Imperfect Systems
IFMISs in Africa

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INTRODUCTION[1]

*All too often, the uncritical adoption of new materials or devices
to solve old or imagined problems can create newer and more
complex problems in an altered environment.*
Henry Petroski, <u>The Evolution of Useful Things</u>[2]

The objective of this paper is to analyze what is required for developing countries to set in place systems of effective control of budgetary expenditures with particular reference to the design and implementation of automated systems. The two principal reasons integrated financial management information systems (IFMISs) fail or under perform in developing countries is the inherent complexity and risk of large-scale information systems and the complexity of building hybrid structures of financial control.[3] By hybrid, I mean integrating selective manual procedures and selective automation within and between the components of financial control (e.g. budgets, accounts, disbursements) reinforced by a legal framework. Information technology alone can not provide sufficient financial control. The typical IFMIS approach is to insert an insulated turn-key computer system which is a relatively simple task compared with building a hybrid manual/legal/automated structure of financial control in the developing country environment. Unfortunately the insulated approach does not provide sufficient financial control and often fails because it does not fit with, or evolve, existing business processes. The conventional IFMIS approach tends to be a comprehensive replacement of the components of financial control and this extensive change of business processes often exceeds the capacity of bureaucracies in developing countries to manage and operate.[4] An IFMIS solution is a narrow technical approach to a much broader organizational problem. As Peter Keen observed, 'the real problem [with information technology-based reforms] is the history of relationships or lack of relationships in most organizations.'[5] Hybrid systems are difficult to build because they blend the old with the new as well as

different sources of control (manual procedures, legal framework, automation). Hybrid structures of financial control are more reliable, sustainable, and expandable.

A hybrid system can evolve with the relative role of manual and automated procedures changing over time. The first task of a hybrid system is to promote effective control and in developing countries this often requires redundant manual systems. Eventually, the manual systems can be replaced with fully automated systems as efficiency is improved.

This paper examines the experience of IFMISs in Africa from two perspectives: what has been the experience of using information technology (including IFMISs) to build sufficient systems of financial control; and, and how has the inherent risk of large-scale information systems been managed.

The next section defines the basic requirements of an expenditure control and reporting system. I define those requirements in terms of what is basic. Basic, in this sense, refers to the *sufficient* conditions for a 'good' control and reporting system - note that I do not refer to *necessary* conditions in this context, because control is control is control, and reporting must include certain reports while others may be optional. Necessary conditions would apply to a further set of objectives that would be specific to the systems of any given country (for example, more performance related reporting; specific reporting requirements for foreign aid agencies; etc). The basic requirements of 'sufficient' financial control in turn should define the role of the financial information system.

I then look briefly at some recent experience. That experience includes my own experience in Ethiopia of establishing a custom built system, and the experience of Tanzania.[6] These two IFMIS initiatives, one a custom the other a package application, have arguably been a success. While it is more useful to study cases of success rather than under performance or failure, the limited number of cases and the uniqueness of their reforms means that one must be careful in applying their lessons to other countries.

I am cautious about citing secondary sources because I think that the documentation available does not always give a substantive and objective enough picture on which countries may base potentially very expensive decisions. I am also skeptical about the propagation of 'best practice', which has been at to great cost to many countries, and IT projects are a good example of this. How can IFMISs be a 'best practice' if many developed countries do not have them.[7] My purpose in making a skeptical review of current experience is to show that we do not need, and should not, accept prescriptions of 'best practice', and to give confidence to those who are tasked with establishing expensive IT systems to return to first principles and work out what is needed in the context of their own systems, traditions, capabilities and culture. There is an erroneous assumption in the development community that there are always increasing returns to reform of PFM.[8] For most developing countries, moving beyond the basics of financial control is difficult and risky. Some reforms (overly complex IFMISs or accrual accounting) are inappropriate for developing countries.[9]

The third part of the paper examines the factors that contribute to the success and failure of large-scale information systems, the trends for limiting risk, and the respective tradeoffs of custom versus off-the-shelf solutions.

Automation and Financial Control

The first objective of a public financial management system is control.[10] Financial control, especially in developing countries, derives from three sources: comprehensive manual procedures, enforced legal frameworks and selective automation. Comprehensive manual procedures are needed because not all financial control tasks need or should be automated. Legal frameworks are needed to impose discipline and limit abuse. Information technology is needed to efficiently manage transactions and reinforce discipline. These three sources of financial control have two attributes: effectiveness and efficiency. For example, manual procedures can impose <u>effective </u>control by stopping the issuance of a purchase order

because there is an inadequate balance in the updated adjusted budget, but this may not be an efficient control because the purchase order is delayed until the adjusted budget is manually updated. In this case, if the adjusted budget and procurement component were automated, budget provision can be rapidly determined and the purchase order issued. Another example of an effective (efficient?) manual control was practiced by the Ministry of Finance in Kenya in the early 1990's when it recalled all sector ministry check books during the fourth and sometimes even the third quarter of the fiscal year to limit cash outflows. (Unfortunately, this practice did not curtail incurring commitments beyond budget provision).

'Sufficient' hybrid systems of control combine the three sources of control with the ideal of achieving both effectiveness and efficiency. Perfect control is never attained as there will always be some successful circumvention of manual procedures, legal sanctions and automation. [11] A hybrid system provides redundant 'layers' of manual and automated controls (effectiveness and efficiency), which limit the potential for compromising control which is especially important in the developing country environment. Effective control is a first order task, efficient control is second order. Automation tends to promote efficiency more than effectiveness of control but this advantage must be weighed with the additional risk they add. The virtue of a hybrid financial controls is it provides redundancy and lowers risk.

Large-scale commercial off-the-shelf IFMISs for public sector financial management (e.g. Oracle, SAP) have evolved from private sector applications and were designed for very different objectives. In the private sector, the primary driver of business is profitability and therefore cost cutting so the priority is *efficient* control--rapid recording of receivables, payables, and preparation of financial statements mandated by law. *Effective* control is the priority of public sector financial systems because of the critical stewardship role of managing resources appropriated from the citizenry. [12] This difference between the private

sector and public sector control is highlighted by the absence or limited role of a budget module in IFMISs.

Table 1 presents a framework of the sources and attributes of financial control. For example, Ethiopia introduced a single pool in district finance offices when the government rapidly decentralized financial management to this level. The objective of the single pool was to issue all payments (financed by domestic—treasury funds) from a single checkbook. At a stroke, the single pool removed the checkbooks from sector offices which limited idle balances, concentrated scarce finance staff in finance offices, and added an additional layer of control over district expenditure. The single pool is an example of a manual procedure backed up by a legal framework which dramatically improved both the effectiveness and efficiency of financial control at the lowest (and weakest) levels of government which are responsible for the largest share of discretionary expenditure. Not all districts have been automated so this important source of control will remain manual for many years.

Unlike Ethiopia which observes a hard budget (and cash) constraint, Tanzania faced a different challenge—lack of cash management. A cash budget was rapidly introduced overriding manual procedures. Automation was used to enforce a strict link between the issuance of a purchase order and the production of a check. Automation was used to introduce effective and efficient control to a limited part of the overall financial control system—the procurement and disbursement components.

A cautionary note. The literature on IFMISs in Africa has tended to extol the success of one or more country experiences. Such assessments are incomplete because the experience with these systems on the continent has not been adequately documented.[13] Such assessments are also misplaced because the do not consider the unique circumstances addressed by a country's automation strategy. The automation solution may be short-term and address only

Table 1

**Sources and Attributes of Financial Control
with Examples from Ethiopia and Tanzania**

Sources

	Legal Framework	*Manual Procedures*	*Select Automation*
Effectiveness	(ET) Single disbursement pool at districts ←→	(ET) Single disbursement pool at districts	(TZ) Production of Purchase order
Efficiency		(ET) Single disbursement pool at districts →	(TZ) Production of a check (ET) Single disbursement pool at districts (IFMIS/IBEX disbursement module)

Attributes

- ET-Ethiopia

- TZ-Tanzania

part of the requirements for a 'sufficient' financial control system. Further, even if one deems a particular country experience a 'success,' this does not imply that its lessons should or can be applied to another country. Reform of public financial management systems is context specific and a one-size-fits-all or worse, a more narrow one-country-fits-all prescription is a recipe for failure.

In this paper I have presented only two country examples of IFMISs. I have not presented other examples from other countries because they are not well documented and in any case, have been deemed either of mixed or poor performance. Without a first hand assessment, it is inappropriate to judge these country's reforms.

A Framework of Sufficient Financial Control

Figure 1 presents the seven components needed for financial control.[14] Reporting and External Audit have been presented as cross-cutting sources of control as they use information from the other five components. Success in achieving good financial control is a result of the sequencing of improvement within and between those seven components and the role of information technology is located in the stages of improving and linking the components. Most developing (and developed) countries can not improve all of the components simultaneously so a reform program must select those priority areas that need most attention—the 'hole(s)' in the 'whole.' A sequence of pathway of reform must be selected.[15]

A country's pathway of reform program is conditioned by their unique circumstances—the current environment of PFM (e.g. economic shocks, fiscal mismanagement), structure of government, quality of existing systems, traditions, and external influences. Ethiopia's pathway focused first on the legal framework and the budget and accounts components, Tanzania's pathway focused on cash budgeting by automating the procurement and disbursement components.

Figure 1
Components of Public Financial Control

Budget	Commitments	Procurement	Disbursement	Accounts
Reporting				
External Audit				
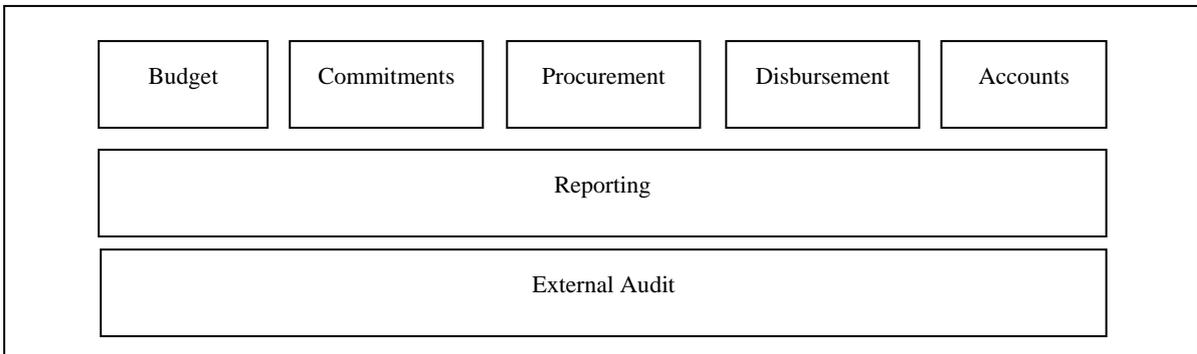
The following paragraphs give a brief description of the components of Figure 1.

Budgets. The budget is the most fundamental source of financial control--its appropriation (approval by the legislature) is the legal basis of public expenditure. The budget is also the most important policy document of a government for it allocates resources to public priorities and determines what revenues need to be raised from citizens. Poor control can mean that the budget is inefficient and that demands for money from citizens are in excess of what they would otherwise be; revenue requirements should not be driven by expenditure need requirements.

The budget structure is the DNA of financial control and is established by the budget classification and the chart of accounts. The structure determines what institutions are assigned a budget, how detailed the items of expenditure and revenue will be recorded, and the specificity of control in procurement, disbursement and accounts. The structure also determines the depth and breadth of financial reporting. Transfer and virement rules determine the level of discretion of a budget given to budget managers. Therefore, the fundamental 'loop' of financial control starts with legislative appropriation and ends with legislative review of the audited statement of accounts. Public accounts demonstrate whether the intent and letter of the appropriation was executed, value for money was obtained, and

prudent control was exercised. A 'financial' calendar should authoritatively schedule the stages of budgeting, accounting and auditing A well functioning budget system has the following :

(a) *Budget classification*. The budget classification translates the appropriation to the administrative structure and shows the delegation of budgets to administrative levels that are not assigned an appropriation. The critical issue is one of materiality--'how low should you go' in determining objects of expenditure, and what tradeoffs must be made between control and analysis. In principle this can be a 'win win' tradeoff but control is a priority over analysis.[16] The budget classification should be clear and consistent over time and capable of mapping to the classification of the functions of government (COFOG) guideline. Since the recent version of the government financial statistics (GFS 2001) guideline is principally about introducing accrual accounting, governments should consider the relevance of revising their budget classification to this guideline.[17]

(b) *Chart of accounts*. The chart of accounts provides a consistent coding of the discrete items in the budget, disbursed from the treasury, captured in accounts and presented in reports. The chart includes items of expenditure, revenue, loans, transfers, etc. As with the budget classification, the design of the chart of accounts involves a tradeoff of control and analysis. A critical question of financial control is the level of detail one should establish in the budget which in turn governs the level of detail of commitment control, disbursement, accounts and reporting. The chart should clearly match the type of expenditure and the type of financing (domestic, external loan, external assistance). One common misconception is that a more detailed chart provides greater financial control. Budget transfers and virement can defeat line item control.

Another misconception is that the introduction of more advanced forms of budgeting withers away line items--they don't as they are fundamental to control (specifically

procurement, accounts and auditing). The challenge of moving to more advanced forms of budgeting (cost centers, performance budgeting) is how to aggregate the chart of accounts. The lack of a robust chart (and budget classification) weakens control and the evolution of budgetary formats.

The chart should clearly match the type of expenditure and the type of financing (domestic, external loan, external assistance). Frequent revisions to the budget classification and the chart whether from domestic requirements or foreign aid conditionality need to be carefully weighed and resisted in terms of the priority of financial control (simplicity and comprehension) over analysis. Budget structure should be stable.

(c) *Financial calendar.* The calendar needs to specify key dates in the execution of select components of financial control. For budget, the calendar should establish when the budget call with ceilings is issued, when budget submissions are due at the Ministry of Finance, when the budget has to be submitted and appropriated by the legislature, and when the vote on account lapses. For accounts, the agency period should be specified as well as the deadline for closure of accounts. For external audit, the submission date to the legislature should be specified. The legal framework should specify the consequence of not meeting the calendar (e.g. the Ministry of Finance can prepare an agency's budget if it is not promptly submitted).

(d) *Budget preparation.* Budgets are time critical and involve the efficient processing of large volumes of data that are frequently adjusted at the last minute. They need to be systematically prepared to ensure adequate time, quality and review. Budget preparation requires rapid reporting to ensure that submissions are within ceilings, composition is appropriate, and sources of finance are properly matched to expenditure type. Budgets need to be adjusted to updated revenue projections especially volatile foreign aid.

Reporting during the budget preparation stage is critical for it allows policy makers a view of how spending agencies intend to operationally implement government priorities before these intentions are 'locked into' the final budget. The budget in preparation often becomes budget policy.

(e) *Notified budget.* Once the draft budget is approved by the legislature, spending agencies need to be promptly notified of their budget so that they can start the financial year. Depending on the level of detail of the appropriation, this notification involves production of notification by budget classification and detailed line item. Along with the notification is the apportionment/allotment of the appropriation to the spending agencies which can be done through provisions in the appropriation law, warrants, transfers to accounts, and notification of cash limits.

(f) *Adjusted budget.* The adjusted budget is the operational source of budgetary control throughout the fiscal year as it reflects updated balances against which commitments, procurement and disbursements are executed. If not current, then operational control falls to the procurement and disbursement components (a cash budget) which is poor financial management and inadequate control (disbursements are not audited for purpose of the approval of financial statements). Since the first step in closing accounts is to finalize the adjusted budget at the end of fiscal year, delay in this task delays the closure of accounts and potentially external audit. Responsibility for the adjusted budget needs to be clearly specified and should reside with the budget not accounts office. One frequently finds that accounts departments manage the adjusted budget because it involves the detailed recording of changes within and between the budget classification and the chart which accounts departments are familiar with. By having the adjusted budget in the accounts department, budgetary control throughout the fiscal year is compromised if not eliminated.

#1 Budget Component of Financial Control

- *Manual procedures*: To facilitate manual preparation as well as accuracy of data entry into a budget information system, manual forms for preparing and presenting the budget should be printed. Having a robust manual system for budget preparation and presentation promotes a seamless manual/automated operation of the budget process which is essential especially for outer administrative areas that have yet to be automated or where automation is unreliable. A detailed operational budget manual also provides the basis for a training program. It is especially important that the budget classification and chart are discussed with spending agencies to ensure it meets the material requirements of financial control and adequate reporting.
- *Legal Framework:* appropriation, transfer, virement, and calendar should be defined and elaborated.
- *Automation:* budget preparation and the adjusted budget should be a core module of any financial information system as it establishes budgetary control of commitments, procurement, disbursements and institutes proper recording. The information system should exactly replicate (not mirror) the user requirements of the budget classification and the chart of accounts. Automation is needed to rapidly assemble and revise budget submissions and analyze composition. Automation is also essential for the prompt notification of the budget by the Ministry of Finance so the budget can be executed at the start of the fiscal year.

Commitments. The commitment component of financial control is part of a broader process of 'budgetary accounting' which monitors the use of the appropriation through the expenditure cycle: apportionment/allotment, commitment, certification, payment.[18] The commitment component ensures that there is budgetary provision before a future obligation to pay is incurred. The commitment component needs to track all contracts, purchase orders and standing payments (e.g. salary).

#2 Commitment Component of Financial Control

- *Manual procedures:* commitments can be controlled by manual ledgers (see an example in Figure 5) which present the adjusted balance and balance after commitments; control can be exercised by the withdrawal of warrants.
- *Legal framework:* incurring commitments without budgetary provision should be proscribed and the legal consequences specified. The treatment of contracts which extend beyond the annual appropriation needs to be specified.
- *Automation:* automation can ensure that the budget balance is current if the adjusted budget is current. Automation can complement and/or replace manual procedures by preventing the production of a valid (computer generated) purchase order or other order documents.

Procurement. The procurement component of financial control involves establishing requirements, adherence to tendering procedures, issuance of contracts/purchase orders, and verification of receipt of goods and services.

#3 Procurement Component of Financial Control

- *Manual procedures:* production of purchase orders and payment vouchers controlled by manual ledgers that show adjusted budget and balance after commitments; verification of goods and services; specification of the tendering and contracting procedures.
- *Legal framework:* Sanctions for incurring commitments without budget provision, regulations or directives that specify tendering and contracting procedures and establish authorizing thresholds (e.g. amounts for each level of tender board).
- *Automation:* automation can link to the commitment component to ensure there is budgetary balance by budget classification and line item for the expenditure. Valid purchase order/approvals would only be made available through computer generated forms or notices; inventory systems for inspection.

Disbursement. The disbursement component involves determining the level of cash available to issue the cash, check or transfer to pay for the payment voucher or contract. Disbursement is part of a larger process of cash management which includes debt management and financial asset management. Different approaches (single treasury, zero based balance) are used to limit idle funds.

#4 Disbursement Component of Financial Control

- *Manual procedures:* the Ministry of Finance (and its equivalent at decentralized levels of government), may require spending agencies to submit cash flow estimates (monthly and quarterly) and obtain written approval before replenishing spending agency bank accounts. Checks may be prepared manually either by the finance agencies or the spending agencies; bank reconciliation done manually and presented for request for replenishment of bank accounts, payroll can be manually prepared annual and periodically issued by cash to eliminate ghosts.
- *Legal framework:* regulations or directives that levels of cash in safe and the management of check books and bank advices (drawing limits, end of year closure).
- *Automation:* can ensure that the sub-accounts of spending agencies are not overdrawn in a single treasury system; automate the production of checks and transfers based on cash availability. The control on cash does not necessarily mean control on budget if the disbursement is not linked to the adjusted budget element of the budget component and the commitment component.

Accounts. The accounting system records expenditure transactions, transfers, revenues, receivables and payables in a timely and accurate manner. The critical issues in the operation of the accounting system are *when* and *what* transactions are recorded (the basis of accounting—cash, modified cash, modified accrual, accrual), and *how* they are recorded (single or double entry).

#5 Accounts Component of Financial Control
- *Manual procedures:* Accounting procedures need to be documented in detail in manuals with forms that allow a fully operational manual system and can be replicated by a computer system. The manuals provide the basis for training materials. Detailed manual procedures facilitate the evolution of the basis of accounting either manual or automated.
- *Legal framework:* regulations and directives should specify respective responsibilities of accounts staff (separation of duties) as well as the format in which the accounts are to be maintained.
- *Automation:* ensures the efficiency and accuracy of recording transactions in the general and subsidiary ledgers, and facilitate the closure of accounts. If linked to an adjusted budget and commitment component, it can provide a current balance of uncommitted funds by budget classification and chart of accounts.

Reporting. This component is cross cutting of the five components listed above: budget, commitments, procurement, disbursement and accounts. The basic requirement is final accounts matched to final adjusted budget by the budget classification and chart of accounts. Reporting should also promote financial management by providing reports across the components (e.g. variance of expenditure to budget). In addition to standardized reporting formats, reporting can also be done to assess policy objectives (sector expenditure) as well as the composition of expenditure. Depending on the basis of accounting (cash or full accrual), reporting should approximate the standards established by the International Federation of Accountants (IFAC). Unfortunately, this body does not present guidelines for the reporting under the modified cash or modified accrual basis of accounting which are the basis that most governments use, and which most developing countries should retain.

A key reporting task is to consolidate accounts from different levels of government with different formats. A budget and accounts reform often has leads and lags so different levels of government may be operating different bookkeeping systems, different basis of accounts and different budget classification and chart of accounts. Consolidation often demands considerable customization of financial information systems as countries have non-standard and different legacy budget and accounting systems.[19]

#6 Reporting Component of Financial Control

- *Manual procedures:* reports should be developed in consultation with users to determine materiality and relevance.
- *Legal framework:* regulations and directives should specify the formats in which accounts are to be presented especially under self-accounting systems.
- *Automation:* can rapidly aggregate accounts data and produce standardized and ad hoc reports. The system should have extensive capacity to consolidate different accounts—a feature that will require customization.

Audit. External audit verifies the robustness of financial control, the accuracy of accounts, and whether value for money has been obtained.

What is an IFMIS?

An IFMIS can potentially provide governments with a tool that can support financial control, management, and planning. By managing a core set of financial data and translating this into information for management, these three financial functions are supported. Since control is the first task of public financial management, IFMISs should be assessed by how they contribute.

More narrowly defined, an IFMIS is a computer application that potentially can integrate key financial functions (e.g. accounts, budgets, etc) and promote efficiency and security of data management and comprehensive financial reporting. An IFMIS is one way to address the problem of 'stove-piped' financial systems that do not talk to each other and do not produce a timely and comprehensive picture of a country's financial position.

IFMISs are usually considered in terms of core and non-core financial functions.[20] While public financial management is a broad field with multiple systems, it is striking how limited the commonly cited specification of the core functions of an IFMIS is. The conventional specification of the IFMIS core is accounting and reporting functions, while non-core functions include budgeting, commitment control, cash management and disbursement functions.[21] The common specification of the core function of an IFMIS does not include all of the components needed for effective financial control and therefore can not

provide sufficient or basic financial control. The limited comprehensiveness of the

conventional core functions of an IFMIS stems in large part from the private sector origins of

IFMIS technology as demonstrated by the absence of a budget component as a core module.

IFMISs are a <u>partial</u> solution to financial control. 'Integration' should not be

confused with 'comprehensive' control. While a partial solution, we argue that the core

components of an IFMIS should be Budget, Accounts, Disbursements and Reporting

(BADR). The lack of a budget component is the most glaring deficiency as it is the

foundation of public financial control.[22]

Figure 2 presents what an IFMIS is and Figure 3 presents how one works using the

example of Ethiopia's IFMIS.

<u>Financial</u> **function of an IFMIS (Column 2, Figure 1).**

Figure 2
Features of a Typical IFMIS

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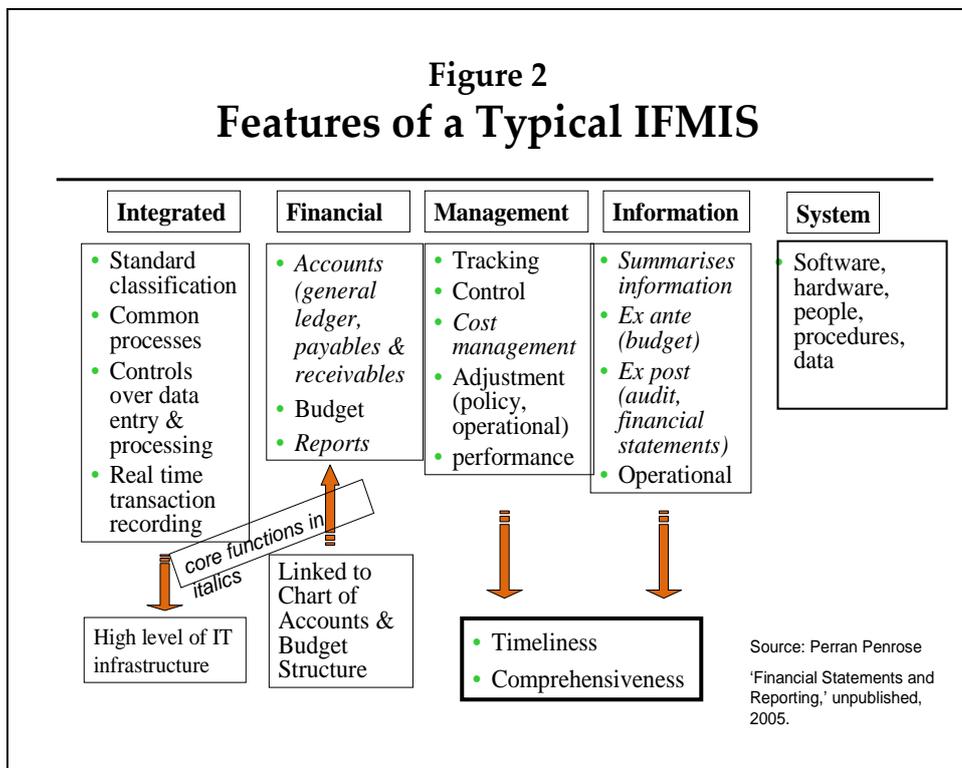
Integrated function of an IFMIS (Figure 2, Column 1). Ideally, and IFMIS provides two types of integration: functional integration across financial components so that data flows seamlessly; and physical integration with networks or stand alone installations that can share data. We would argue for a third feature of integration which is key to the building of a hybrid system—integration between manual and automated procedures.

IFMISs are designed to manage financial data efficiently so that once entered, data are securely stored and shared with different financial functions (e.g. budgets, accounts). The management of data from the user standpoint is standardized with common input screens and report formats. Integration is within the core modules but is also meant to include seamless data sharing (possibly on-line) across administrative entities to promote financial control. One limitation is that the on-line requirements of a conventional IFMIS can be significantly constrained by the low bandwidth found in many developing countries.

The conventional IFMIS almost invariably overlooks the issue of integration with manual systems. Prudent financial management, especially in developing countries, requires reliability more than efficiency.[23] Operating parallel manual and automated systems (at least until reliability has been established in the use and operation of the automated systems which can be a very long time) provides redundancy that increases control and reliability in financial management.[24] Moving financial management to lower and less capable levels of administration means that there are likely to be different financial systems (manual at the lowest levels with automation upstream). Should the infrastructure supporting the automated systems fail or come under strain, the manual systems allow governments to maintain their operations.

The manual system also provides a platform from which the user and the application developer can rapidly and cost-effectively evolve the system. It provides the user with a familiar and accessible prototype of new procedures and how to adapt them.[25] This approach

promotes government ownership and also provides technology developers with clear, workable and user accepted requirements. The failure of information systems to meet user requirements is arguably the one of the principal source of failure and under performance of IFMIS systems. A strategy of developing IT systems from robust manual systems does not need to take a long time because application development is rapid and considerably less costly and user acceptance is continuous and assured.[26] This approach promotes sustainability as the manual and computer application are developed incrementally and embedded step by step. By taking time in the early stages of the financial reform, appropriate basics are established, user ownership is promoted, and costly and time consuming application development is avoided.

It is not possible to automate everything.[27] There will always be manual systems that complement computerized systems and both systems require discipline in their execution. The continued role of manual systems reinforces case for a modular process change approach to reform, as the manual systems will require improvements and these in turn will impact the automated systems which in turn will have to be improved.

Management **function of an IFMIS (Figure 2, Column 3).** The management function of an IFMIS applies the information function (column 4 of Figure 1) to execute the three roles of a financial system: control, management and planning.

Information **function of an IFMIS (Figure 2, Column 4).** This function translates financial data into information. IFMISs provide a wide range of reports.

System **function of an IFMIS (Figure 2, Column 5).** Finally, an IFMIS is an information technology that embeds financial procedures in software applications, data stores, and communications infrastructure. Figure 3 uses the example of the Ethiopian custom IFMIS (IBEX) showing how an IFMIS is constructed. The *functional modules* deliver the content of the application and in this case budgeting, accounts, and disbursements.[28] The

technical platform is the backbone of crosscutting services provided by the system which includes the volume and speed of data processing, data security, distribution (in this case via the WAN), the front end interfaces for the user and the languages it presents the modules in. The third part of the application are the *migration tools* which allow data to be exchanged seamlessly between the legacy financial systems (BIS/BDA) and IBEX as well as between standalone installations and networked installations.[29] One limitation of an OTS IFMIS is the management of legacy systems and their data. While in principle these data can be shared, it is often necessary to build a custom migration capability, thereby increasing costs: in other words, an OTS is not necessarily synonymous with a turnkey system. A virtue of custom systems is their de facto inclusion of custom services such as integrated legacy migration tools.

Figure 3
An Example of the Platforms of an IFMIS
Ethiopia's IBEX System
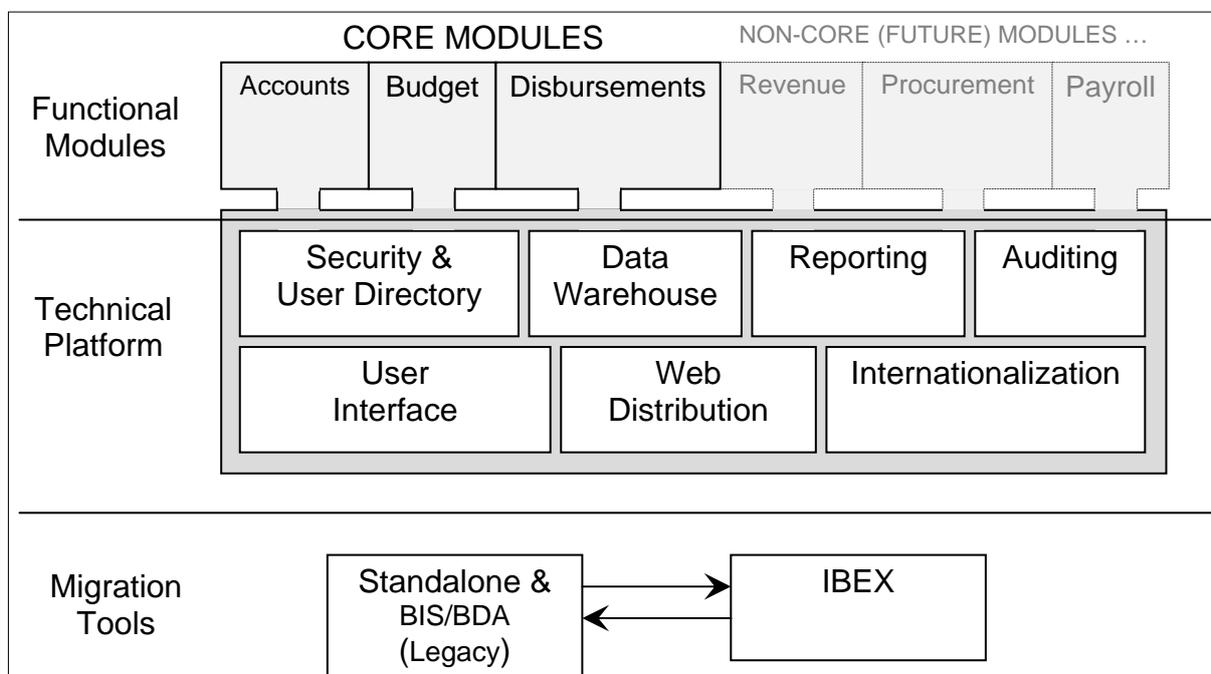
Source: Adam Abate and Eric Chijioke, 'The DSA Financial Information Systems,' unpublished, 2005

Well designed IFMISs are modular. Modular systems by definition can be developed using independent modules as user requirements evolve, and modules can then be linked in order to share data. Five virtues of modularity may be noted in particular:

(a) independent development of finance components as user requirements evolve;

(b) flexible sequencing of a financial reform (budgets first then accounts);

(c) appropriateness to the relatively un-integrated structure of public bureaucracies in developing countries;

(d) operation of different scale systems at different levels of administration demanded by fiscal decentralization; and,

(e) evolution of migration tools to consolidate data from different versions of the same financial sub-system (e.g. old and new chart of accounts) (thus managing a financial reform at different stages). Modularity supports process change which is uneven between financial components and administrative levels.

It is important to understand the concept of modularity in the context of the design and implementation of an IFMIS. A well designed IFMIS will have discrete modules (e.g. budget, accounts) that are integrated. One design issue is whether these modules are sufficiently independent to allow multiple versions. For example, can the system provide a single-entry and a double-entry version of accounts and consolidate both? Even for the same module (accounts), can different versions be developed for different administrative levels and then be consolidated? Further, can the systems operate in different configurations: standalone, local area network, and wide area network? IFMISs have to be significantly customized to meet the varied demands of a financial reform and some applications are simply unable to support certain configurations (standalone) or different versions (single or double entry).

Modularity of design is essential to supporting a modular or sequential implementation of a financial reform. This is especially true in the common case of countries that are at the same time implementing fiscal decentralization because administrative levels will be at different stages in the decentralization and financial reform. A virtue of the custom IFMIS developed in Ethiopia, for example, is that it was extremely flexible and was able to run multiple versions of financial modules customized to each major administrative level and consolidate the data. Similarly in Ghana:

> FMS [Financial Management Systems] reforms should be divided up into
> self-contained modules. This is one of the key lessons from the Ghana
> experience where the high interdependency of the various components and
> sub-components has created significant implementation problems. A
> modular approach would allow a focus on changes that become necessary
> during project implementation on the specific module. The repercussions on
> the remaining project would be limited even in the case of delays or other
> difficulties with one module.[30]

Pathways to Financial Control
Ethiopia and Tanzania

Table 2 presents a four-stage framework of financial reform illustrated by the Ethiopian reform which has implemented the first three stages (comprehension, improvement, expansion) which has built the basics of financial control.[31] The 'toning' stages evolve existing procedures and is a far less risky approach than replacing procedures. PFM reforms which do not evolve financial systems avoid the first two 'toning' stages and leap directly to the third stage of 'reform' which introduces added risk with new techniques (e.g. double entry accounting, modified cash, single treasury ledger systems, financial statements). Unfortunately, developing countries are encouraged to continue this 'momentum' of reform and experiment with Stage 4 PFM reforms (e.g. accrual accounting,

performance budgeting, high end IFMISs). The development community has not fully appreciated that there are diminishing not increasing returns to PFM reform.[32] Modest improvements of existing systems can have significant effects.[33] Stage 3 reform (basics++) provides sufficient control and Stage 4 reform (basics+++) is unnecessary, inappropriate and substantially increases risk. 'International best practice' is primarily about Stage 4 reform and one reason developing countries are urged to adopt high end IFMISs is because these systems often have Stage 4 features. Beyond the appropriateness of such reforms, the high end IFMISs may not facilitate the migration of current financial systems to these 'best practices.'

The Ethiopian Reform

Broader Public Sector Reform Agenda. A public sector reform has three attributes: *ownership*, *purpose* and *approach*.[34] Ethiopia's public financial management reform was located within a broader civil service reform designed and driven by the government.[35] The government pursued an explicit strategy of limiting the influence of foreign aid agencies to ensure that <u>it</u> *owned* the reform. Bilateral and multilateral foreign aid agencies who were willing to provide grants (not loans) were invited to fund select parts of the reform with overall coordination located in the Prime Minister's Office and initially supervised in detail by the Prime Minister. The sources and form of financing were important because the financial reform was not tied to onerous and unrealistic conditionalities—reform could proceed at an appropriate pace. The *purpose* of the financial reform was to rapidly upgrade the country's financial system because of its deterioration caused by a long civil war and the urgent need to support the agenda of decentralization. The *approach* was to comprehensively upgrade the civil service generally and expenditure management specifically.[36] The approach to expenditure management was to evolve rather than replace existing systems because of the overriding government policy to rapidly decentralize. Rapid expansion of financial

Table 2

Pathways to Financial Control
The Case of Ethiopia

Components of Financial Control	STAGE 1 **Outcome:** Basics **Objective:** Comprehension **Approach:** Toning 1 **Schedule in ET:** Years 1-2	STAGE 2 **Outcome:** Basics+ **Objective:** Improvement **Approach:** Toning 2 **Schedule in ET:** Years 3-4	STAGE 3 **Outcome:** Basics++ **Objective: Expansion** **Approach: Reform** **Schedule in ET: Years 5-10**	STAGE 4 **Outcome:** Basics+++ **Objective:** Experimentation **Approach:** Reform **Schedule in ET:** Year 8-10 (not by the DSA Project)
Budget **Procedures** **IT** **Legal**	Budget Classification/ chart of accounts (Federal) Budget Manual--cost center budgeting (Federal) Public Investment Program (Federal) BIS (EU bid for IFMIS pending) Comprehensive financial law and regulations	Budget Classification/ chart of accounts (Regional) Budget Manual--cost center budgeting (R) Performance Budgeting Type 1 (R) BIS upgraded to SQL Server (EU bid for IFMIS pending)	 IBEX (F) then (R) (EU bid for IMFIS pending)	Per Budget Type 2 (Not working)* Bid for EU IFMIS Awarded
Commitment **Procedures** **IT** **Legal**	Manual-No change Manual No change New	" Automated		
Procurement **Procedures** **IT** **Legal**	New none New	No change No change No change		
Disbursement **Procedures** **IT** **Legal**	Manual—no change Manual—no change No change	No change No change No change	Single pool (R) ZTB (F) ZTB (R) IBEX-ZTB None	
Accounting **Procedures** **IT** **Legal**	Existing Documented Extensive Training BC/COA Legacy updated BDA 2 New financial law/regulations	D-Entry (F)/mod-cash D-Entry (R)/mod-cash BDA (3A), BDA (3B), BDA 3(B) upgraded to SQL server		
Reporting **Procedures** **IT** **Legal**	No Change No Change New financial Law/regulations	Financial Statements (F) Continuous upgrade in BDA	Extensive (F) (R) IBEX	

management to lower administrative levels meant that existing financial systems had to be extended while improvements and new systems had to wait. In summary, public sector reform was driven by a domestic not external agenda and while not initiated under an economic crisis, it was a high government priority with sensitive political and critical administrative objectives.

Ethiopia's Pathway to Financial Control. Unlike most African and developing countries, Ethiopia observes a hard budget constraint. This financial discipline has been the foundation for rapid decentralization and has allowed the PFM reform to take the necessary time to evolve the existing systems and start a long-term fundamental PFM reform which is sustainable and expandable. It has also meant that Ethiopia did not have to take shortcuts (e.g. write off the six year backlog in accounts) which would have undermined discipline and procedures of effective financial control. Effectiveness was not bartered for efficiency. Unlike the case of Tanzania and most developing countries, the PFM reform was not a response to a breakdown in financial control which required an immediate short-term response.

Ethiopia's pathway to financial control accords with 'international findings' that financial procedures in some African governments are relatively robust and that the risk of large-scale financial information systems can be reduced with iterative development and modular growth of smaller systems.[37] The challenge of financial reform faced by Ethiopia, was the need to rebuild a cadre of financial staff displaced by the long civil war and expand their number to staff the decentralized structure of government. Existing staff had an operational knowledge of the financial systems (they knew 'how to do it'), but lacked a deeper understanding of 'why' (the principles of accounting) and the 'rationale' (their legal responsibilities).[38]

The reform's approach to information technology accords with a number of trends in this field: avoiding large-scale IT systems in favor of smaller, rapidly and iteratively developed systems; IT should support not drive financial reform; user requirements should define systems; and that all information systems involve customization so there is not a priori advantage of commercial-off-the-shelf systems to custom/bespoke systems.

The Ethiopian case illustrates the fundamental issues of financial control faced by governments in Africa: procedures and the discipline to implement them. IFMISs are seen as a means of introducing and sustaining both procedures and discipline but worse, are assumed to be a 'quick' fix. The evidence would suggest that without manual procedures and an enforced legal framework, these systems have little or no effect. They do however add considerable risk to financial management and their high failure rates and low sustainability mean they should have a limited not primary role in PFM reform. IFMISs are certainly not a quick fix as some estimates suggest that it takes seven to nine years to implement an IFMIS in Africa.[39]

Table 2 presents the three stages of reform of financial control in Ethiopia. The first two stages 'toned' up the existing system and made it more comprehensible and effective. In these stages, over ten thousand staff were trained in the newly documented procedures mainly from the front-line districts which were delegated to be self-accounting (i.e. responsible for managing their own budgets and closing their own accounts). A legal framework including law, regulations and directives was the first task of the broad civil service reform program to be started and was completed before any of the other financial reforms were well underway. This legal framework, initially prepared for the federal government, was rapidly extended to regional governments. The reform of the legal framework reinforced the already high level of financial discipline by making individual roles, responsibilities and repercussions of misuse clear. Ensuring that an up-to-date legal pillar was in place early on was important especially

with the rapidly expanding decentralization of public financial management. The extensive

training of central and regional finance staff in the financial legal framework also made

officials aware of the seriousness of the reform and prepared them for the follow-on

procedural reforms in budgeting, accounting and expenditure planning.

The financial reform focused from the beginning on the basics—getting an up-to-date

legal framework in, and improving the performance of budgeting and accounting. Figure 4

presents the steps taken so far (1 and 2) the proposed evolution of the system (3,4,5).

In terms of the tactics of reforming financial control, the reform focused on the budget

and accounting components. Ethiopia began its reform with a hard budget and cash constraint

which allowed it to systematically build up the basics. It did not have to adopt emergency or

interim measures such as a cash budget. Cash management was manually and tightly

controlled by the Ministry of Finance and the Bureaus of Finance in the regions as line

spending agencies (at the respective central and regional levels) had to get monthly approvals

of cash flow by budget classification and line item. With the extensive second stage

decentralization to districts, over seventy percent of regional funds were transferred to these

remote and relatively weak administrative agencies. Budget and cash control remained strong

because of the tight manual control of salaries which comprise often eighty percent of

expenditure at districts. The introduction in district finance offices of a single pool (single

check book) for issuing all treasury payments concentrated control and limited discretion by

spending agencies.

The weak link in the current system is the delay in updating the adjusted budget.

Strong manual procedures and legal sanctions (with specified prison sentences), however, are

in place which limits expenditures without budget provision. Figure 5 is the

'Budget/Expenditure Subsidiary Ledger Card' which provides manual control of the budget,

adjusted budget and commitments by budget classification and line item. Effective manual

control exists but could be reinforced and made more efficient with automation.

Strengthening budgetary control is also enhanced by a clear separation of duties--making

budget rather than accounts departments responsible for the adjusted budget. Currently in

Ethiopia the arrangement varies with some agencies having accounts responsible and others

having the budget department responsible. There is a tendency in many governments for the

accounting staff to maintain the adjusted budget because they receive from spending agencies

the detailed documentation of expenditure as well as transfers. The ledger card in Figure 5

shows this integration of budget management (the first ten columns) with expenditure control

(the last four columns).

Figure 4

The Steps in Automating Financial Control in Ethiopia

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┌─────────────────────────┐
│   The Current System    │
└─────────────────────────┘
```

Step #1

- Budget preparation and adjusted budget
    - Rapid development of a Visual Basic/Access system
    - Upgrade from an Access RDBMS to MS SQL Server
    - Comprehensive upgrade to Java (WAN, LAN, stand-alone), extensive migration tools for legacy data
    - Piloting on a WAN
- Accounting
    - Migrated legacy system from mini computer to PC server
    - Migrated legacy COBOL single entry old chart of accounts to Visual Basic Access RDBMS
    - New version: new chart of accounts, single entry
    - Upgrade from an Access RDBMS to MS SQL Server
    - New version: new chart of accounts, double entry
    - Commitment control
    - Extensive consolidation tools (including nation-wide consolidation)
    - Comprehensive upgrade to Java based enterprise system (WAN, LAN, stand-alone), extensive migration tools for legacy data
    - Financial statements
    - Piloting on a WAN

Step #2
- Disbursement system
    - Transfers between central and regional finance offices

- -

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┌─────────────────────────┐
│  Proposed Next Steps    │
└─────────────────────────┘
```

Step #3 Procurement
- Purchase request
- Purchase order
- Inspection/receipt of goods and services
- Payables (including payment voucher)

Step #4 Disbursement (second phase)
- Check production and transfers
- Bank reconciliation

Step #5 Cash management and debt management
- Cash forecasting

- -

Figure 5
Budget/Expenditure Subsidiary Ledger Card

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Name: _____BOFED_____ Code ___152___

Name of Program: _____ Code ___00___

Name of Sub Agency: ___Adm & General Service_____ Code ___01___   Source: _____Treasury_____ Code ___1800___

Name of Sub Program: _____ Code ___00___   Type of Budget: _____Recurrent_____ Code ___01___

Name of Project: _____ Code ___000___   Item of Expenditure: ___Office Supplies____ Code ___6212___

No	Date	Description	Reference No	Approved Budget	Addition to Budget	Reduction to Budget	Adjusted Budget	Payment Received	Unpaid Balance	Commitment	Balance Not Committed	Expenditure		Balance	
												Debit	Credit	Debit	Credit
1	14/7	Me/Be/Ma 4	N/1/98	3,000			3,000				3,000				
2	26/7	Me/He 71	_					2,000	1,000						
3	1/8	Approval of PO	PO/1/98							2,000	1,000				
4	2/9	Approval of PO	PO/2/98							1,000	0				
5	10/9	Cancel PO/2/98	PO/2/98							-1,000	1,000				
6	15/9	Me/Be/Ma 6	RC/1/98		5,000		8,000				6,000				

The Strategy of Automation of the Ethiopian Reform

The strategy for automating the budget, accounts and disbursement reforms in Ethiopia has four attributes. First it is a custom and iterative approach. Second, it is driven by procedures. Third, it is simultaneously managed multiple versions of the system at different administrative levels. Fourth, the systems are developed in a phased approach based on user demand and resource availability.[40] The automation strategy accords with an emerging view that risk of large scale information systems can be reduced by evolving smaller systems.

> Public sector budgeting systems can encourage the funding of large and highly
>
> visible IT projects...that often fail. A radical approach, increasingly adopted in
>
> the private sector, is to avoid large projects altogether, opting for small
>
> projects instead. One expert has called this change a shift from 'whales to
>
> dolphins'. Adopting dolphins does not mean breaking big projects into small
>
> modules. Rather, it involves a shift to a different way of working and thinking,
>
> with total project time frames of no more than six months, technical
>
> simplicity, modest ambitions for business change, and teamwork driven by
>
> business goals.[41]

The baseline financial information systems at the start of the financial reform were rudimentary. Budgets were prepared on Excel spreadsheets and a simple accounting system written in COBOL operated on the mainframe.

There have been three distinct phases in the development of these systems (Table 3)

Table 3

The Evolution of the Ethiopian Financial Information Systems

	Phase 1 2000-2002	Phase 2 2002-2004	Phase 3 2004-Present
Features			
Functionality	Partial core	Partial core	Core
Architecture	Stand alone	LAN	WAN/LAN/Stand-alone
Level of integration			
Implementation	Weak/but delivered	Excellent Just in Time	Excellent Systematic
Data migration	Limited	Limited	Full
Complexity	Low	Medium	High
Visibility	Low	Medium	High
Expectations	Low	Low	High
Iterative development	High	High	Medium
Factors of Success			
Cost (development)	Low Under $100,000	Modest $1,400,000	Modest $1,650,000
Quality	Barely acceptable	Acceptable	International Standards
Speed	Slow	Slow	Fast
Risk	Low	Low	Low
Assessment			
Virtues	Development -requirements driven -clear forms Implementation -operational on time working	Development -LAN capability -rapid new reports Implementation -rapid piloting in region	Development -WAN capability -International standards -Functional review -Implementation -Consolidation capability -Additional reports
Deficiencies	Documentation Expandability	Sub-contractor	Sustainability Government' capacity to manage

Phase 1: Translating the requirements and operational testing. The first phase of automation focused on replicating the new manual procedures by creating a seamless interface between the manual forms and the input screens of the application. Phase 1 system development went hand-in-hand with the procedural design and the manual formats were meticulously designed and brought a new standard of clarity to budget and accounts preparation. Phase 1 automation produced an operational prototype that was tailored to the needs of users who had never used a customized computer applications. The risk of using an operational prototype for budgeting (the Budget Information System—BIS) was limited

because the new manual formats could have been processed using the previous practice of rudimentary spreadsheets.[42] The risk of using an operational prototype for accounts (the Budget Disbursement and Accounts—BDA system) was reduced because there was an existing operational application that was available. In summary, in this critical first stage of reform, risk was carefully managed by having redundant computer systems and by having the new system mirror the new manual formats.

In Phase 1, the distinctive contribution of the automation team was form design (translating the new manual procedures into the application's input screens). The technology platform of Phase 1 was rudimentary (Visual Basic and a Microsoft Access data base) and the costs were modest at under $100,000 per year. The IT investment of this phase was modest because this activity was not part of the scope of work.

Phase 2: Expansion of the Applications and Implementation. Phase 2 emerged with the government's introduction of second stage devolution and the automation reform had to cope with two requirements simultaneously: the introduction of double-entry bookkeeping and second stage devolution by the government from zones to weredas (districts). At a stroke, second stage devolution expanded the administrative scope of the system by a factor of fifteen and the challenge for the automation reform was to support the devolution and manage the dramatic increase in data processing. During this phase the database of the accounts application (BDA) was upgraded and introduced (along with the budget application—the BIS) into local area networks.[43] This 'outreach' phase involved extensive training and support for the applications.

To manage this expanded scope the project sub-contracted a local firm to assist in software development, training and application support. Scaling up the support task was critical to meet the dramatically expanded scope of the operations. Because these applications were custom, relatively simple and not proprietary, it was possible to augment locally the

capacity to develop and maintain them. If the system was an OTS IFMIS, it would have not been possible to customize it quickly much less support it as broadly in a timely cost efficient manner. During Phase 2, IT was budgeted and became an explicit part of the reform project's brief.

Phase 3: Redesigned to international standards. In the third and current phase of development, the budget (BIS) and accounting (BDA) systems have been significantly redesigned to meet and exceed international standards. The DSA project made the argument that in this final phase, it was prudent to leave the government with a system that would meet its needs (and international standards) long after the project had ended and before a potential OTS would be operational.[44] The project began work on the Integrated Budget Expenditure (IBEX) system which allowed data migration from the existing budget and accounts systems. Three other factors influenced the decision to upgrade the BIS and the BDA: government's development of a nation-wide voice, data and video network called WeredaNET; the growing requirement to strengthen financial management at the wereda (district) level; and, the continued delays in government's procurement of an OTS IFMIS. The IBEX system was meant to meet the current and future needs of government. From a functional perspective, the IBEX system replicates the manual procedures already automated in the existing BIS/BDA systems and supplements them as required to meet additional requirements from government. From a technical perspective, the IBEX system is a complete architectural re-design to meet the strategic requirements (international standards, WAN connectivity, and long-term sustainability). The IBEX demonstrates that a custom system can meet and exceed international standards.

In this third phase of systems development the project is implementing a two track strategy of financial information systems. Track one is continuing to rollout and support the BIS/BDA legacy systems nation-wide to regional and zone finance organizations (not

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districts) Track two of the strategy is the completion of the IBEX in a WAN, LAN and stand-alone version and the replacement of the BIS/BDA applications. The flexibility of the custom IBEX to operate within a full range of connectivity using modest bandwidth makes it suitable to the varied and limited ICT conditions in Ethiopia. The two tracks ensure that operational needs are continually met while moving to a more robust solution.

Beyond international standards. The current Ethiopian IFMIS is not only more comprehensive than the baseline 'best practice' prescribed for IFMISs (it has a budget module), it has significant innovations not found in state-of-the-art web based applications. In response to the limited bandwidth found in Ethiopia (and many developing countries), innovations were used in IBEX that allows it to operate on minimum bandwidth (it can run on a 28.8 Kbps connection—slow dialup).[45] The ability of the IBEX to operate with minimal bandwidth means it is able to use the emerging nation-wide WAN network (WeredaNET) which uses VSATs to link all of its district finance offices. The connectivity innovation of IBEX will soon allow Ethiopia to run an on-line financial management system at all levels of government throughout the country including the most remote locations. Other large-scale government applications which are being developed or have been borrowed from other countries have found the limited bandwidth a major hurdle that has limited their extension country-wide.

Table 4 presents the key technical features of Ethiopia's IFMIS.[46]

Table 4

Technical Features of Ethiopia's IFMIS
(Integrated Budget Expenditure-IBEX System)

1) Web based, browser based application with no client-side application requirements (except the browser and acrobat reader for PDF reports).

2) Ultra lightweight bandwidth requirement. This is a principle that has been applied throughout application development. Application runs well on 56kBps (dialup) and is even usable at 28kBps (slow dialup). This principle manifests itself in many lightweight application components such as the 'on-demand' loading tree's which only load portions of the tree at a time as the tree is expanded by users.

3) It has truly hybrid deployment capability: As a WAN distributed application (on the multi-server environment), or as a standalone application on a non-networked environment *without any additional application development* . This is quite unusual for a web-based application and it means that all the code developed for one deployment mode is completely used for the other deployment mode (a true time-saver in terms of design, development and testing time). Many IFMISs either do not support a standalone mode, or require a different client-side application with it's own development requirements.

4) Seamless integration between standalone non-networked installations and WAN distributed installations. This serves to 'integrate' (functionally) the non-connected installations with the central WAN distributed installations. This is accomplished using the integrated (built into the system) migration tools. This even allows for seamless migration of data from the legacy systems (BIS/BDA) to the centralized IBEX systems as necessary (for budget formulation and accounts consolidation nation-wide, etc.).

5) The preferential use of robust, enterprise-class open source frameworks. Everything except the actual database (SQL Server) and the web security product (Netegrity Siteminder) uses open source frameworks. This reduces cost. SQL Server and Siteminder were consciously chosen only because the alternatives were not so sustainable in the Ethiopian market (SQL Server due to lack other DBMS experience in market), or as best of breed product (In security matters, it is good to go with a proven, trusted product - Siteminder).

6) Application has its own embedded, declarative reporting framework yet is open to integration with third party reporting tools/systems. "Declarative" means that additional reports can be developed and new reports can be added without changing application code.

7) Highly granular security embedded in application but configured declaratively using XML and security configurations (again no code changes). This means that any application resource (functional module, page, button, link etc.) can be secured right down to the individual user level and read or write access to any individual piece of application data (such as Budget code, account code etc.) can be secured right down to the individual user level. As is usual, this security can still be applied at the group or role level as well (Such as by region, department or departmental role etc.)

8) Complete internationalization. Application currently runs in 4 languages (English, Amharic, Tigrigna and Oromiffa) and it is **very** easy to add additional languages (Actually adding additional languages is not even really a programming task, just a matter of translating text etc. to the new language)

9) Has desktop-like application usability. Is a rich web application including things like number-pad navigation support, field auto-fill and predictive text etc. Surpasses the usual web-browser *form* interface design.

10) Real functional integration between all functional modules. (i.e. data is entered once and available everywhere --with network of course). No batching or importing of functional data between modules within application.

11) Current modules: Budget, Budget Adjustment, Budget (Commitment) Control, Accounts (TR, GL Budget Execution), Disbursements. Open architecture means additional module development or even integration with third party applications is possible.

Source: Adam Abate, Eric Chijioke, Simon Solomon, DSA Project, 2007

Assessment of Ethiopia's Financial Information System.

Ethiopia's current financial information system exceeds international standards both in scope (it has a budget module), innovation (low bandwidth capability); and seamless integration of standalone and networked installations. The custom IFMIS (IBEX) meets most of the following criteria which we believe 'good' public sector information system should have:

1. *Operational*. Yes. Works and is available now and not in several years. It is a system in being not a system to be. Upgrades can be seamlessly introduced without disruption of service.

2. *Reliable.* Yes. Continuously available with few failures.

3. *Functional*. Yes. Delivers user requirements in terms of content and operates in four languages.

4. *Capable*. Yes. Performance meets or exceeds user needs especially effective in managing connectivity.

5. *Compatible*. Yes. Has extensive migration tools that data from legacy systems and fits with and reinforces appropriate manual procedures.

6. *Manageable.* Mixed. Non-IT government officials should have an adequate understanding of the capabilities and limitations of the system and can utilize most if not all of its resources. This capacity has not been fully developed in part because of the delay by the government in approving the financial statements. There are critical reports for accounts and budgets which meet the basic reporting requirements of government and foreign aid agencies.

7. *Sustainable*. Mixed. A system should be sustainable within country (not necessarily within government). Government should 'own' the system and limit dependence on any single contractor or vendor. It should be well-documented and

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government should have source code. The system is based on open source
frameworks, is extensively documented and has user manuals currently in English
as well as one national language (Amharic). The government owns the source
code. The principle risk is that the government has relied on a single technical
assistance project for the development of the IFMIS and this project is drawing to
a close. Despite the development of an extensive hand over strategy, it is doubtful
whether the government will be able to do product development in-house although
operational maintenance is possible in-house. The system was developed in
Ethiopia largely by Ethiopians so while the capacity to fully sustain this system
will in all likelihood not be in-house (within government), the capacity exists in-
country.

8. *Expandable*. Yes. A system should be able to grow with new requirements. This
   system has continually evolved and added new functionality.

9. *Affordable*. Yes. The initial investment and on-going maintenance should meet a
   'reasonable' social and cost benefit calculation. Software development of the
   different versions of the system has been $3.2 million (the latest system which is
   IBEX cost $2.5 million) and using an industry rule of thumb of 15% maintenance
   cost, the current IBEX system can be maintained for approximately $375,000 a
   year. In terms of social benefit analysis, a cadre of Ethiopian computer specialists
   have been trained in state-of-the-art systems development who can bring these
   skills to sustain this system as well as build additional systems for the Ethiopian
   market.

Tanzania's Financial Information System

The objective of the Tanzanian financial reform was to rapidly establish control over
cash. Ministries were incurring large commitments and overdrafts and the country was

running unsustainable deficits—there was not a hard budget or cash constraint and financial control was neither effective nor efficient. The initial reform introduced a centralized payment system (CPS) in the Auditor General's Office (not in the Ministry of Finance) which was later extended to district treasuries in a stand alone version.[47] The system was based on the Platinum mid-level commercial off-the-shelf package by EPICOR and was extensively customized to meet requirements. The core of this reform was the automation of the procurement and disbursement components of public financial control—generating by computer local purchase orders (or other ordering document) and checks.[48] The system now imposes detailed controlled by item of expenditure and sub-head and does not permit issuance of a purchase document without line item provision (even if there were funds remaining in other line items under the sub-head).

Whether manual procedures were 'totally dysfunctional' and needed to be replaced was the key strategic decision of the financial reform. The implementers of the automation strategy themselves argued that the approach was 'risky' and were concerned whether a software package existed which would fulfill the requirements.[49] Given the pathway to replace procedures, a package approach probably made sense as it allowed the rapid introduction of a system within six months.[50] We say probably because the extensive customization of the package may have taken more or less the same amount of time as starting with a custom solution. Some specialists in information technology have argued 'that whatever [a] package does is good enough and that customization is not an option…and if you do not follow this philosophy, implementing a COTS [commercial off-the-shelf] package is no cheaper and no less risky than building a system from scratch.'[51] The Ethiopian reform demonstrates that a COTS is potentially more expensive in the long term and definitely more expensive in the short term.

An alternative strategy (with arguably less risk) could have been done through a combination of manual procedures (removal of warrants),[52] rapid introduction of a tough and enforced legal framework and strengthening the budgeting and accounting components.

Both the Ethiopian and Tanzania experience with automating financial systems demonstrate the value of a modular approach and the need to selectively not comprehensively address core deficiencies of financial control—fixing the hole(s) in the whole. They both involved extensive customization to meet user requirements. They both put into question the need for 'high end' commercial off-the-shelf systems which are expensive, complex, difficult to customize and have features which have little or no use for the current or foreseeable needs of a government.

The modular approach adopted did make sense as the reformers needed to focus on the core problem of cash control. The Tanzanian reform demonstrates the virtue of selective financial reform in developing (and developed?) countries as it is not possible nor desirable to reform everything at once. A selective approach is at odds with the assumption that an IFMIS will provide extensive integration of financial components. One needs to be careful about how one defines integration within financial control generally and the role of an IFMIS specifically. The World Bank assessment of this reform was critical of its modular approach and the lack of extensive integration of financial components:

Because of the incomplete coverage of the IFMIS system, the data building

up the accounts is drawn from a large number of sources and not an

integrated accounting system. This clearly throws some doubt on the

reliability and completeness of the information. A number of systems are

not yet automated including external finance and the policy analysis

division.[53]

I disagree with this assessment. The modular approach adopted in Tanzania made sense given the priority to rapidly introduce selective financial control. The initial absence of a budget module and sub-head budget control however did weaken this control. The World Bank review of the system in 2001 found that 'accounting officers [could] allow expenditure in excess of the relevant budget head, thus informally diverting funds from the priority areas for which they were originally intended.'[54]

One can characterize this reform as a 'success' in that it introduced under crisis, effective and efficient control of two components of public financial control—procurement and disbursement.[55] The system did have a rapid effect: a World Bank study found "a noted reduction in the number of missing vouchers encountered by the Ministry of Education under the previous manual system"[56] and the "Controller and Auditor General Office indicated that 97.3% of non-payroll and non-procurement expenditures in fiscal year 2002/2003 had evidence to support authenticity of expenditure incurred."[57]

Missing from the initial installation was a budget preparation module and ministries, departments and agencies in the central government prepared their budgets with spreadsheets and other applications which in turn were reentered into the central IFMIS (in the OAG or the Ministry of Finance?).[58] In short, the system lacks budgetary control: 'IFMIS only controls against money released by Exchequer, but not against budget ceilings.'[59] While strict line item control can instill discipline, line items do not ensure financial control much less, optimal expenditure. Budgets are plans of expenditure and managers need discretion to reallocate during the fiscal year (of course without exceeding ceilings). Line items, especially miscellaneous items, facilitate fungibility and limit detailed control of expenditure for they can be used for a variety of goods and services. What is not clear from the literature on the Tanzanian reform was the impact of the CPS on the quality and composition of expenditure—not just staying within aggregates. A budgeting system (along with the audited

statement of accounts) is essential because it is the fundamental financial control in a parliamentary system and it presents the priorities and the details of expenditure needed to implement them. Effective control requires accountability on outcomes, not just on inputs.

There are a number of questions which the literature on the Tanzanian automation reform does not address. First, how was the backlog of accounts handled? If the existing systems were deemed to be 'totally dysfunctional,' presumably this backlog was 'written off' and the new system was used to manage expenditures going forward. Assuming double entry accounting was introduced, what beginning balance was used? A key issue for any automation strategy is how legacy data is to be handled? The need to migrate legacy data into a new system involves customization (sometimes extensive) so a fully 'turnkey' commercial off-the-shelf approach is not viable. A second question is what was the vision for the evolution of the basis of accounting system from cash to modified cash/modified accrual?[60] A third question is whether the internal audit or inspection capability was improved as that is a key link between the raising of a purchase order and the release of payment. Inspection verifies that the goods and services were received and given the indiscipline and dysfunctional procedures, this capacity would be critical to assure that the central payment system was effective and that corruption did not creep in. Inspection is perforce a manual procedure reinforced by a legal framework and if these procedures and framework are 'dysfunctional' then control over payment orders and check production is undermined. A fourth question is why was the legal framework updated four years after the reform started rather than at its beginning if indiscipline was a critical problem? A fifth question is the scope and content of the training of staff not just in the operation of the software, but in accounting more generally. Finally, given the extensive customization that has been done on the Platinum platform, does the government have ownership over the source code?

Two further issues of this reform need to be considered: connectivity and cost. On-line access is needed to <u>fully</u> reap the value of integration of an IFMIS. The limitations of bandwidth faced in the developing country environment has not been adequately acknowledged and addressed by IFMIS solutions, especially high end applications. The lack of bandwidth has blocked the extension of the on-line capability of the IFMIS in Tanzania and Uganda to outer areas.[61] In Tanzania, the regional sub-treasuries have yet to be connected to the central server in the Treasury Dar es Salaam because of 'sufficiency of bandwidth.'[62]

The literature is not clear on the total costs of the system but it would appear that it has more than tripled from the original budget of $1 to $2 million. One reason for the escalation in cost has been the unplanned customization for the budget and commitment modules which were not in the Platinum package due to its private sector origins and the additional costs 'of reprogramming [these customized components] each time a new upgrade of the software was installed.'[63]

The Tanzanian IFMIS can be assessed in terms of the following criteria which we believe 'good' public sector information system should have. This assessment is impressionistic because the literature does not provide adequate detail on these criteria.

1. *Operational*. Yes. Works and is available now.

2. *Reliable.* Yes. Continuously available with few failures. The literature does not provide details on performance and bandwidth has slowed processing even in the capital installations.

3. *Functional*. Mixed. Delivers user requirements in terms of content. The initial centralized payment system did not provide sub-head budgetary control but the current version does.

4. *Capable*. Mixed. Performance should meet or exceed user needs. The extension of the application on-line to users outside the capital has been significantly limited by bandwidth.

5. *Compatible*. Not clear. A system should migrate data from legacy systems and fits with and reinforces appropriate manual procedures.

6. *Manageable.* Mixed. Non-IT government officials should have an adequate understanding of the capabilities and limitations of a system and can utilize most if not all of its resources. There are limitations in this area.[64]

7. *Sustainable*. Mixed. Should be sustainable within country (not necessarily within government). Government should 'own' the system and limit dependence on any single contractor or vendor. It should be well-documented and government should have source code.[65] The literature does not go into the details of the government's ability to support this system in terms of product development or operations. The extensive customization has meant dependence on a single outside supplier and the literature does not clarify how well the system is documented, whether government has the source code or and whether the government has an IT department capable of fully taking over the system from the contractor.[66]

8. *Expandable*. Yes. A system should be able to grow with new requirements. A number of modules are being added to the system.

9. *Affordable.* Unclear. The initial investment and on-going maintenance should meet a 'reasonable' social and cost benefit calculation. There is insufficient cost data to determine the cost of maintaining the software much less the hardware.

Comparing the two reforms, Ethiopia's was driven by policy (administrative decentralization) while Tanzania's was driven by crisis (the need for a cash budget). Ethiopia's reform strategy was to evolve its legal framework and financial procedures using

automation in a supportive role. Tanzania's strategy was based on the assessment that the procedures were deemed 'totally dysfunctional' and that automation needed to be the driver of the reform. Ethiopia's reform started with a hard budget constraint and robust manual systems (effective control existed), and sought to improve the efficiency of the control of existing systems before changing them. Automation in Ethiopia was principally used to improve the efficiency of control. Automation in Tanzania was used to institute both effective and efficient control. The considerable difference in size of the two countries needs to be considered. The scale and remoteness of Ethiopia has required a measured rollout of automation as there are severe limitations in infrastructure. The geography has also required the rollout of a seamless manual/automated system as many frontline administrative units will not be automated for some time.

The origins and thus pathway of reform were very different in these countries. Success should be measured by not only where they began but also, where they are headed and the degree of sustainability. Have they built and are they building sufficient financial control?

Managing the Risk of Financial Information Systems in Developing Countries

Large scale public and private information systems are inherently risky and frequently fail or under perform.[67] This section presents five frameworks for assessing and reducing the risk of these systems:

- Project framework: scope, budget, schedule

- Business processes: process change vs innovation (reengineering)

- Small scale iterative development versus comprehensive development (dolphins rather than whales)

- Common problems in software projects and their antidotes

- The debate over custom versus COTS (commercial off-the-shelf solutions)

Framework #1: the Iron Triangle of Projects. Automation projects (as all projects) are driven by three variables: scope, schedule and budget. Scope is a function of resources and time.[68] 'Scope', refers to the number of activities and objectives to be achieved: many IFMIS planning schedules are complex, and require multiple tasks across weak institutions and complex management processes. 'Schedule' refers to the development timelines; while 'budget' determines the *ex ante* financial constraints, and how they are staged over time, within which the project has to be managed.

This 'iron triangle' represents the three critical (and interrelated) project design constraints and the management of these constraints is a necessary and possibly sufficient condition for successful automation projects.[69] Tailoring the scope, schedule and budget to local circumstances limits risk. The iterative approach mitigates risk by limiting the scope; sticking to short, frequently updated, and tight schedules; and, relying on modest incremental budgets. Scope is the key corner of this triangle: the project design objective should always be to reduce scope as much as possible at any given stage.

IFMISs in many developing countries have under-performed or failed because their scope has been excessive, their development schedules long and often indeterminate, and they have lacked hard budget constraints because they have been funded by overly generous and indeterminate concessionary foreign aid. There is no indication of a departure from this trend.

Instead of the iron triangle of effective project management, IFMISs have all too often been driven by a perverse triangle of incentives: government officials acquire rents, contractors a cash cow, and foreign aid agencies move money and impose unrealistic 'best practice' as conditions of grants and loans.'[70]

The perverse triangle explains why an inappropriate IFMIS strategy continues to be pursued in developing countries despite the consensus by information systems specialists and

even foreign aid agencies of the poor performance of the conventional IFMIS approach and the need for iterative strategies. Indeed, it is often not clear why supposedly scarce resources are applied so lavishly to IFMIS projects rather than other, arguably more needed, projects.[71] There are few if any incentives to economize. The central question should be whether an IFMIS can improve the outcomes of public expenditure: aggregate fiscal discipline, allocative efficiency and operational efficiency, leading to better lives for the population. If an IFMIS is principally justified for marginally improving reporting, is such a risky and costly investment justified? The cost-benefit calculus, both financial and social, of large public sector financial projects has generally been missing from most decisions to establish new systems: as costs and benefits in the form of net present financial or social values should guide marginal decisions, it is little surprise that the scope of IFMIS projects often tends to be inflated. I do not consider the economics of an IFMIS further, but they must be a central decision criteria along with the more technical criteria.

Framework #2: Business Processes. Financial reform in developing countries should be driven by the design of financial procedures. Once the financial system design is formulated, the automation strategy needs to be determined. That strategy must focus on what components should be automated, what components should be integrated, and what components should be both manual and automated.

Procedural reform can take two different forms: *process change* or *process innovation* (typically called business process reengineering).[72] Process change evolves existing procedures and work flows using information technology in a supportive role. Process change is a less risky strategy of reform as it works with existing requirements, and with existing developed knowledge and user capacity which is relatively low in developing countries. Process innovation involves a radical and comprehensive restructuring of procedures and work flows, and it uses information technology as the driver of change. The limited success

of reengineering efforts in both the private and public sectors in the 1980s, 1990s, and even now, in developed countries underscores the risks of a strategy of process innovation, particularly in developing countries.[73]

Therefore, IFMISs may fail or under-perform in developing countries because they typically involve a high risk strategy of process innovation. Public bureaucracies in those countries have limited capacity, and improvements are often best made through gradual strengthening of processes and skills. The presence of limited capacity does not necessarily imply the presence of dysfunctional financial procedures. In other words, process change is a strategy of improvement while process innovation is a strategy of replacement, and *the central question for financial reform, in the context of automation or simply basic design, is whether existing procedures should be improved, or whether they should be replaced.*

In his review of financial systems in Anglophone and Francophone African countries, Ian Lienert concludes:

> [T]he disappointing features observed are due not to the PEM systems themselves, but in the way they operate. [I]n the absence of attitudinal changes by all players of the budget process…it is unlikely that significant improvements will occur. Critical actions will be those directed towards enhancing budget discipline and improving accountability of all those responsible for budget preparation, execution, reporting and evaluation.[74]

Lienert's conclusion--that the basic designs of public finance systems in Africa (with exceptions) are reasonably sound while their execution is not--may not be universally accepted,[75] and clearly there is always scope for improvement. (The assumption was accepted in the Ethiopian reform and not accepted in the Tanzanian reform). Nevertheless, his conclusion supports the contention of this paper that in most African countries there is a reasonably strong base, existing or potential, from which to evolve financial systems—a process change approach.[76] A major reason why the budget and accounts reforms succeeded

in Ethiopia was because the existing system was evolved through a process of learning by doing—process change.

To summarize, the current approaches to IFMIS development as set out in most of the existing literature (the same literature that testifies to widespread failure) often propose excessively sophisticated solutions to an ill-defined problem (the need for better information for management, control and reporting) in an unsupportive and risky environment. Automation strategies thus should be driven by procedural improvements (process change) and manage risk.

Framework #3: Iterative Development. Emerging experience from the public sectors in both developed and developing countries suggests that the greater the complexity and scale of the IT platform to support financial systems, the greater the risk of failure or under-performance of that platform, and by extension the system as a whole. IT systems that started small and are iteratively expanded are less likely to fail or under perform because the associated risks can be managed better.[77]

> Public sector budgeting systems can encourage the funding of large and highly
> visible IT projects...that often fail. A radical approach, increasingly adopted in
> the private sector, is to avoid large projects altogether, opting for small
> projects instead. One expert has called this change a shift from 'whales to
> dolphins'. Adopting dolphins does not mean breaking big projects into small
> modules. Rather, it involves a shift to a different way of working and thinking,
> with total project time frames of no more than six months, technical
> simplicity, modest ambitions for business change, and teamwork driven by
> business goals.[78]

Process change does not require whales. Dolphins will do.

In his comparative study of information systems in developing countries, Richard Heeks found that systems with 'design divisibility' that feature modularity and

incrementalism promoted 'improvisation': that is, they fit information system design (imported from developed countries) to local conditions rather than change local conditions to fit system design. 'Improvisation' approaches were more successful than standardized approaches that were rigidly integrated.[79]

> The design divisibility meant staff could learn from early, relatively small failures, and could address subsequent improvisations of both design and actuality [local context] to manageable project components. They were not overwhelmed as they would have been by a single, whole system design. Design divisibility is therefore a frequently cited prophylactic against failure that should be adopted more widely. However, many donor-funded IS [information system] projects in developing countries take the opposite approach, partly because of short donor time scales and attention spans. Where design comes as this single whole, 'big bang' implementation, opportunities for local improvisation are reduced and risks of failure correspondingly increase.[80]

The conventional OTS IFMIS approach may be characterized as a 'big bang' reform which usually imposes standardized procedures (from developed countries and often from commercial (not public) applications. The rigidity, limited capacity, and high customization cost of such systems to be customized means that public bureaucracies must adapt to the system rather than evolve the system to fit their needs.

Framework #4: Common Problems of Software Projects. The sinking of one of the largest warships of the seventeenth century illustrates the common problems that sink software projects.[81] These ten factors plague IFMIS projects perhaps the two most significant were presented above in the project framework--schedule pressure and changing requirements. Table 5 presents the ten factors. The tenth factor, unethical behavior, has been

absent in the discussion of IFMISs. Is an IFMIS approach appropriate to a developing country environment or is driven by a misalignment of incentives amongst contractors, funders and governments?

As with the Vasa, there has been not been a formal and thorough review of the poor performance of IFMISs in Africa:

> According to the formal Vasa hearing's transcript, no one asked how or why the ship had become unstable or why it was launched with known stability problems. The failure of this line of inquiry is perhaps the most compelling problem from the Vasa case study, as is our often-observed, present-day failure to learn from our mistakes in software engineering.[82]

Table 5

Ten Software Project Problems and Some Antidotes[83]

Problem area	Antidotes
1. Excessive schedule pressure	Objective estimates More resources Better resources Prioritized requirements Descoped requirements Phased releases
2. Changing needs	Iterative development Change control/baseline management
3. Lack of technical specifications	Development of initial specifications Event-driven updating of specifications Baseline management of specifications A designated software architect
4. Lack of a documented project plan	Development of an initial plan Periodic and event-driven updating Baseline management of the project plan A designated project manager
5. & 6. Excessive and secondary innovations	Baseline control Impact analysis Continuous risk management A designated software architect
7. Requirements creep	Initial requirements baseline Baseline management Risk management A designated software architect
8. Lack of scientific methods	Prototyping Incremental development Technical performance measurement
9. Ignoring the obvious	Back-of-the-envelope calculations Assimilation of lessons learned
10. Unethical behavior	Ethical work environments and work culture Personal adherence to a code of ethics Independent quality assurance?

Framework #5: The Custom versus Package Debate. The argument that a COTS (commercial off-the-shelf) solution is superior to a custom approach is not proven. The literature is silent on whether the solution (custom or COTS) is a culprit in the failure or underperformance of IFMISs in Africa. In some sense, the distinction is a red herring because virtually all systems have to be customized especially in the public sector developing country environment. Package solutions that were adapted from the private sector require extensive customization as the case of Tanzania demonstrates (a custom budget and commitments module had to be developed). Table 6 presents a comparison of the success factors of a commercial-off-the-shelf (COTS) versus custom IFMIS applications. COTS are not superior to a custom approach. The key issues are: does the application meet user needs, is it sustainable in-country if not in-house (within government) and is it cost effective.

Table 6[84]

The Attributes of a COTS versus Custom Solution

Success Factors	Customized Off-the-Shelf	Custom
Cost	**High Cost.** Initial product cost Implementation &Customization costs Licensing fees Future upgrade costs including additional costs to reengineer existing customizations	**Lower cost.** Depends on scale and quality of implementation.
Product/Vendor Lock-in	**Locked into product.** Has **high cost implications** for evolution.	**Locked into implementation vendor**. High barrier to proliferation of specialty skills required to maintain and evolve systems.
Excessive Scope Schedule overruns	**Misaligned Incentives** means that Implementers sell excessive scope in unrealistic timeframes, expecting (indeed hoping for) schedule blowouts and overruns	**Variable.** Ad-hoc nature of implementation methodology means that schedule depends a lot on an experienced of project managers/architects. Lack of standards to determine proper scope/ implementation methodology.
Follow-On Support	**Support always available** from implementation vendor or product developer, but at **high cost**.	**No guaranteed follow-on support** as skills concentrated with implementation vendor and subject to vendor's terms.
Quality Assurance	**Core services well tested**, but all customization subject to quality of implementation	**Variable.** Subject to quality of implementation
Best Practices (Procedural, Implementation methodology, systems)	**Best practices as defined by vendor**. OTS solutions come with embedded procedures. Replace instead of supplement or build-on existing procedures. Typically IT driven, top-down approach (risky).	**Variable.** Best practices subject to the quality of requirements, specification and implementation. Can be subject to distortion by users/political ends. Can integrate well with existing procedures. Orientation (top-down vs. bottom-up) dependent on
Staff Retention	**Very difficult.** Skills in OTS systems highly sought after in private sector.	**Good.** Specialized skills in custom PFM application use not marketable. Implementation not done by staff.
Role Perception	**Strong brand perception**. **Negative dependence perception** (on vendor).	**Negative dependence perception** (on implementers).

Source: Adam Abate and Eric Chijioke, DSA Project, 2007.

Conclusion

The central question about automating financial systems is whether it contributes to

effective and/or efficient control without due risk. Arguably both the Ethiopian and

Tanzanian reforms have been successful. Both pathways were selective and focused on

systematically addressing key weaknesses in financial control. The first order task was to instill effective control while the second order task is to improve the efficiency of control. Both involved extensive customization. The cases demonstrate that an overly integrated and complex solution which relies principally on technology to instill control does not work. The conventional wisdom of the role of IFMISs needs to be reconsidered.

References

[1] I am grateful to Adam Abate, Mebrahtu Araya, Eric Chijioke, Sally Houstoun, James Joseph, Perran Penrose and Simon Solomon for helpful comments, exchanges of ideas, or references, some of which influenced me quite a bit, although none should be held responsible.

[2] Petroski, Henry (1992). *The Evolution of Useful Things,* Vintage, p. 236.

[3] The failure or under performance of IFMISs and large scale financial information systems have been extensively documented: The World Bank (2002). 'Design and Implementation of Financial Management Systems: An African Perspective,' Africa Region Working Paper Series No. 25; Dorotinsky, William (2003). 'Technology and Corruption: the Case of FMIS,' The World Bank; Diamond, Jack, Khemani, Pokar (2005). 'Introducing Financial Management Information Systems in Developing Countries,' IMF Working Paper No. 05/196; Peterson, Stephen (2007). 'Automating Public Financial Management in Developing Countries.' In Shah, Anwar (ed). *Budgeting and Budgetary Institutions*, The World Bank; Dorsey, Paul (2002). 'The Top 10 Reasons Why Systems Projects Fail,' www.dulcian.com; International Monetary Fund, (2006). 'Selected African Countries: IMF Technical Assistance Evaluation—Public Expenditure Management Reform,' p. 53.

[4] On the limitations of African bureaucracies to absorb information technology see Peterson, Stephen (1998). 'Saints, Demons Wizards and Systems: Why Information Technology Reforms Fail or Under Perform in Public Bureaucracies in Africa.' *Public Administration and Development,* Vol. 18, pp. 37-60; Peterson, Stephen (1996). 'Making IT Work: Implementing Effective Financial Information Systems in Bureaucracies of Developing Countries,' in Glenn Jenkins (ed), *Information Technology and Innovation in Tax Administration.*

[5] Keen, Peter (1991). *Shaping the Future: Business Design Through Information Technology,* Harvard Business School Press, p. 214.

[6] The Tanzanian reform has been viewed as a qualified success in the literature Diamond and Khemani (2005); IMF (2006); and Wynne (2005). Wynne (2005) and early assessments World Bank (2001), *Country Financial Accountability Assessment—Tanzania*, do raise concerns.

[7] Wynne, Andy (2005).'Public Financial Management Reform in Developing Countries—Local Solutions for Local People?'

[8] Perran Penrose. This insight on public financial reform is virtually absent in the literature although in Allen Schick's argument that developing countries should not adopt New Zealand style reforms implicitly makes this point, Allen, Schick (1998). 'Why Most Developing Countries Should Not Try New Zealand Reforms.' Paper presented to PREM Seminar, World Bank, Washington, D.C.

[9] Athukorala S.L, and B. Reid (2003). *Accrual Budgeting and Accounting in Government and its Relevance for Developing Countries,* Asian Development Bank.

[10] Schick, Allen (1966). 'The Road to PBB: the Stages of Budget Reform.' *Public Administration Review*, Vol. 26, pp. 243-255; Schick, Allen (1988). 'Contemporary Problems in Financial Control,' in R. Brown (ed). *Accounting and Accountability in Public Administration..*

[11] Dorontinsky (2003). Automation can not defeat corruption alone, the weak—soft systems around the 'hard' IT can defeat the IT. In one state in Nigeria, senior officials were able to circumvent the SAP IFMIS and proceed with procurement not sanctioned by the system.

[12] In am indebted to Sally Houstoun for making this critical distinction.

[13] There is little or no mention in the literature of the custom IFMIS being developed by Accenture for the South African government.

[14] This framework focuses on expenditure not revenue which is the focus of most IFMISs.

[15] The failure of the 'hurdle approach' to budget reform in Thailand was due to the failure to properly sequence and the excessive sophistication of the approach which were based on 'best practice,'see Dixon, Geoffrey (2002). *PREM Note* No. 73, The World Bank.

[16] Wildavsky makes the critical point that the format in which a budget is appropriated does not preclude different forms of analysis, see Aaron Wildavsky, 'A Budget for all Seasons? Why the Traditional Budget Lasts', *Public Administration Review,* Vol. 38, November 1978, pp 501-509.

[17] Even with the GFS 2001 format, reports can still be provided from cash accounts although some figures/reports will not be provided when cash accounting is used.

[18] Schiavo-Campo, Salvatore and Tommasi, Daniel (1999). *Managing Government Expenditure,* Asian Development Bank, Manila, p. 146.

[19] One virtue of Ethiopia's IBEX system is that it allows consolidation of discrete government entities and/or with a non-networked architecture which is needed where the ICT infrastructure is poor.

[20] Deepak Bhatia of the World Bank provides the following specification (which is the accepted convention) of what the core of an IFMIS should be: general ledger, accounts payable and receivable and may also include financial reporting, fund management, cost management. The non-core functions are: human resources/payroll, budget formulation, revenue (tax and customs), procurement, inventory, property management, performance, and management information. See Bhatia, Deepak (2003). 'IFMS Implementation: Aspects for Consideration,' World Bank.

[21] The Tanzanian reform had to customize at considerable expense the OTS IFMIS (Epicor) to include budgeting and commitment. Wynne (2005), p. 22. While Bhattia includes fund

(presumably 'funds') management in his definition of the core modules of an IFMIS, Diamond and Khemani (2006) exclude disbursement altogether (pp. 100, 102).

[22] It is important to distinguish a budget formulation module from and budget control module. Some IFMISs do capture budgets in the General Ledger and therefore commitments and expenditures can still be controlled against budget (and presumably kept up to date with an adjusted budget in the GL). Budget preparation can and often is done by a separate system.

[23]The inappropriateness of excessive reengineering or streamlining of procedures that remove redundancy needed to check rent seeking and improve reliability in developing bureaucracies. See Peterson, S (1997). 'Hierarchy Versus Networks: Alternative Strategies for Building Organizational Capacity in Public Bureaucracies in Africa.' in Grindle, M (ed). *Getting Good Government: Capacity Building in the Public Sectors of Developing Countries.*

[24] One weakness of the Uganda IFMIS was the absence of a parallel manual system, see World Bank (2002).

[25] A further virtue of developing a robust manual system is that you start the not so insignificant translation of procedures into local languages and you develop user guides and training manuals. The accounts manual for Oromia in Ethiopia took two years to translate. By proceeding early with this step, the computer application which had internationalization capability, could be quickly modified to operate in this language.

[26] A virtue of having a manual system is that it puts a structure—an architecture to the system.

[27] Many developed countries do not have comprehensive integrated financial systems and even comparatively large and advanced transitional developing countries (China and India) which have the technological capability to develop and operate large scale information systems, have opted for simpler custom systems. China currently uses a custom system though is reviewing OTS solutions; while Andhra Pradesh state in India adopted an

innovative 'middleware' solution which linked its legacy systems together See Government of Andhra Pradesh. (2001) 'Request for Proposal: Integrated Finance Information System.'

[28] A consolidation module should be a core module in an IFMIS in order to provide prompt financial statements. Consolidation is need where different levels of government have their own set of accounts (discrete systems and databases).

[29] IBEX stands for the Integrated Budget and Expenditure system.

[30] World Bank (2002).

[31] Peterson, Stephen (2001). 'Financial Reform in a Devolved African Country: Lessons from Ethiopia,' *Public Administration and Development,* Vol. 21, pp. 131-148.

[32] Perran Penrose.

[33] There is an emerging awareness by foreign aid agencies of the need for modest PFM reform, see SIDA, (2007). *Public Finance Management in Development Cooperation: A Handbook for Sida Staff,* p. 95.

[34] I am indebted Perran Penrose for stressing the importance of 'purpose' in financial reform. This attribute is often overlooked—see for example Schick, Allen (2001). 'Opportunity, Strategy and Tactics of Financial Reform, *OECD Journal of Budgeting.*

[35] The Ethiopian financial reform was located within a broader Civil Service Reform which was painstakingly designed by the Government over a two year period see Office of the Prime Minister of Ethiopia (1996). *Task Force for Civil Service Reform Comprehensive Report,* Volumes 1-5, Addis Ababa. Technical assistance for the budget, accounts, expenditure planning reforms was provided the Decentralization Support Activity (DSA) Project which was implemented by Harvard University and funded by USAID, Ireland Aid, and the Royal Netherlands Embassy. For an overview of this technical assistance see, Decentralization Support Activity (2006) 'Overview of the DSA Project: Reform Strategy

and Components of Reform (Budget Planning, Accounting and Financial Information Systems,' Project Report M-70, June 7, 2006.

[36] The scope of Ethiopia's civil service reform program was massive and included five pillars: top systems management, human resource management, expenditure management and control, service delivery and ethics.

[37] Ian Lienert makes the point that financial procedures in Africa are relatively robust see Lienert, Ian (2002). 'Comparison Between Two Public Expenditure Management Systems in Africa,' *IMF Working Paper No 03/2*, Washington, p. 31; and the OECD has found iteratively developed information systems more appropriate than comprehensive see, OECD (2001). 'The Hidden Threat to E-Government: Avoiding Large Government IT Failures.' *PUMA Policy* Brief No.8.

[38] Yardly, James (1997). 'Assessment of Training Needs in Accounting and Accounting Practices,' Decentralization Support Activity Project Brief No. A-2.

[39] Dorotinsky (2003).

[40] The financial reform was piloted and rolled out sequentially not comprehensively so there were leads and lags in the over all system configuration. For example, some regions were operating the new chart of accounts with double entry bookkeeping, some were operating the new chart of accounts with single entry bookkeeping while some were operating the old chart of accounts with single entry booking. All three systems needed to operate simultaneously and share data.

[41] OECD (2001). The iterative 'dolphin' approach to financial systems development is also supported by a recent World Bank study of financial systems in Africa which found that a 'well-focused, incremental approach is more likely to succeed' than a comprehensive approach.' See World Bank (2002), pp. 12-13. The dolphin approach accords with the

‘extreme’ programming approach to systems development which is based on very rapid development of a system which allows the user and the developer to fine tune requirements.

[42] There are several versions of the BDA system.

[43] The migration was from Microsoft Access to Microsoft SQL Server.

[44] Introducing the IBEX was a prudent strategy even if the government decides to procure an OTS IFMIS because full implementation will take several years.

[45] IBEX requires only minimal bandwidth because only those parts of the interface that need to be refreshed (reloaded) are reloaded.

[46] Decentralization Support Activity (2006).

[47] Joel Jones Kijalo Mwanza, Assistant Accountant General, United Republic of Tanzania, ‘The Integrated Financial Information System,’ presentation to the East Afritac conference on Integrated Financial Management Information Systems, Windsor Golf and Country Club Resort, Nairobi, Kenya, November 8-12, 2004.

[48] Ministry of Finance, Government of Tanzania (2006). ‘Reforms Achieved,’ p. 2. Kiragu, Kithinji (2005). ‘Tanzania: A Case Study in Comprehensive and Programmatic Approaches to Capacity Building,’ Report to the World Bank, June 2005, p.14.

[49] Murphy Peter, Bhatt Harish (2000). ‘Integrated Financial Management in Tanzania,’ Paper presented to the International Consortium on Governmental Financial Management, Miami Florida, March 27-March 31.

[50] Bhatt and Murphy (2000), p. 176.

[51] Dorsey (2002), p. 9.

[52] Lienert (2002).

[53] World Bank (2001). Country Financial Accountability Assessment—Tanzania,’ p. 30 cited in Wynne (2005), p.19.

[54] Ibid.

[55] Diamond and Khemani (2005) contend that the Tanzanian IFMIS 'appears to be the most successfully implemented system in Anglophone African countries,' p. 15.

[56] A World Bank/International Records Management Trust Partnership Project, 2002 cited in Cuffie, Lam, Tung, Watanabe and Wendle, 'Tanzania's PFM Reform: IFMS and MTEF,' research paper, John F. Kennedy School of Government, Harvard University, Spring 2007.

[57] Embassy of Denmark, Public Financial Management Program Document, 2004 cited in Cuffie, Lam, Tung, Watanabe and Wendle, 'Tanzania's PFM Reform: IFMS and MTEF,' research paper, John F. Kennedy School of Government, Harvard University, Spring 2007.

[58] Wynne (2005).

[59] At least until 2001, the CPS did not control on sub-head. The World Bank (2001) review found that 'accounting officers [could] allow expenditure in excess of the relevant budget head, thus informally diverting funds from the priority areas for which they were originally intended," cited in Wynne (2005), p. 19.

[60] Diamond and Khemani (2005) contend that the accounting system is 'essentially maintained on a cash basis' although the system does have payables and receivables, p. 14.

[61] Wynne (2005) found that as of March 2005, the IFMIS only connected 40 ministries and departments in Dar es Salaam and that the regional sub-treasuries and regional secretaries were not connected nor were the ministries based in Dodoma, p. 18. Uganda's IFMIS may not be suitable for extension to lower levels of government and it is recommended that a 'smaller scale' package be implemented which involves less effort.' See Aarnes, Dag, Murphy, Peter, Williamson, Tim, 'Appraisal Report: Financial Management and Accountability Programme, FINMAP Uganda,' May 25, 2006, pp. 38-39.

[62] Ministry of Finance Government of Tanzania website, http://www.mof.go.tz/index.php?option=com_content&task=view&id=34&Itemid=49, cited

in Cuffie, Lam, Tung, Watanabe and Wendle, 'Tanzania's PFM Reform: IFMS and MTEF,' research paper, John F. Kennedy School of Government, Harvard University, Spring 2007.

[63] Wynne (2005), p. 19. While the total cost of the Tanzanian IFMIS is not stated, it is estimated that cost to date is $5 million which does not include technical support, cited in Cuffie, Lam, Tung, Watanabe and Wendle, 'Tanzania's PFM Reform: IFMS and MTEF,' research paper, John F. Kennedy School of Government, Harvard University, Spring 2007.

[64] Wynne (2005) notes that the CPS promotes central control in the Accountant General but has 'disadvantages in terms of ownership and the level of expertise available in the line ministries to use the information provided by the IFMIS to improve the management of their financial resources,' p. 20.

[65] The source code of the customization of a off-the-shelf package should be provided.

[66] There is no mention in the literature on the Tanzanian financial information system of whether a Quality Assurance Audit has been conducted. Has anyone 'looked under the hood' to assess the quality of the customization, its documentation, user manuals, etc.

[67] Dorsey (2002).

[68] Chijioke, Eric (2004).'Managing Large-Scale Information Systems Development: A Dymystifing Approach.' Presentation to the Executive Program in Public Financial Management, John F. Kennedy School of Government, Harvard University, July 17, 2004.

[69] Getting the requirements of an information system of course, is the most important factor determining its success.

[70] According to the contractor, the Government of Tanzania adopted a 'risky' strategy of using an OTS IFMIS [Epicor] because the financial procedures were deemed to be 'completely dysfunctional.' The decision to adopt an OTS IFMIS was driven in large part by the demands of foreign aid agencies for the country to rapidly improve budget execution. See Murphy and Bhatt (2000), p.168.

[71] While IFMISs are commonly being recommended and funded in aid dependent countries in Africa, they are not common in either OECD countries or in further developed developing countries (e.g. India, China) or even Asian tigers—Taiwan.

[72] Davenport, Thomas (1993). *Process Innovation: Reengineering Work through Information Technology,* Harvard Business School Press, pp. 11-15.

[73] Varon, Elana (2004). 'For the IRS There Is No Easy Fix, *Australian CIO.*

[74] Lienert, Ian (2002). 'Comparison Between Two Public Expenditure Management Systems in Africa,' *IMF Working Paper No 03/2*, Washington, p. 31.

[75] Whether one can extend Lienert's argument to other developing countries is an empirical question. Experience from selected Latin American countries highlights the virtues of existing procedures and the inappropriateness of new procedures imposed by a technology solution. "[A]n original design option for a new hospital IS (information system) in Guatemala was to reengineer administrative processes to make them more efficient. But in reality, hospital directors supported current procedures and wanted controls to remain in place to ensure corruption was held in check. The design was therefore amended to ensure that these current work processes were supported by the new system." Silva, et al. (2000) presented this problem cited in Heeks, Richard (2002), 'Information Systems and Developing Countries: Failure, Success and Local Improvisations.' *The Information Society.* p. 108.

[76] Lienert's research also points out the limits of introducing complicated procedural reforms into developing countries—which is what an IFMIS does. Francophone countries in Africa have elements of accrual accounting (e.g. recording of financial assets and liabilities) but do not function well because they are 'either too complex and archaic to operate and/or the rules are flouted.' Despite the relative sophistication of the accounting systems, they are unable to deliver the 'basics' (prompt monthly and year-end reports). See Lienert (2002), p. 29.

[77] World Bank (2002), p.13.

[78] OECD (2001). The iterative 'dolphin' approach to financial systems development is also supported by a recent World Bank study of financial systems in Africa which found that a 'well-focused, incremental approach is more likely to succeed' than a comprehensive approach.' See World Bank (2002), pp. 12-13. The dolphin approach accords with the 'extreme' programming approach to systems development which is based on very rapid development of a system which allows the user and the developer to fine tune requirements.

[79] For developing countries, Heeks (2002) stresses the virtue of improvisation rather than standardization—don't change the local conditions to fit the information system design rather, change the design to fit the situation.

[80] Heeks (2002). p.110.

[81] Richard Fairly and Mary Wilshire, 'Why the Vasa Sank: 10 Problems and Some Antidoes for Software Projects,' *IEEE Software*, March/April 2003.

[82] Ibid., p. 25.

[83] Ibid.

[84] Adam Abate and Eric Chijioke, DSA Project, 2007.