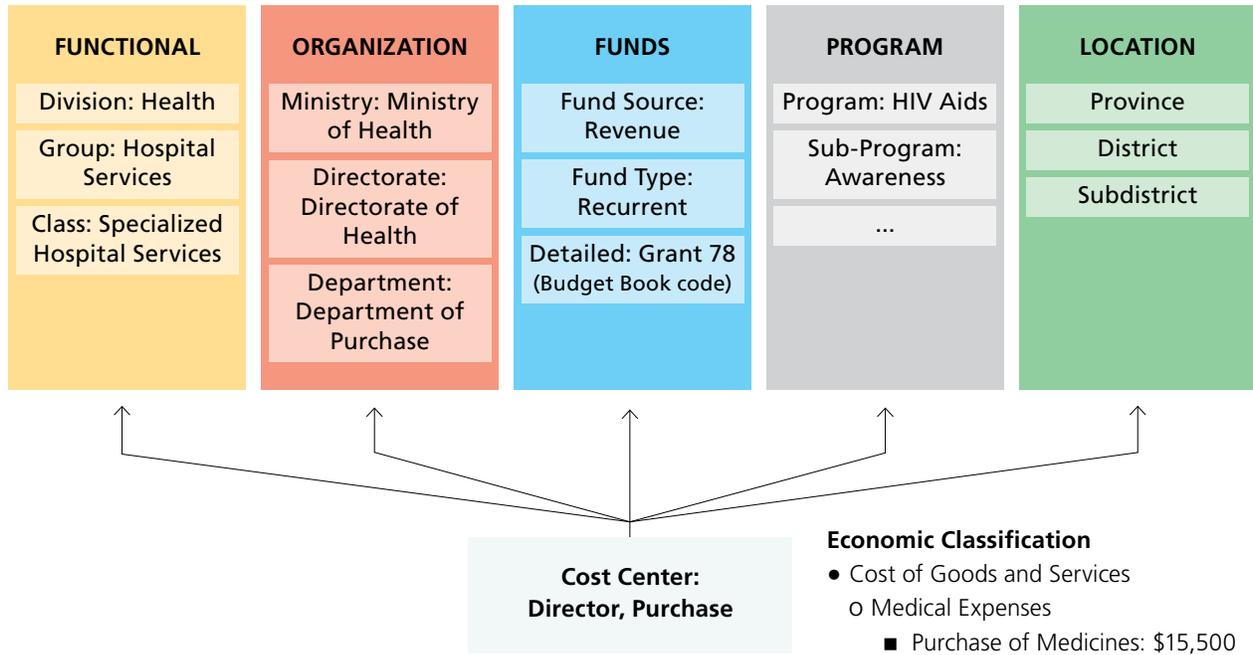
Considerable flexibility exists in defining the structure of the remaining segments — entity, fund, program, and location — which do not require any standard or compliance and are meant to reflect the local context. In addition, the design could also combine some segment codes, depending on the analysis. For example, in some countries, the location code is part of the administrative classification, or programs are part of the function code. Finally, the BC and COA are living documents, and should be constantly updated to reflect the evolving realities, such as changes in ministry structure. The coding scheme can be defined according to the local requirements. In some countries, it is too detailed and could go up to 70 digits, while in others, it could be considerably less detailed.

## Consistency

The classification of transactions should be applied consistently and can be achieved through automated mapping of codes and user training. FMIS systems should be configured to ensure that the users select only the basic transaction level information at the time of recording the transaction: spending unit or cost center code, economic classification code, and fund code (in some cases). The

remaining segments codes should be mapped to the spending unit or cost center in the system settings to ensure consistency of classification (see figure A.1).

**Figure A.1. Automated Mapping of Codes**



Mapping is relatively permanent. The function code, administrative code, program code, and location of a spending unit do not change frequently and can be derived automatically through the mapping. Table A.3 shows a sample of mapping done in the system settings.

**Table A.3. Sample of Mapping Done in the System Settings**

Organization	Function	Fund	Program	Location
Agriculture Research Institute, District X	Agriculture, Fishing, and Forestry Research and Development	Consolidated Fund Revenue/Recurrent/Grant for Agriculture	Agriculture Production and Productivity	District ABC
Cost Center Code	Function Code	Fund Code	Program Code	Location Code

The mapping is done only for the codes, as the system will automatically derive the description. The mapping would obviate the need to use judgment and choose these codes. It also makes the system much more user friendly as the user selects only minimum number of codes and does not need to enter full length of the code.

In some jurisdictions, COFOG can be derived from the administrative or program classification, and the Government Finance Statistics economic classification can be derived from the object codes. Other noncore financial reports can also be produced through mapping tables, for example, the sustainable development goals.

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## APPENDIX B. GUIDANCE NOTE ON THE PROCUREMENT OF FMIS

For financial management information system (FMIS), procurements involve large scale contracts of complex information and communication technology (ICT) items, including software applications, hardware, networking equipment, implementation services, and training, support, and maintenance services. Typically, FMIS contracts run for large durations, ranging from 5 to 7 years on average, often with major time and cost overruns. In addition to the requirements for high technical expertise, the vendor should also have the capacity to manage the immense logistical challenge of rolling out the system across the country in most instances. Equally, a balanced mix of ICT and project management skills is required in the contracting agency to ensure a successful FMIS implementation.

This appendix aims to provide guidance on the procurement aspects of FMIS to address the challenges outlined. This guidance is consistent with the 2016 Procurement Framework of the World Bank.<sup>6</sup> The applicability of the new Procurement Framework is contextualized to FMIS procurement, based on the Bank's international experience.

### Planning and Strategy

Good procurement planning is essential to achieve value for money (VFM). This includes an evaluation of the costs and benefits of different procurement arrangements along the procurement cycle including contract management. Sufficient time should be given for the planning to yield maximum value and procurement results. Price alone is not the only determinant. VFM approach involves a combination of factors such as evaluation of risks, adequate qualification requirements, nonprice attributes, and life-cycle costs.

The FMIS procurement plan should be part of the broader project procurement strategy for development. Having identified the need of FMIS procurement, key areas of planning include operating context, market analysis, and procurement and contract management arrangements including the identification and mitigation of associated risks.

### Operating Context

In developing the FMIS procurement strategy, careful consideration should be given to the operating context of the country. Some key factors include:

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<sup>6</sup> For more details, see <http://pubdocs.worldbank.org/en/178331533065871195/Procurement-Regulations.pdf>.

- **Political aspects.** Political considerations should be evaluated as part of the risk mitigation strategy. With a lifespan of several years, FMIS procurements can be disrupted by political changes in the country. While political support at high levels is a key success factor, broad stakeholder support has to be secured at different levels to mitigate the risk of procurement disruptions.
- **Governance aspects.** The overall legislation in general and market regulations in particular may affect procurement arrangements. For example, the potential involvement of state-owned enterprises as technology vendors has to be clarified. Fragile and conflict-affected situations, such as Iraq and Somalia, would need clarity on issues such as physical security, lodging, and other logistics. Potential disaster and emergency situations should be assessed. These may all have an impact on the readiness and proposals of technology vendors. Conflict of interest situations should be red flags. These include a key official being related to or friends with or a beneficial owner or partner of the firm interested in the bid, or a key ministry official managing and supporting a local vendor with a running contract for maintenance and support of an existing system and consistently favoring the award of contracts to this vendor on a single-source basis.
- **Economic aspects.** Competition may be affected by high inflation rates, exchange rate volatility, sustainability regulations including domestic preference, and a reputation for payment delays. These aspects need to be addressed by adequate procurement arrangements, e.g., risk-mitigating procurement approaches and contract clauses. Small island economies, such as the Federated States of Micronesia, the Marshall Islands, and Togo, will have simpler requirements, technical complexity, and rollout scope, but higher logistical and climate challenges such as cyclones. Opportunities for sharing the solution with neighboring islands through a joint procurement and governance approach should be considered in these circumstances (e.g., the SmartStream FMIS solution used by 12 Caribbean countries).
- **Government capacity.** Experience in implementing similar projects is of fundamental significance with profound impact. The procurement plan should involve assessing whether an in-house external expert with relevant experience is needed to provide operational support, while institutions like the World Bank can provide more strategic guidance. Many countries have opted to appoint an FMIS advisor or coordinator as an individual consultant to augment the implementation capacity. An important aspect of the capacity is the assessment of whether the government team has the capacity to manage the FMIS project and provide quality assurance. In most contexts, such technical assistance is provided through the consulting services firm responsible for preparing the functional requirements and specifications.
- **Network connectivity.** Broadband connectivity penetration in the country would inform the required procurement of network components. The information on connectivity, which can be collected through a short survey, would be helpful to determine procurement options and scope of the needed network components.

## **Market Analysis**

The purpose of market analysis is to understand the market on various aspects of FMIS procurement. Key elements include market research and market engagement.

Market research will help get information on the local versus international availability of vendors along the FMIS supply chain, e.g., manufacturers of IT equipment, application software developers, software and hardware distributors, installers, and maintenance providers. The market research will inform the FMIS procurement arrangements including contract packaging (e.g., turnkey versus multiple contracts), market approach options (e.g., open or limited competition), national versus international approach and selection methods (e.g., competitive dialogue, one-stage, or multi-stage bids, and proposals with or without initial selection or qualification), and different consultant selection methods.

As an example for FMIS procurements, the information may be collected among others during market research: (i) implementation partners in the country or region; (ii) cloud computing vendors in the country or region; (iii) local ICT firms and talent and skills for networking specialists, hardware engineers, COTS experts, and programmers for maintenance and support, even if the main implementation is done by an international bidder; and (iv) local hardware vendors for major equipment such as servers and networking equipment or as certified partners of the original equipment manufacturers including Cisco, Dell, Hewlett Packard, and Sun.

Market engagement is a critical element as it will help formulate vendor-neutral specifications, fit-for-purpose procurement methods, realistic vendor eligibility and qualification criteria including requirements for reasonable experience and financial strength of the vendors, and key performance indicators for contract performance. Procurement planning for FMIS should always include market engagement to raise vendor awareness and consult with interested potential bidders on potential innovative FMIS solutions. Vendor confidence will be raised if they feel involved at an early stage of the planning phase allowing them to contribute to shaping the FMIS requirements and specifications as input to the bidding documents. This helps encourage fair competition and avoid potential complaints at the bid preparation, submission, and evaluation stages which would unnecessarily delay the FMIS procurement process.

## **Procurement Arrangements**

Two different types of contracts are typically involved in the FMIS implementation: (i) a consulting contract to prepare the functional specifications based on a business process review (BPR) and the bidding documents for the FMIS procurement; and (ii) an implementation contract. Additional contracts could involve the procurement of commodity hardware, such as personal computers, networking equipment, printers, scanners, and the selection of individual experts such as FMIS coordinators, networking specialists, and other ICT experts as needed.

Table B.1 identifies key contracts with estimated amounts, procurement methods, market approach, and nature of contract for typical FMIS procurements in most countries. These can be customized to the operating context and market analysis on a case-by-case basis.

**Table B.1. Key Contracts for Typical FMIS Procurements**

<b>Contract</b>	<b>Estimated Cost</b>	<b>Procurement Method</b>	<b>Market Approach</b>	<b>Nature of Contract</b>
BPR consultancy	\$250,000 –\$350,000	QCBS	Open international preferred	Time based
FMIS implementation	Worked on the basis of \$15,000 per user, on average	Competitive dialogue or RFP	Open international preferred; RFP multi-stage preferred	Lump sum
Procurement of commodity hardware that is inexpensive and easily available, such as personal computers, printers, and networking equipment	Worked on the basis of \$1,500 to \$2,000 per user	Request for bids	Open national preferred	Lump sum
Consulting firm or FMIS advisor	—	Individual consultant or selection of firm based on (i) quality and cost, or (ii) consultant’s qualification based selection	Open international preferred	Time based
Networking expert	—	Individual consultant or selection of firm based on (i) quality and cost, or (ii) consultant’s qualification based selection	Open national preferred	Time based

Note: BPR = business process review; FMIS = financial management information systems; QCBS = quality- and cost-based selection; RFB = request for bid; RFP = request for proposal.

Most of the discussion that follows will focus on the major contracts for FMIS: consulting, implementation, and hardware contracts. The key denominator in all these approaches is open competition to derive the best value, though some exception will always exist and should be carefully evaluated in context.

**I. Consulting Services Contract for BPR**

- **Approach to market and procurement method.** Due to complexity and specialized knowledge requirements, it is preferable to adopt an open international market approach. If local firms are available, they should be encouraged to participate in the bid. If the market analysis results in the availability of a sufficient number of world-class BPR consultants, the approach could be changed to open national market.
- **Contract packaging.** The consulting contract typically involves a diagnostic. In many jurisdictions,

a diagnostic is already available through the World Bank, International Monetary Fund (IMF), or other donors, including Public Expenditure and Financial Accountability assessments, which would obviate the necessity for packing the diagnostic in the contract.

- **BPR and functional specifications.** This involves as-is and to-be studies and preparation of the functional specifications. The business process review is of fundamental significance, as it provides opportunity to adopt a problem-driven approach, improve process controls, streamline the process, and customize the good practices to the context.
- **Chart of accounts and budget classification.** The structure as well as the detailed codes of the chart of accounts are defined in line with the BPR, IMF's Government Finance Statistics, and the disclosure requirements of the International Public Sector Accounting Standards.
- **Financial regulations.** The to-be process study would need to be incorporated into financial regulations. The financial regulations and manual prescribes the processes to be carried out in the government which becomes the basis of the audit. Therefore, consideration should be given to who will develop and update the regulations. These regulations could go through an iterative approach as some adjustments in the revised manual would be necessitated after the system has been implemented to align the manual with systems settings.
- **Procurement support.** This will involve supporting the preparation of the bidding documents, evaluation including compiling the evaluation sheets, and preparation of the evaluation report. The evaluation should be done by the government with assistance from the consultants.
- **Contract management support.** The consultant contract should also include support to the government on contract management of the FMIS implementation contract. Many issues around payment schedules, interpretation of the contract, clarifications of requirements, and scope disputes typically arise during implementation. A strong capacity for contract management is extremely critical to ensure high-quality results and contract delivery within time and budget.
- **Quality assurance and testing of the system.** Testing should be done by users, but support from consultants is needed to develop the test scripts, testing sheets, and final operational acceptance testing (OAT) report. The OAT report for each site should be within the scope, though the testing in the project's later phases should focus on site-specific developments only. It is best to retain the same firm for quality assurance and testing that had developed the functional specifications to leverage their learning of the environment achieved through the BPR, avoid multiple contracts, and avoid issues with a new firm or consultant who may raise questions about the adequacy of the previous work.
- Most of the deliverables are sequential. Therefore, it should be stated in the terms of reference that the work of the consultant will be extended to the next phase upon satisfactory performance of the previous phase.
- **Evaluation criteria.** Evaluation criteria and their weighted scores should reflect the key value

expected from the contract. In consulting contracts, staff experience and expertise deliver the highest value. There are situations in which large consulting firms with high brand value have proposed relatively inexperienced staff. The scores could vary on a case-by-case basis, but typically quality should be given a weight of 80 percent as compared to 20 percent price. These assignments are primarily relying on the capability of the consultant’s staff for both the initial design phase and the subsequent implementation support phase. The technical scores should be weighted using the criteria in table B.2.

**Table B.2. BPR Consulting Services Contract: Evaluation Criteria and Indicative Weighted Scores**

Criteria	Score
Methodology	20–40%
Firm experience	10–20%
Qualifications and experience of key staff	40–60%
Knowledge transfer	10–20%
Participation of national key staff	0–10%

## II. Goods, Works, and Nonconsulting Services Implementation Contract

- Approach to market and procurement method.** This contract will be the main FMIS implementation contract. Due to complexity, risk, and size, an open international approach is preferred. Proposals could be submitted in single stage or two stages. The two-stage approach, which typically takes 12–18 months or longer, allows the government team to see demos of all proposed products (e.g., FreeBalance, Oracle, and SAP) for comparison purposes. In contrast, the demos under the single-stage approach could be allowed only as a post-qualification criterion for the one product selected through the evaluation process. The two-stage approach gives the government team an opportunity to see multiple systems in terms of user friendliness and comparative knowledge of the technical teams involved in the demos. It broadens the knowledge of the government teams on how different vendors and technologies offer solutions to the same or similar problem (e.g., multi-year commitment). It also forecloses the argument, which has been noted in some countries, that an alternative product to the already existing one is better and should be implemented and replace the existing product. In The Gambia and Malawi, government officials wanted to discontinue Epicor. In Maldives and Pakistan, some argued that SAP should be replaced with Oracle. In Sierra Leone, some government officials wanted to discontinue FreeBalance and implement another product. The single-stage approach, however, results in time savings of typically 4–6 weeks and less coordination effort due to the absence of demos from all bidders.
- Contract packaging.** There are several elements of the contract packaging for this large and complex ICT procurement. However, the most profound decision is whether to opt for a single vendor turnkey contract or multi-vendor contracts (see table B.3).

**Table B.3. Pros and Cons when Choosing Contract Packaging**

Type of Contract	Pros	Cons
Turnkey	<ul style="list-style-type: none"> <li>• Responsibility for compatibility of software with hardware lies with the system integrator as the lead supplier.</li> <li>• Project management is less complex. Procurement, project planning, contract management, communication, and coordination are simpler as they involve one vendor and project manager.</li> </ul>	<ul style="list-style-type: none"> <li>• Favors large integration firms with resourcefulness to establish joint venture with hardware firms.</li> <li>• Dependency on one firm.</li> </ul>
Multi-vendor	<ul style="list-style-type: none"> <li>• Smaller or more specialized firms can deliver the value with less cost.</li> </ul>	<ul style="list-style-type: none"> <li>• Government’s project management more demanding and complex in terms of procurement, schedule conflicts, contract management, communication, and coordination. Component (software and hardware) incompatibility would require extra efforts to resolve the issues.</li> </ul>

- o **Turnkey contract.** Supply of application software, implementation and training services, and hardware (e.g., servers, personal computers, and networking equipment) is packaged under one turnkey contract. Under this arrangement, it should be clearly mentioned that the lead partner will be the system integrator, rather than the hardware supplier, in case the bidder is a joint venture, which is usually the case. System integration is the most critical component during implementation.
- o **Multi-vendor contract.** The procurement of application software, hardware, training, and implementation and integration services may be separately advertised and awarded individually or in certain combinations to different specialized vendors.
- o **Scope.** The bidding documents should be elaborated in sufficient detail to allow bidders develop a consistent understanding of the scope of the FMIS and provide reasonable prices. Key elements of the bidding documents include the following:
  - *Objectives of the bid.* The overall objectives of the bid should be clearly mentioned.
  - *Estimated cost.* Typically, the total amount allocated for the project is mentioned in the introductory part of the bidding document. However, distinction should be made between allocation for the total project and allocation for the FMIS component. Some governments do not disclose the cost estimate for the FMIS component as they want the market to respond with unbiased price proposals. Other governments publish the cost estimate for the FMIS component as part of the procurement plan or in the bidding document thus avoiding any potential attempt of bidders to find out about the cost estimate. If the market approach

includes options such as competitive dialogue, negotiation, or best and final offer, which all provide the opportunity to change the initially submitted price, nothing is wrong in disclosing the cost estimate upfront.

- *Functional specifications.* The functional specifications — as-is study, to-be study, and functional specifications and requirements — are a core element of the bidding documents. Requirements should be labeled mandatory and desirable after careful analysis as, too often, almost all the requirements are described as mandatory, which makes the bid too rigid. Requirements should be developed at a reasonable level of detail, but not too detailed to allow for flexible process design. All the interfaces should be specified. Security and reporting requirements should be developed as separate sections.
- *Entity scope.* All the phases of the project based on the rollout strategy should be adequately defined within the scope of the contract. During implementation, the government would need to continue using the legacy systems and processes and prepare their consolidated financial statements. The consolidation requirements through this transition, where some sites will be using the new system while some will be using the legacy systems, should also be clearly mentioned. If some remote sites, with least transaction volume, will be connected through some simple web forms rather than a full rollout of the system, such requirements should also be clearly defined. In some jurisdictions (e.g., Ghana and Zambia), the government decided to use the firm to configure the system prototype and complete the initial rollout, while deploying its own staff to carry out the remaining rollout. On the one hand, this approach builds internal capacity and ownership. On the other hand, however, this has the downside of incentivizing staff to delay the rollout with the objective of gaining more per diem and special project allowances. In addition, this creates some feeling of inequality with the rest of the staff.
- *Data migration.* A separate section on data migration requirements should be developed, elaborating the sources of data, nature of data, volume of data, and staff support available to the vendor for data clean-up and validation. If manual data input is involved, it is best to require the vendor to develop some input screens to capture data, rather than requiring inputting the data manually, as this will not be the best VFM. Manual data entry should be done through government staff.
- *Users and licenses.* One of the most critical sections in the bidding documents is related to the definition of the FMIS users. This should give the prospective vendors, especially in case of COTS procurement, reasonable information to estimate the license cost. This information should be as detailed as possible. Some key elements include the number of users and concurrent users, broken down by module — budget users, budget execution users, and users accessing reporting tools such as Business Intelligence or Crystal reports. In addition, further break-up should be provided on read-only users, data entry users, development users, and portal users per each module. Software license prices vary substantially based on these types. This is also important as vendors typically prefer to oversell and cross-sell

the licenses after the contract is signed, often through back channels, which are not fully transparent. To mitigate this risk, the section related to licenses and users should be very clear and fully elaborated.

- *Volumetric*. The bid should also provide a volumetric analysis. This will elaborate key master and transaction data related numbers such as purchase orders per second to be processed concurrently, vendor master records, employee master records, users, and payroll (if payroll is part of the bid). These numbers will help the vendor size the servers, if it is a turnkey contract. This is a performance-based approach to the procurement of servers, in which performance requirements are provided to the vendor rather than detailed specifications. The volumetric could be developed using server sizing and benchmarking tools available openly on the web.
- *Maintenance and support*. Maintenance and support requirements should be specified. Such support should be sought for 3–5 years, though it can be tailored to the contextual requirements.
- *Training requirements*. They should be described in detail, elaborating number of users, sites, and logistics support provided by the government. Training for relevant technology certifications of the key staff should also be specified. A train-the-trainers approach can be taken into consideration to achieve better VFM.
- *OAT requirements*. A section on OAT requirements should be developed and define who will carry out the test, the role of the quality assurance consultants, and the test scripts to be used — if they have been developed. Otherwise, reference should be made that testing will be based on test scripts to be developed. Testing should be done based on live data.
- *Intellectual property and software code*. For COTS, the country-specific code developed as part of the implementation typically is the intellectual property of the government. The same applies to custom-developed software from scratch for which the government owns the intellectual property as a nonnegotiable condition. For proprietary software, the intellectual property rests with the software provider.
- *Payment schedule*. The payment schedule should be linked to the site's go-live productivity, after initial payments for the advance and prototype development. The license recurring payments should also be linked to the site's go-live productivity or productive use of licenses, rather than license delivery date.
- Often vendors are interested in front-loading the recurrent payment upon license delivery, rather than productive use, which is detrimental to the government's interests as there may be a large lag between delivery and go-live, adding unnecessary recurring costs for an asset the value of which is not yet ready to be realized.

- o **Evaluation criteria.** Combined rated-type criteria (technical evaluation criteria) and financial scores should be used for these proposals. Typically, this is a 30/70 split between technical score and financial score. Lower weight to the technical score is given since the FMIS technology has been standardized over the last few decades and is commonly available through many vendors. The majority of requirements can be marked as mandatory with some desirable features left that will be given technical scores in addition to the criteria listed in table B.4. The scoring of the technical criteria can be split.

**Table B.4. Goods, Works, and Nonconsulting Services Implementation Contract: Evaluation Criteria and Indicative Weighted Scores**

Criteria	Score
Methodology	10 – 20%
Relevant experience of the firm	0 – 10%
Qualifications and experience of key staff	10 – 30%
Knowledge transfer	10 – 20%
Local presence for technical support	0 – 10%
Product demonstration	20 – 40%

### III. Goods, Works, and Nonconsulting Services for Hardware Contract

- **Approach to market and procurement method.** Since this will involve commodity hardware, which is easily available and inexpensive, an Open National approach is preferred approach.
- **Framework agreement (FA).** FA should be explored as a viable option as the hardware and other components would be required over a longer duration, averaging 7 years. It would not be advisable nor feasible to procure all commodity hardware many years in advance of their actual requirement. FA will save the government repeated procurement procedures, as the firm/firms selected through an open approach under the FA can be asked to provide call-off quotations for the hardware acquisition as and when required over the duration of the project. This will also ensure that the government gets the latest versions and models of the technology as and when required.

**Note:** The above approaches are for general guidance, though contextual evaluation should eventually determine if other approaches will deliver the best value. Some exceptions include ongoing consulting or implementation contracts with an existing firm, fragile and island economies where local vendors for commodity hardware would not be available and an international or regional tender, open or limited, would be a better choice. If an Open approach failed, but yielded a reasonable short-list of interested vendors, rebidding could be done under the limited approach.

## **APPENDIX C. QUESTIONNAIRE TO DETERMINE THE STATUS OF FMIS SYSTEMS AND THEIR UTILIZATION**

The set of questions in appendix C follows closely the conceptual framework for the financial management information system (FMIS), as discussed in more detail in chapter 1. The checklist helps determine the status of the treasury single account (TSA), FMIS core functionality and ancillary features, coverage, and utilization, and provides guidance for key technical aspects. The checklist will help the practitioner identify deficiencies across the FMIS conceptual framework. This determination forms the basis for a targeted reform program and helps establish a credible link between FMIS investments and public financial management (PFM) outcomes.

### **Evaluation Questions to Assess the Status of the Treasury Single Account**

The presence of a comprehensive TSA is a critical enabling condition for a functioning budget execution system (see table C.1). From a cash management perspective, it is important to have all government moneys in a TSA at the central bank to avoid large idle balances in commercial bank accounts outside the purview of the treasury and the control of the ministry of finance. Placing money outside the TSA and the central bank means that government would not be able to draw on these funds for investment (or fund requests from other spending units). Further, commercial banks holding this money could use it to buy government borrowing instruments, such as treasury bills, meaning they could lend to government its own money, at interest.

Ideally, extra-budgetary funds and donor funds are also placed in a TSA under the purview of the treasury. A root–branch arrangement could be set up such that donor funds could be ring-fenced, even though they are part of the TSA. However, as a second-best arrangement, several countries have adopted a modality whereby these funds are banked in the central bank, but outside the TSA. This arrangement would lower the overdraft limit for government borrowing from the central bank, and users could still have access through zero-balance accounts in commercial banks where balances are swept periodically. The situation that needs to be corrected is where these funds are banked in commercial banks which are not zero-balance accounts of a main account in the central bank.

**Table C.1. List of Questions to Assess the Status of the Treasury Single Account (TSA)**

<b>EQ#</b>	<b>TSA Evaluation Questions</b>	<b>Country Response</b>
Q1.1	Has a TSA been established? Are government funds deposited in a consolidated fund or control account? Where is the TSA located — central bank or private bank?	
Q1.2	Are large project or program advances given out to line departments? Are these advances banked outside of the TSA and central bank in a private bank?	
Q1.3	Do large extra-budgetary funds exist? What is their share of total government spending? Are these banked within or outside the TSA and central bank in line ministry or department accounts?	
Q1.4	Do large internally generated funds exist? What is their share of total government spending? Are these banked within or outside the central bank and TSA?	
Q1.5	What is the percentage of external donor-funded resources compared to the government’s own budget? What is the share of external donor-funded resources banked in the central bank and in commercial banks?	

### **Questions to Assess the Status of FMIS Core Functionality**

This category aims to establish the quality of the core functionality provided by the system and the controls it incorporates. The concept of core functionality is explained in Uña, Allen, and Botton (2019) and Hashim and Allan (2001). These questions are examined in detail:

- How does the FMIS accommodate budget management? What is the budget classification structure in use, and is it compliant with the IMF’s Government Finance Statistics (GFS)? Is the chart of accounts for budgeting the same as that for accounting, and is it the same across various levels of government? How are the initial budget and in-year budget transactions loaded in the system?
- How has commitment control been implemented, and is it applied to all transactions? Is commitment control integrated with payment processing?
- What are the controls exercised for the various types of payments that are handled by the system?
- How are tax and nontax receipts data recorded in the system?
- What is the type of interface used with the banking system?
- What is the quality of fiscal and financial reporting available from the system?

**Table C.2. List of Questions to Assess Core Functionality**

Category	EQ#	Evaluation Question	Response Options	Country Response
Budget classification	Q2.1	Is the BCS compliant with GFS?	The BCS is not GFS compliant.	
			A basic GFS-compliant BCS with function, organization, and economic classification segments is used.	
			A comprehensive BCS with capacity to also monitor expenditures on projects and programs is in use.	
	Q2.2	Are budget and accounting data integrated?	The economic classification segment of the BCS is not a subset of the COA.	
			The economic classification segment of the BCS is a subset of the COA.	
	Q2.3	Is there uniformity of budget classification for all levels of government?	The BCS and the COA are not the same for all levels of government.	
The BCS and the COA are the same for all levels of government.				
Budget transactions	Q2.4	How is the budget loaded in the system?	The treasury or accountant general loads the initial approved budget in the system.	
			A budget preparation or budget compilation system is in place and integrated with the treasury system. After the budget is finalized, it is available to the FMIS to post transactions; no separate load is required.	
	Q2.5	How are in-year budget releases (warrants) entered in the system?	The treasury or accountant general enters transactions in the system.	
			The budget department is connected to the system and enters them directly.	
	Q2.6	How are in-year budget transactions (e.g., apportionments, allotments, virements) managed? <i>Note:</i> The approved budget should be transported by some automated means from the budget preparation system. In-year changes to the approved budget should be properly authorized and tracked.	The treasury or accountant general enters transactions in the system.	
			Line ministry budget administrators are directly connected to the system and enter transactions into it.	

Category	EQ#	Evaluation Question	Response Options	Country Response
Commitment management	Q2.7	How is commitment control practiced?	No commitment control is practiced.	
			Selective commitment recording is in place <i>separately</i> for major contracts or for selective line items, but payment control against these commitments is not automatic.	
			Selective commitment recording is in place in FMIS and is also used for payment control. The treasury loads commitments transactions in the system.	
			Comprehensive commitment control is in place.	
Payments management	Q2.8	How are goods- and services-related payments managed?	The system does not carry approved budget or released budget (warrant) data. There is no automatic ex ante budget and cash control before payments are made.	
			The system has approved budget and released budget data and uses these to control payments.	
	Q2.9	Is there full transaction coverage?	Only payment requests based on invoices are entered in the system.	
			There is full P2P transaction coverage at all stages of the transaction, including a purchase order, contract or goods received note, and invoice. All are entered in the system.	
	Q2.10	How are payroll-related payments handled?	Payment requests from individual SUs are based on a calculated payroll by SUs sent to the state treasury. The treasury then enters the payment request in the system. The system checks against the relevant budget head for adequacy of funds and releases for payment (budget control is implemented at the aggregate level for each SU).	
			A central payroll calculation system is in place. The payroll payment file is sent to the treasury, and payments are made through the treasury or FMIS system. The system checks against the relevant budget head for adequacy of funds and releases for payment (budget control is implemented at the aggregate level for each SU).	

Category	EQ#	Evaluation Question	Response Options	Country Response
Receipts management	Q2.11	Are nontax receipts routed through the FMIS?	Nontax receipts are collected by a separate system or systems and deposited in the TSA. The treasury gets information on nontax receipts through the banking interface.	
			Most nontax receipts are entered in the FMIS.	
	Q2.12	How are taxes and customs duties managed?	Tax receipts are deposited in bank accounts controlled by the customs and tax department and are periodically deposited in the TSA. The treasury gets information via the banking interface.	
			Tax and other levy receipts are deposited in bank accounts controlled by the treasury. The treasury or TSA bank informs the tax and customs departments of details of receipts.	
Interface with the banking system	Q2.13	How are payment transactions routed to the TSA?	Payment transactions from FMIS are sent to the TSA bank or fiscal agent manually or through a file-based interface.	
			Payment transactions from FMIS are routed to the TSA bank or fiscal agent through an automated system (e.g., Swift).	
	Q2.14	How are receipts sent to the FMIS?	Receipt transactions from the TSA bank or fiscal agent are sent to the FMIS through a separate file or in the form of paper-based statements.	
			Receipt transactions from the TSA bank or fiscal agent are sent to the FMIS through an automated banking interface.	
Adequacy of fiscal reporting	Q2.15	What is the adequacy of fiscal reporting?	The MOF relies on reports from line agencies, which are submitted late and cannot be checked for accuracy.	
			The MOF gets some information from the treasury or FMIS on the status of budget execution for payments and receipts that are routed through the treasury.	
			The MOF gets fairly comprehensive information on the status of budget execution as most central budget transactions are routed through treasury.	
			The MOF or treasury has completed and timely information on all budget receipts and expenditures. A comprehensive set of fiscal or budget execution reports is produced by the treasury for the MOF.	

Category	EQ#	Evaluation Question	Response Options	Country Response
Basis of accounting	Q2.16	What is the basis of accounting?	Cash.	
			Modified cash.	
			Accrual.	
Advanced budgeting features	Q2.17	What is the budgeting modality?	Line item.	
			Program based.	
			Performance criteria are introduced and monitored along with costs.	

Note: BCS = budget classification structure; COA = commercial-off-the-shelf; FMIS = financial management information system; GFS = Government Finance Statistics; MOF = ministry of finance; P2P = person to person; SU = spending unit; TSA = treasury single account.

### Evaluation Questions to Assess Ancillary Features

This category assesses ancillary features related to FMIS functionality, such as the use of other modules and their interfaces with other systems (see table C.3). Modules scored under this category include the nature of the budget preparation system, whether a medium-term expenditure framework capability exists and is integrated with the budget preparation module, the nature of the capacity to perform establishment control prior to making payroll payments, the nature of the debt management system in place, whether a fixed-assets management module is part of the FMIS in use, and whether oversight institutions have independent access to the FMIS transaction databases.

**Table C.3. List of Questions to Assess Ancillary Features**

Category	EQ#	Evaluation Question	Response Options	Country Response
Budget preparation	Q3.1	How is the budget compiled and prepared?	Manually.	
			Partly or fully automated but not integrated with the treasury system.	
			Automated and integrated with the treasury system.	
	Q3.2	What is the capability of the MTEF?	Full budget preparation, including calculation of the costs of programs and projects.	
			Operated separately from the budget preparation system.	

Category	EQ#	Evaluation Question	Response Options	Country Response
Establishment control	Q3.3	How is establishment control integrated with payment control?	No establishment control.	
			Department of public service or the treasury checks availability of establishment (posts) offline before running payroll.	
			Integrated with the FMIS payments system; prior to the payroll run, the department of public service, treasury, or MOF checks for availability of approved posts from the approved establishment list online. In this case, the budget check is both the aggregate budget of the SU and the establishment register to see whether the person being paid is occupying an approved slot. This reduces the risk of payment to ghost workers.	
Fixed-asset management	Q3.4	How are fixed assets managed?	Manually.	
			Automated but not interfaced with the FMIS system.	
			Automated and integrated with the FMIS system.	
Debt management	Q3.5	How is debt servicing managed?	Manually.	
			Automated and integrated with the FMIS system.	
	Q3.6	Is a debt management package in use?	Yes.	
			No.	
	Q3.7	Does this cover both domestic and foreign debt?	Only domestic.	
			Domestic and foreign.	
	Q3.8	Does the system include a record of debt servicing liabilities and opening balances?	Yes.	
			No.	
	Q3.9	Are debt servicing payments routed thru the FMIS?	Yes.	
No.				
Auditing	Q3.10	How is the auditing function accommodated?	Not interfaced.	
			Audit department has access to treasury databases.	

Note: FMIS = financial management information system; MOF = ministry of finance; MTEF = medium-term expenditure framework; SU = spending unit.

## Evaluation Questions to Assess Coverage and Utilization

The objective of this dimension is to identify which payments and receipt transactions are routed through the FMIS and which bank accounts (where government financial resources are banked) are covered by the FMIS (see table C.4). Coverage of the FMIS is critical because partial budget and execution reports derived from the FMIS only give a partial picture.

Further, benefits related to commitment and expenditure controls would apply only to funds covered by the FMIS; thus, the usefulness of the FMIS as a budget management tool is a function of the amount of government financial resources covered. Transactions can only be considered as being routed through the system if subjected through system internal ex ante budgetary controls. Posting transactions into the system after they have occurred only gives the illusion of comprehensiveness, while integrity cannot be ensured, and controls are not applied.

Project advances and internally generated funds are a part of the government's own budgetary resources and should be transacted through the FMIS (banked in the TSA) and therefore be subject to budgetary controls. Transactions related to extra-budgetary funds and donor funds can also be routed through the FMIS even if they are not part of the TSA, because these accounts can be defined in the FMIS and the agencies that are responsible for transacting them can use the same system as is used for government funds.

**Table C.4. List of Questions to Assess Coverage and Utilization**

Category	EQ#	Evaluation Question	Response Options	Country Response
Coverage of payments handled by the MOF	Q4.1	Are debt service payments routed through the FMIS?	Debt service payments are sent directly to the central bank, TSA, or bank, and then posted ex post in the accounting system.	
			Debt service payments are routed through FMIS and subject to ex ante budget control.	
	Q4.2	Are fiscal transfers or subsidies-related payments routed through the FMIS?	Fiscal transfers, subsidies, or transfers to state-owned enterprises are not routed through the FMIS. The MOF directs the central bank, TSA, or bank to make payments directly. Transactions may be posted ex post in the FMIS.	
			Fiscal transfers, subsidies, or transfers to state-owned enterprises are routed through the FMIS and subject to ex ante budget control.	
Geographical coverage	Q4.3	What is the geographical coverage of the FMIS?	It only covers line departments and spending units at the central level.	
			It also covers transactions generated at the provincial level.	
			It also covers transactions generated at the district level.	

Coverage of financing sources	Q4.4	Is the recurrent budget processed through the FMIS?	Yes.	
			No.	
	Q4.5	Are the capital budget or project advances to line ministries processed through the FMIS?	Yes.	
			No.	
	Q4.6	Are EBF transactions processed through the FMIS?	Yes.	
			No.	
	Q4.7	Are IGF transactions processed through the FMIS?	Yes.	
			No.	
	Q4.8	Are donor funds transactions processed through the FMIS?	Yes.	
			No.	

Note: EBF = extra-budgetary funds; FMIS = financial management information system; IGF = internally generated funds; MOF = ministry of finance; TSA = treasury single account.

## Evaluation Questions to Assess Technical Aspects

This category covers issues such as the nature of technology used, whether the FMIS is custom developed or uses a commercial-off-the-shelf software package, the scope of the functionality provided by the software, and the FMIS and its deployment architecture (see table C.5). This section contains questions regarding some informational items to describe the technical platform used, the numbers of users connected to the system, and the costs incurred for setting it up and required for its ongoing maintenance. The section also requests information on the numbers of staff and budgetary resources that are available for ongoing maintenance and the quality of the telecommunications network used to connect the various system nodes in the country. These aspects have been found to be important for ongoing operations and maintenance and for the sustainability of the FMIS.

**Table C.5. List of Questions to Assess Technical Aspects**

Category	EQ#	Evaluation Question	Response Options	Country Response
Quality of information support	Q5.1	What information systems support is available to the budget preparation, execution, and reporting processes?	No information systems support.	
			Rudimentary and partially manual information systems assist the treasury in distributing limits and warrants and controlling payments, and a patchwork of systems that are not connected to each other is in use.	
			A countrywide, online, custom-developed basic treasury system is in use, which enables budget availability checks and warrant control and allows MOF or treasury to practice fiscal control.	
			A fully functioning treasury system with capacity for budget management, commitment management, accounts payable, accounts receivable, general ledger, purchasing, fixed assets, and fiscal reporting is in place; and the system has the capacity to use accrual accounting.	
	Q5.2	What is the systems architecture?	No system is in use.	
			Distributed architecture.	
			Partially distributed architecture.	
			Centralized architecture.	
	Q5.3	What is the systems deployment modality?	Treasury centered. SUs need to send the transactions manually to a designated treasury office for entry to the system.	
			Treasury and line departments and budget administrators are directly connected to the system.	
			Budget administrators, line departments, SUs, and treasury offices are connected, or line ministries and SUs have access via a web portal.	

Category	EQ#	Evaluation Question	Response Options	Country Response
Quality of tele-communications network	Q5.4	What is quality of the telecommunications network that connects remote end-users to the system in terms of the bandwidth available, robustness, and medium of connection (e.g., fiber optic or copper)? State speed in megabytes per second.	Very good.	
			Good.	
			Fair.	
	Q5.5	Is a network management system in use that monitors network performance and identifies nodes with problems? If yes, which package is used?	Yes.	
No.				
Data warehouse and use of analytics tools	Q5.6	What is the use of data warehouse and analytical tools?	None.	
			A data warehouse has been implemented and gives users the ability to formulate queries against the system databases and produce a variety of fiscal and budget execution and other analytical reports.	
	Q5.7	Please give the name of the package used.		
Information security	Q5.8	Are there adequate arrangements for information security?	Yes.	
	Q5.9	Briefly describe the software used.	No.	
End-user support and documentation	Q5.10	Is a help desk operational to assist users in resolving operational issues?	Yes.	
			No.	
	Q5.11	Is good quality end-user documentation available?	Yes.	
			No.	
	Q5.12	Is good quality technical documentation available?	Yes.	
			No.	
	Q5.13	Is there a team of power users available in SUs who can resolve issues?	Yes.	
			No.	
Q5.14	Are end-user training courses refresher courses offered on a regular basis for new users?	Yes.		
		No.		

Category	EQ#	Evaluation Question	Response Options	Country Response
Budgetary and technical staff resources	Q5.15	Are there adequate budgetary resources allocated on a yearly basis for ongoing systems maintenance and support and for operational costs? What is the amount of these resources?	Yes.	
			No.	
	Q5.16	Is there an adequate number of technical staff available within MOF and government to provide ongoing maintenance and support for the system?	Yes.	
			No.	
Project management arrangements	Q5.17	Is there a high-level steering committee to address policy questions regarding the system and bring issues to the attention of management?	Yes.	
			No.	
	Q5.18	Is there a full-time project manager who can address day-to-day operational issues and raise higher-level issues to the attention of the steering committee?	Yes.	
			No.	
	Q5.19	Is the project manager adequately empowered to take decisions?	Yes.	
			No.	

Category	EQ#	Evaluation Question	Response Options	Country Response
Nature of technical platform used and cost	Q5.20	Is the FMIS custom developed or based on a COTS package?	Custom developed.	
			COTS.	
	Q5.21	Name of the software package used.	Name (in case of COTS only).	
	Q5.22	Is this an open source package?	Yes.	
			No.	
	Q5.23	Number of end-users connected to the system.	Number (average, maximum).	
	Q5.24	Capital cost to date (in US\$).	Application software licenses.	
			Implementation services.	
			Hardware systems, software, among others.	
			Telecommunications network costs.	
			Other (design and supervision consultancies).	
	Q5.25	Total annual recurrent and operating cost (in US\$).	License fees (application software, middleware) per year.	
			Ongoing telecommunications usage costs per year.	
			Costs for technical staff for systems operation and maintenance per year.	
Use of cloud-based services	Q5.26	Are cloud-based service providers available where the system can be housed and implemented?	Yes.	
			No.	
	Q5.27	Are there any government restrictions on the use of public cloud services?	Yes.	
			No.	
	Q5.28	Does the government operate a government private cloud-based service?	Yes.	
			No.	
	Q5.29	Does the FMIS system use cloud-based services?	Yes.	
			No.	
	Q5.30	Government private cloud and public cloud-based services?	Hardware and infrastructure: Infrastructure as a Service.	
			Application software: Software as a Service.	

Note: COTS = commercial-off-the-shelf; EBF = extra-budgetary funds; FMIS = financial management information system; IGF = internally generated funds; MOF = ministry of finance; SU = spending unit; TSA = treasury single account.

## Template for Transactions Data Capture

**Table C.6. Template for Transactions Data Capture**

<b>Ranges (US\$)</b>	<b>Expenditure Transactions during the Period that Fall in This Range (number)</b>	<b>Total Value of Transactions in This Range (US\$)</b>
< \$100	20,000	2,000,000
\$100–\$200	150,000	22,500,000
\$200–\$500	100,000	25,000,000
\$500–\$1k	70,000	52,500,000
\$1k–\$5k	5,000	17,500,000
\$5k–\$10k	3,000	22,500,000
\$10k–\$25k	200	3,000,000
\$25k–\$100k	100	5,000,000
\$100k–\$500k	70	17,500,000
\$500k–\$1,000k	60	45,000,000
\$1,000k–\$10,000k	10	50,000,000
\$10,000k–\$50,000k	7	75,000,000
> \$50,000k	5	250,000,000
<b>Totals</b>	<b>348,452</b>	<b>587,500,000</b>

Note: Precise numbers will be entered into this template.