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### **Automating Public Financial Management in Developing Countries**

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**Automating Public Financial Management in Developing Countries**

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## Abstract

The principal recommendation to developing countries for automating their financial systems is to adopt off-the-shelf integrated financial information systems (IFMISs). The recommendation to adopt an IFMIS goes beyond a strategy of automation. IFMISs are often viewed as the driver of financial reform in developing countries. Experience shows that these systems usually fail or under perform yet research to date has not adequately explained their poor performance. This paper presents two frameworks and a case study from Ethiopia which illustrates an approach to automating financial systems that has worked. The first framework distinguishes between business process *innovation* (reengineering) and process *change*. Process innovation is a comprehensive change of procedures and organization driven by information technology. Process change is an incremental strategy driven by procedural reform and supported by information technology. Process change is far less risky than process innovation and is a more appropriate approach because the financial systems in most developing countries are relatively sound and thus provide a basis for improvement. The conventional off-the-shelf IFMIS reform is principally process innovation which exceeds the capacity of most public bureaucracies in developing countries. The second framework concerns the three factors of risk to an automation project: scope, schedule and budget. The availability of concessionary aid to many developing countries means there is not a hard budget constraint to automation projects and there is little discipline with schedule and scope. The virtual absence of a financial and social cost-benefit analysis of these large and questionable investments is a serious failing in the use of development assistance and loans. The custom IFMIS developed to support the Ethiopian reform is presented as an example of a successful low risk strategy of automation in a difficult environment. The case illustrates the two frameworks as the reform focused on process change and the automation component was delivered on budget, ahead of schedule and beyond specification. The Ethiopian case demonstrates several lessons about automation in developing countries: the virtue of process change, the role of automation to support not drive financial reform, the virtue of 'optimal obscurity' of automation projects given that high level commitment can not be assumed, and the value of an incremental development strategy of frequent operational upgrades of information systems.

## INTRODUCTION<sup>1</sup>

*A complex system that works is invariably found to have evolved from a simple system that works.* John Gall

In recent years Integrated Financial Management Systems (IFMISs) have become core components of financial reforms in developing countries. The purpose of this paper is to set out the functions of these systems and how to manage them with particular reference to the choices that developing countries face as they seek to introduce improved financial management. In that IFMISs require a relatively complex IT platform, the paper also discusses at some length the questions that surround the decision that governments must take when procuring an IFMIS, above all, whether to purchase off-the-shelf (OTS) systems and customize them, or to develop their own tailored systems. The subject is important because of the apparent general consensus that IFMIS systems have not met the high expectations that seem to have been attached to them.<sup>2</sup>

Moreover, there is a second dimension that needs to be addressed: the same literature that analyses the failure of IFMIS also argues that IT systems not only should provide a technology platform to manage transactions and the budgetary process, but should also go further and *drive* budgetary reform. In the process, the demands of IFMISs (especially OTS), force governments to adapt their systems to those demands, and those governments thereby make 'reforms' that they would not otherwise make.<sup>3</sup> This is an important reason why an IFMIS may fail.

Two themes underlie this discussion about information technology in public financial systems. First, information technology should *support, not drive*, public financial management reform. Second, the introduction of information technology systems comes with considerable risk and the single most important factor in deciding

on a strategy of automation is the management of the associated risks, both of failure and of wrong functionality.

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).<sup>4</sup> 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.<sup>5</sup>

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.<sup>6</sup>

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,<sup>7</sup> and clearly there is always scope for improvement. 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.<sup>8</sup> 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.

The rest of this paper is in four parts. The first part outlines an automation strategy that supports process change. The second part presents a framework of managing risk in financial information systems and examines several country examples. The third part illustrates an appropriate automation strategy of process change in a difficult environment using the example of the Ethiopian reform. The final part

concludes with a summary of the issues developing countries should consider when they embark on the automation of their financial systems.

### **AN AUTOMATION STRATEGY FOR PROCESS CHANGE**

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.<sup>9</sup>

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.<sup>10</sup>

Process change does not require whales. Dolphins will do.

The vision of an OTS IFMIS is appealing to many. It seems, all at the same time, to install international standards, instill discipline, improve efficiency and strengthen control by connecting all the financial sub-systems. The menu of features offered is attractive and seems to provide a one-stop-shop for public financial sector reform. Indeed, it is not an exaggeration to say that, in the minds of many authorities, an IFMIS raises the bar of financial management and lifts it out of the reach of corruption. The apparent virtues of OTS IFMIS systems in aid dependent countries are very attractive to



donors and creditors concerned with fiduciary risk as well as governments that wish to fulfill conditions in order to gain access to foreign aid resources. The adoption of an OTS IFMIS is viewed as 'international best practice'<sup>11</sup> and seems to have become a tangible indicator of a government's commitment to reform.

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.<sup>12</sup>

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.<sup>13</sup>

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. Indeed it is worth noting that some specialists are emphatic that a decision to procure an OTS

application must be a decision not to customize. Customizing an OTS application they contend, 'is no cheaper and no less risky than building a system from scratch.'<sup>14</sup>


### WHAT IS AN IFMIS?

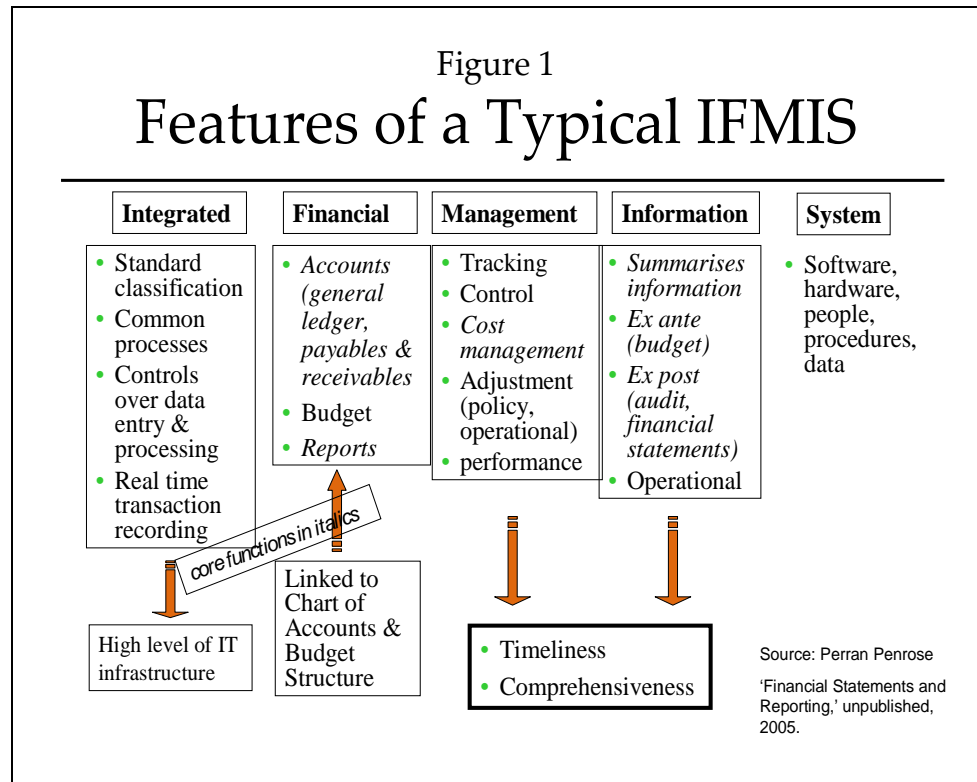
An IFMIS provides governments with a tool that can support financial control, management, and planning. By managing a core set of financial data and translating this into information for management, these three financial functions are supported.

More narrowly defined, an IFMIS is a computer application that integrates key financial functions (e.g. accounts, budgets, etc) and promotes 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. Figure 1 presents what an IFMIS is and Figure 2 presents how it works.

#### *What is an Integrated Financial Management System (IFMIS)?*

##### **Financial function of an IFMIS (Column 2, Figure 1).**

IFMISs are usually considered in terms of core and non-core financial functions.<sup>15</sup> 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.  conventional specification of the IFMIS core is accounting and reporting functions, while non-core functions include budgeting, commitment control, cash management and disbursement functions.<sup>16</sup> The common specification of the core functions does not include all of the components needed for effective financial control and, by definition, therefore, will increase risk. The limited comprehensiveness of the conventional core functions of an IFMIS stems in large part from the private sector origins of IFMIS technology. In short, IFMISs do not 'get the basics right' for public sector financial management. This raises the question of how they can constitute 'best practice'.



At a minimum, a proper core of financial functions should include, in addition to accounting, budget, commitments, cash management and disbursement. Many IFMISs lack a core cash management function that ensures adequate cash to disburse against the commitment. The absence of a commitment module is a serious omission. Strong financial control requires a linked set of core modules, as follows:

- (a) a budget module that sets ceilings. Budgetary control requires that an adjusted budget be maintained at all times, and that it is available at the end of the fiscal year for the prompt closure of accounts. (While the inclusion of a budget module is ideal, the commonly accepted definition of a core IFMIS does not conventionally include a budget module for preparation and adjustments);
- (b) a commitment control module which controls balances incurred but not disbursed. Commitment control is critical for avoiding arrears (again not conventionally specified as a core module);

- (c) a cash management module that shows cash available to pay commitments (again, not specified as a core);
- (d) a disbursement module that records disbursements; and
- (e) an accounts module which records expenditures once goods and services are received.<sup>17</sup>

Even if IFMISs do include the five financial components listed above which are needed for effective control (budget, commitment, cash management, disbursements, accounts), that would not prevent their disuse or misuse or make up for lack of financial discipline. For example, weak commitment control is a problem in many Anglophone African countries, resulting in the accumulation of arrears. Commitments could be controlled through manual procedures (warrant withdrawal) but this is “rarely done” and “reflects the generalized lack of financial discipline.”<sup>18</sup>

**Integrated function of an IFMIS (Figure 1, Column 1).** 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 ‘real time’ (on-line) data sharing 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.

IFMISs are integrated two ways: in terms of data management and also in terms of modularity. Integration is both a virtue and weakness of IFMISs. When IFMISs are integrated in terms of data management, but at the same time they are not modular, this may impose a rigidity that limits customization. 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 unintegrated 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.<sup>19</sup>

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.<sup>20</sup> 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.<sup>21</sup> 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.<sup>22</sup> 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.<sup>23</sup> 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.

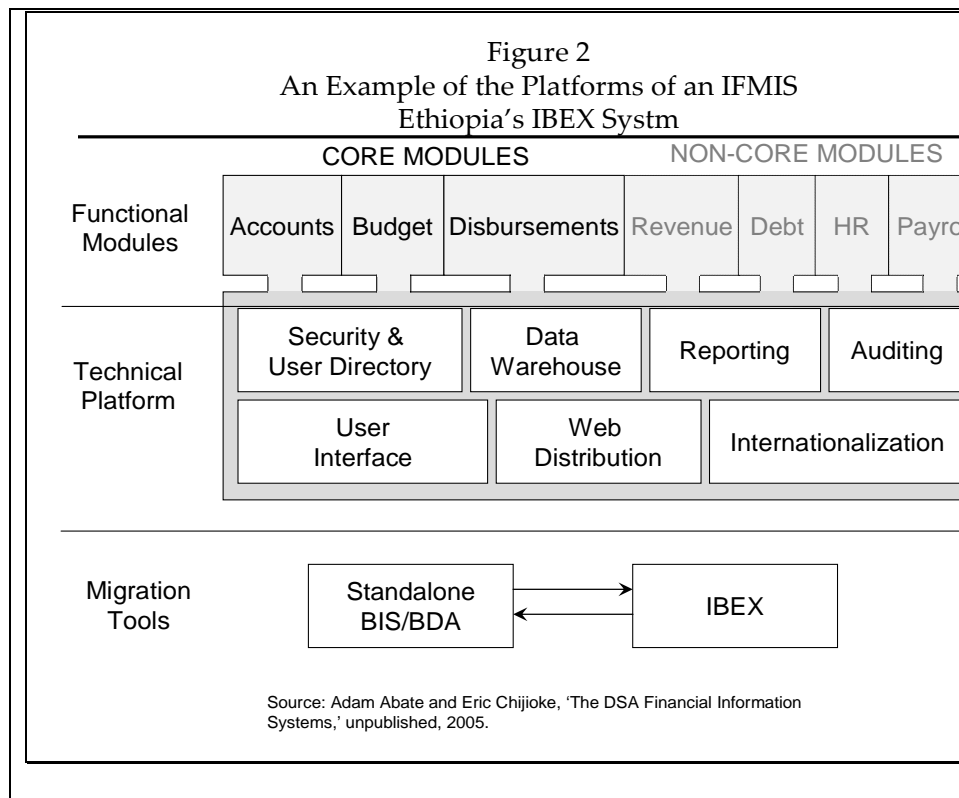
It is not possible to automate everything.<sup>24</sup> There will always be manual systems that complement computerized systems and both systems require discipline in their execution. The continued role of manual systems reinforces case for a modular process change approach to reform, as the manual 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 1, 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 1, Column 4).** This function translates financial data into information. IFMISs provide a wide range of reports.

**System function of an IFMIS (Figure 1, Column 5).** Finally, an IFMIS is an information technology that embeds financial procedures in software applications, data stores, and communications infrastructure.

Figure 2 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. The *technical platform* is the capacity of the system which includes the volume and speed of data processing, data security,



connectivity (in this case to the web), 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 between the legacy financial systems (BIS/BDA) with IBEX.<sup>25</sup> 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 inclusion of custom migration tools.



## A RISK MANAGEMENT FRAMEWORK FOR FINANCIAL INFORMATION SYSTEMS

Risk management is at the center of any policy decision to introduce or upgrade a country's financial information systems. This chapter argues that since the financial procedures that are set out in most countries' public finance statutory and regulatory frameworks are generally likely to be sound, it is possible and desirable to pursue a strategy of process change as contrasted with a strategy of process innovation—improve what exists rather than comprehensive replacement.

Automation projects (as all projects) are driven by three variables: scope, schedule and budget. Scope is a function of resources and time.<sup>26</sup> '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.<sup>27</sup> Tailoring the scope, schedule and budget to local circumstances limits risk. The iterative ('dolphin') 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.<sup>28</sup>

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.<sup>29</sup> 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 discussed in this paper 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 that are the subject of this paper.

Table 1 presents a framework that compares the risk of different automation strategies. Risk is a function of scope which in turn is a function of schedule and budget. Conventional OTS IFMISs are the highest risk because of their long

schedules and cost overruns. A custom iterative solution in contrast, has a lower risk because scope is better managed because the schedules and budgets are tighter.

**Table 1**  
**A Risk Management Framework for Financial Information Systems**

<i>Approach &amp; Example</i>	<i>IT Strategy</i>	<i>Reform Strategy</i>	<i>Risk (scope, schedule, budget)</i>	<i>Redundancy (integration with manual systems)</i>
#1 Ghana (Oracle)	Integrated OTS	Process Innovation [comprehensive replacement]	High	No
#2 Tanzania (Epicor)	Modular OTS	Process Innovation [modular replacement]	High/ Moderate	No
#3 Kosovo (Free- balance)	Modular OTS	Process Change [modular improvement]	Moderate	No
#4 Ethiopia (Java, SQL Server)	Custom/Bespoke	Process Change [modular improvement]	Moderate	Yes

### *Scope*

The scope of a financial information system should be determined by four factors: the content to be automated (which functions-- budget, accounts, etc); the

quality of existing financial procedures (whether they can be evolved or must be replaced); the capacity of public bureaucracies to absorb and sustain information technology; and, a conservative and healthy skepticism about the capability of contractors.

In regard to content, a coherent core set of financial functions needs to be automated and linked. As argued earlier, the commonly accepted core for IFMISs is not comprehensive as a coherent core should cover budget (formulation and management—adjustments and commitments); accounts (general ledger, payables, receivables, reporting), and disbursements (and cash balances if possible). The user requirements of these systems need to be relatively stable.

The second factor that affects scope refers to the quality of the existing procedures of these functions and how effectively they are integrated. For example, do commitment data from the budget module control the disbursement module? Effective integration of modules requires both the sharing of data but also the existence and execution of procedures for management and control.

The scope of a system affects whether the public bureaucracies are able to absorb and sustain these systems. Public bureaucracies are typically weak in developing countries in the context of the management requirements of complex projects and have limited capacity to manage sophisticated information technology systems.

The fourth factor of scope is the capability of contractors. A striking finding from the experience of African countries with IFMISs is the unreliability of contractors.<sup>30</sup> Turnover is frequent and several systems have suffered starts and stops due to repetitive procurement of contractors. Several internationally known contractors have failed in their efforts to implement IFMISs.<sup>31</sup>

Contractors do not have an incentive to reduce scope nor to recommend lower cost options to governments. Contractors often prefer packaged rather than

custom solutions, often based on current or recent engagements, so that they can leverage their experience and charge current clients for previous customization work. Contractors have little incentive to review the existing procedures and systems extensively enough and to work with the government to evolve the processes. A strategy of evolving financial systems has limited short term profits and the overall profitability of the project is lower than a replacement approach. Replacing existing processes with a computer application is more profitable as costs are substantial and front loaded with the procurement of software, hardware and staff ('system integrators'--operating staff and managers). An evolutionary strategy of systems reform is less attractive to contractors than a replacement strategy because total profits are lower and they are spread out over time.

The modest objectives of the iterative approach reduce the scale of the project and lessen the risk of contractor failure. Frequent delivery of system updates allows government to assess periodically the performance of contractors and detect early deficiencies. Demanding that each version be tested and well documented lessens the risk to government if the contractor fails or quits.

### *Schedule*

It is rare that automation projects are completed on time. Conventional IFMIS solutions have very long time frames (five to seven years on average in developing countries and seven to nine in Africa).<sup>32</sup> It is frequently claimed that OTS IFMISs can be rapidly introduced, especially if there is little or no customization to be undertaken. However, it does not appear that these claims have been justified in most developing countries. Of the four major stages in an automation reform -- procurement, design, implementation, and hand over -- the first and last seem to have the most risk for OTS IFMISs. An IFMIS, especially a high end OTS solution, is a complex and costly project and involves a lengthy procurement process that can take several years.<sup>33</sup> If customization is limited, the design phase can be relatively

rapid, but as a consequence the implementation schedule is extended because procedures need to be rewritten and staff retrained. At the other end of the process, handover, seems to have been neglected and it takes considerably longer with an OTS IFMIS, if it occurs at all. Such systems are proprietary and contractors are often unwilling to give up source code to the government. The complexity of the systems exceeds the capacity of most governments and local computer firms to manage.

The virtue of an iterative approach is that it continuously develops an operational system. Risk is lower because disruptions of daily operations are limited and continuous improvements can be verified.

### *Budget*

When asked why his government did not procure an elaborate OTS IFMIS, a senior government official from a Mexican state recently remarked, 'we could not afford one so we built a custom system.'<sup>34</sup> Without concessionary foreign aid, most developing countries would also be faced with a hard budget constraint for their automation projects and would have to adopt a low-cost solution. The absence of a hard budget constraint means that the scope is excessive and overruns in budget and schedule are tolerated. Effective project management is undermined which leads to overly complex designs that fail or under perform.

Why are these systems typically so expensive and often overrun their generous budgets? Failure to contain scope leads to costly customization and long time frames. Information systems specialists command high salaries and contractor management fees are based on multiples of these salaries. The applications are expensive and vendors are moving to new pricing mechanisms which escalate costs (e.g. license fee per user rather than blanket site licenses). Contractors often have links to application vendors which means low cost options are not adopted.<sup>35</sup> Frequent upgrades of OTS IFMISs which are marketed as a virtue in keeping financial systems up-to-date are costly as they involve additional customization and

training. Often overlooked is the annual cost of maintaining a system which as a rule of thumb is fifteen to twenty-five percent of the application development cost.

To be sustainable, the recurrent costs of government operations should not be funded by volatile foreign aid yet these considerable and critical costs are either overlooked or assumed to be funded by continuing concessionary assistance. The systems are risky not just because they are complex or because governments lack the staff to operate them, but also because governments strapped for funds cannot afford the recurrent costs to support them.

In general, sophisticated OTS IFMISs also do not meet the necessary conditions of effective information system development from the standpoint of the user--governments in developing countries (although they would appear to meet the necessary conditions of most foreign aid agencies given how strongly they recommend IFMISs). The necessary conditions are: trust, need, help and urgency.<sup>36</sup> It takes time for governments to *trust* the contractors and entrust them with their financial systems. Except for external conditionalities and the availability of concessionary funding, the *need* for a new financial system is often not clear to government nor do they always see how the IFMIS solution *helps* (especially compared to their legacy systems). Governments in developing countries often do not understand or much less effectively manage information technology. Finally, unlike firms in a market economy which embrace information technology to obtain a competitive edge, there is also no *urgency* for the public sector to reform (except to meet foreign aid conditionalities and use concessionary finance).

## **THE ETHIOPIAN FINANCIAL REFORM<sup>37</sup>**

### **The Strategy of Ethiopia's Procedural Reform**

The budget, accounts and disbursement reforms in Ethiopia were a challenge because of the size of the country, its remoteness, poor infrastructure, limited

capacity, changing government and foreign aid policies together with continuous political, economic and environmental shocks.

The continuous evolution of the administrative structure has also posed a major challenge to financial management especially 'second stage devolution' to districts (weredas) in 2001. Overnight the number of reporting agencies that needed to be included in the financial reform increased by a factor of fifteen. During the reform the country also faced a series of serious shocks: two droughts (including a fifty year drought that threatened thirteen million people), a two-year war and two elections (the latest in 2005 is still being questioned as to its fairness).

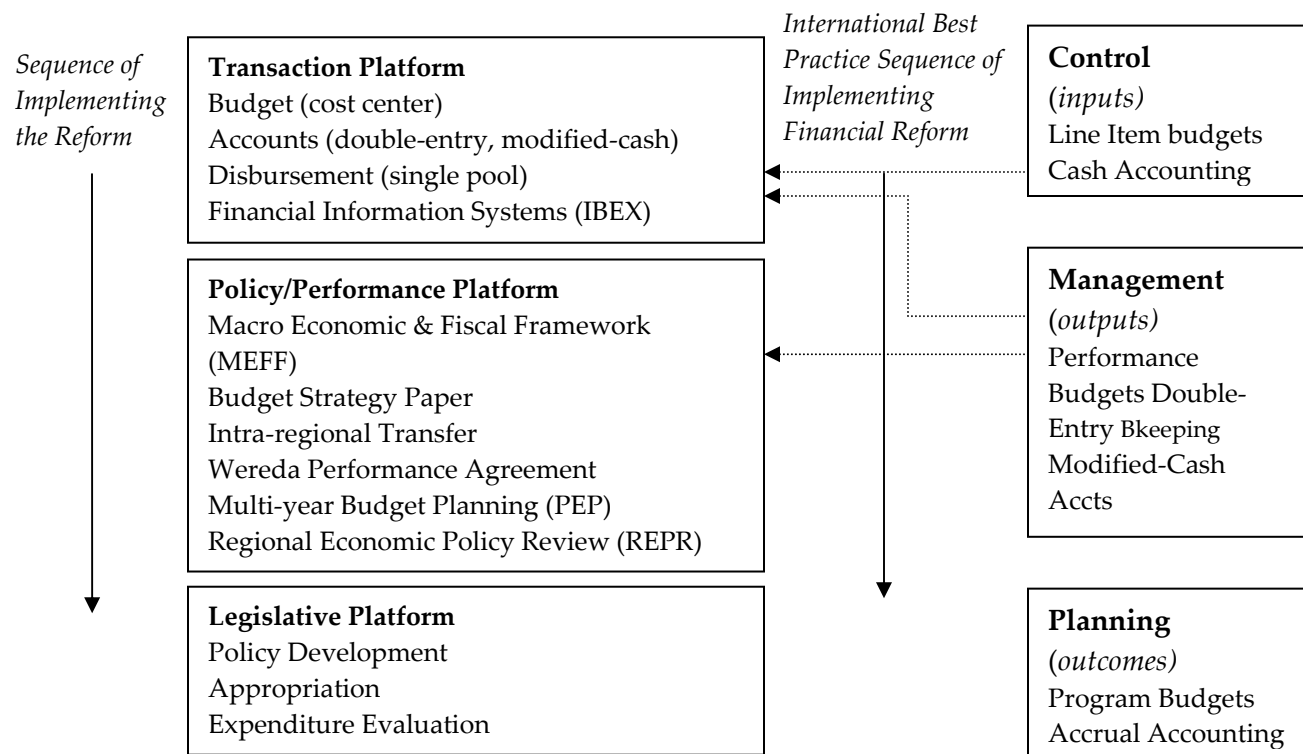
When the reform started, there was an accounts backlog of six years. The budget was formulated and consolidated by spreadsheet. The accounts system was a single entry system, and the chart of accounts was loose, resulting in a large 'other' category and misspecified expenditures. In short, most of the public finances were run manually, and even that system was not well managed.

The DSA project strategy was to consolidate first, then reform. That strategy was justified by the low level of skill, the evolving fiscal decentralization, and the general degradation of the financial system that had taken place over the previous years. At the same time, Ethiopia managed its fiscal aggregates reasonably well, did not generally run a deficit, and maintained an exchange rate pegged to the dollar. In other words, the DSA strategy was to get the basics right.

The reform has for the most part been based on a (partially) sequential 'platform' summarized in Figure 3. The logic of this strategy is the need to ensure that basic systems are in place before proceeding to more complex 'higher order' systems. The first task was to get the *transaction platform* (budgets, accounts, disbursements and their automation) functioning smoothly and then develop key elements of a *policy/performance platform* (particularly focused on regions). In brief the project's strategy for improving the transaction platform was to *evolve* the existing



**Figure 3**  
**The DSA Strategy of Public Financial Management Reform in Ethiopia**



Source: Perran Penrose and Stephen Peterson, 'DSA Project Brief,' February 2003.

budget and accounts procedures and drive the automation from the procedural requirements which were defined by the user. The approach has been very much incremental and iterative with the government staff extensively involved. This approach takes time but promotes an appropriate and sustainable reform that is accessible to devolved administrative levels which have little capacity. The platform approach of this strategy fits with the conventional wisdom of sequencing financial reform.<sup>38</sup>

Several principles of sequencing the reform had been established which had proven effective in piloting the reform. The key elements of those principles were:

simplification, elimination of backlogs, and sequential procedural change (budget first followed a year later with accounts). Before a regional government implemented the budget and accounts reforms it had to bring the existing systems up-to-date. Financial management was simplified (e.g. limit the number of budget institutions, concentrate financial management into a single pool), and the budget reform was then initiated to be followed by the reform of accounts procedures. Implementation was carefully designed and heavily resourced and mass with training programs in detailed procedures were launched using extensive training materials developed in local languages.

To summarize, the approach involved bringing efficiency and closure to the existing system, and partial introduction of the new system (budget reform in the first year followed by accounts reform in the second year). The existing system was first completed so that scarce finance staff could move on to managing the new system and not be burdened with managing two systems simultaneously. Limiting the burden on scarce staff was a key consideration and one of the reasons why the budget and accounts procedures were introduced separately over two financial years. Imposing a new and comprehensive system would have been inappropriate because it would have exceeded the capacity to absorb it.

The sequence of reform was characterized by its emphasis on completeness and selectivity, rather than integration. Bringing existing systems up-to-date before introducing new systems was critical, for the necessary staff were released to learn and operate the new systems. Although integration is held to be a centerpiece of 'best practice' of financial reform as well as a dominant attribute of the recommended IFMISs,<sup>39</sup> the Ethiopian reform demonstrates that integration must be carefully defined in the context of the wider financial reform. The budget and accounts were procedurally integrated from the start through the budget

classification and chart of accounts but they were not operationally implemented in an integrated sequence (e.g. the budget and accounting reforms at the same time).<sup>40</sup>

The Ethiopian financial reform has been underway for over ten years and provides insights in the sequencing of financial procedures and information systems in a rapidly decentralizing developing country. The reform is an example of process change, not innovation. The DSA project implemented a three-step approach to process change of financial procedures: comprehension, improvement then expansion.<sup>41</sup> Comprehension meant documenting and training staff on existing procedures. Improvement meant marginal changes (better forms, streamlining procedures) and expansion meant introducing new procedures (moving from single to double entry bookkeeping). This three-step approach to process change of procedures in turn necessitated an iterative custom approach to automation.

The approach to process change focused on getting the existing system understood and operating efficiently. Improving efficiency of financial management was as much if not more a result of streamlining the organization of financial management (e.g. how many budget entities) as improving financial procedures. This was a critical step because the rapid second stage devolution to weredas (districts) created an extensive number of reporting units at wereda level (up to 81 in each wereda in Oromia—the largest region in the country). Simplifying the organization of financial management facilitated the absorption of the financial reform. The objective was to free up scarce finance staff who could work on further improvements and not be burdened with managing two systems simultaneously. Limiting the burden on scarce staff was a key consideration and one of the reasons why the budget and accounts procedures were introduced separately over two financial years. Imposing a new and comprehensive system would have been inappropriate because it would have exceeded the capacity of staff to absorb it.

The alternative approach of process innovation, by contrast, requires a high level of government manpower to operate the new reform. Their capacity determines the pace of a reform. A weakness of process innovation is that it does not always adequately take into consideration the need to clean up administrative backlogs (a six year backlog in accounts in the case of Ethiopia). The iterative approach in Ethiopia started with this. The government's decision to clear up the accounts backlog before implementing the double-entry bookkeeping reform was prudent but also meant that the accounts reform was two years delayed. It also meant that procedural improvements, training and the computer systems needed to support the existing accounting system and not just a new system.

### **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.<sup>42</sup>

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 2)

**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 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.<sup>43</sup> 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.<sup>44</sup> 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: Upgrading to international standards.** In the third and current phase of development, the budget (BIS) and accounting (BDA) systems have been upgraded 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.<sup>45</sup> 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 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.

A custom approach not only limits complexity and delivers the system to the user with the user's own specification, it also ensures the suitability of the system to the country's information and communications technology (ICT) capacity. An OTS IFMIS solution requires a WAN network whereas the broadband infrastructure that is to be found in developing countries is frequently inadequate. In some countries for example, Oracle's forms and the interfaces which are bulky and require 'real' bandwidth have thwarted implementation until the ICT is upgraded.

[C]ustomization has its limits. Typically if we speak about customizing an OTS system, we are speaking of business processes, inputs, outputs (i.e. functional components). Oracle is not going to customize its fundamental platform (e.g. its interfaces). It might customize what you see, but not how you see it.<sup>46</sup>

In contrast, the custom IFMIS system developed to support Ethiopia's expenditure system (the Integrated Budget Expenditure System—IBEX), has interfaces that were designed to operate with minimal bandwidth and can run even with 28.8 Kbps connections (i.e. modem).<sup>47</sup> 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.

**Table 2**  
**THE EVOLUTION OF THE ETHIOPIAN FINANCIAL INFORMATION**  
**SYSTEMS**

	Phase 1 2000-2002	Phase 2 2002-2004	Phase 3 2004-Present
<b>Features</b>			
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	Low
<b>Factors of Success</b>			
Cost (development)	Low Under \$200,000	Modest Under \$1,500,000	Modest Under \$2,000,000
Quality	Barely acceptable	Acceptable	International Standards
Speed	Slow	Slow	Fast
Risk	Low	Low	Low
<b>Assessment</b>			
Virtues	<ul style="list-style-type: none"> <li>• Development -requirements driven -clear forms</li> <li>• Implementation -operational on time working</li> </ul>	<ul style="list-style-type: none"> <li>• Development -LAN capability -rapid new reports</li> <li>• Implementation -rapid piloting in region</li> </ul>	<ul style="list-style-type: none"> <li>• Development -WAN capability -International standards</li> <li>-Functional review</li> <li>• Implementation</li> </ul>
Deficiencies	<ul style="list-style-type: none"> <li>• Documentation</li> <li>• Expandability</li> </ul>	<ul style="list-style-type: none"> <li>• Sub-contractor -Organizational risk -technical proficiency</li> </ul>	-Sustainability



The upgrade to IBEX addresses the following main concepts and demonstrates that a custom IFMIS can have the full capability of an OTS IFMIS:<sup>48</sup>

- ❑ **Scalability** – The current BIS and BDA applications are desktop applications that must be installed separately on every workstation that need to use them. The implication of this is that there is no marginal decrease in both the rollout and support tasks of implementing these systems nationwide. IBEX is a browser based application, hosted from a few centers, thus making it highly scalable in terms of implementation and support.
- ❑ **Security** – IBEX improves data security by using a state of the art security framework to ensure the integrity of national financial data.<sup>49</sup>
- ❑ **Data Integrity and Manageability** – By unifying the data store for all application functions, IBEX eliminates the problems caused by multiple data stores. IBEX also upgrades to a full-scale database product which will handle the volumes of data present in the system for the foreseeable future
- ❑ **Extensibility** – Besides implementing the automation of the core financial management functions, IBEX exists as a framework for integration of financial functions in general. The application architecture means that addition of additional integrated financial modules or the addition of additional functions or reports within the existing modules is greatly simplified.
- ❑ **Functionality and Usability** – The IBEX application brings with it a redesigned interface that is intended to replicate what users are used to while improving interface controls where possible. In addition, the IBEX framework provides for dynamic internationalization which allows users to change the language of the application on the fly, and supports the addition of other language sets should they become necessary.

## **Institutional issue: The virtues of benign neglect**

The Ethiopian experience presents an interesting counter hypothesis to the conventional wisdom that information system reform requires top management commitment (from either the government or foreign aid agencies): benign neglect can actually facilitate reform. Neglect by both the government and the donor/creditors meant that technical development could proceed unimpeded by external micro-management or duplication.

On the government side, the two-year war between Ethiopia and Eritrea starting in 1998 was fortuitous for the financial reform as it insulated the reform from government and foreign aid agency micro-management during the critical early development stage and allowed the iterative development of the foundations of a financial system—the budget classification and the chart of accounts.

Moreover, the senior official responsible for the reform faced a weak and fragmented ministry of finance which had to coordinate financial management with an equally weak and fragmented ministry of planning. As a political appointee this senior official was unable to direct the work of the ministry's middle management (department heads) who were permanent civil servants and who could ignore the directions of senior officials. Ethiopia demonstrates that even when there is a high level of commitment by senior officials, this does not ensure effective reform because it is the middle level bureaucrats who have to implement the reform. In this case, the middle managers were indifferent to this reform until the project could demonstrate its value to their particular work. Even when such benefits were demonstrated, some individuals still resisted change.<sup>50</sup>

The power of the senior official responsible for the reform was highly circumscribed and his contributions to the reform included: securing funding at critical phases of the project, accepting the advice of the chief technical assistance

advisor, and closely monitoring the project's progress. Fortunately he did not divert project resources nor did he micro-manage the project. In this environment of indifference, and at times hostility, managing the overall reform of these financial components as well as their automation fell to the project.

The donor/creditor community was another source of neglect. The initial design of the financial reform contractually separated the procedural reform from the automation reform. The DSA project which was responsible for the procedural development of the budget, accounts and disbursement systems, was eventually requested to automate these systems because of delays in procuring the separate automation project. Closely coordinating procedural and automation development within a project framework promoted a coherent reform driven by procedures. Because automation was not part of the contracted scope, the systems developed were rudimentary and very inexpensive. These systems have always been viewed as interim awaiting the original automation procurement—the 'final solution'—which is an OTS IFMIS. Ten years later the procurement has still not been completed.

The institutional environment presented above determined the DSA strategy of financial reform and its automation. Benign neglect on the part of the government and foreign aid agencies coupled with the limited and at times even hostile government management, meant that the reform was driven by a project and not by government or foreign aid agencies. The project faced a complex and rapidly evolving task environment (Ethiopia introduced a massive second stage devolution to districts literally overnight just as the reform was being piloted in the first region). The need to 'bring the government along' at all levels of administration and support the rapid devolution meant the adoption of an evolutionary strategy or process change.<sup>51</sup> The virtual lack of resources for the financial information systems meant a custom not costly OTS system driven by a rapidly evolving procedural reform.

To summarize, the custom automation strategy of the Ethiopian budget and accounts reform was an appropriate scale and sequenced to the pace of the procedural rollout and the limited financial resources available. It has managed risk well by keeping a focused scope and by adhering to a tight and frequent schedule of system updates. The very limited budget has reinforced a clear scope and schedule.

### **LESSONS FOR DEVELOPING COUNTRIES**

Automation of Ethiopia's financial procedures exemplifies a 'dolphin' approach. The financial reform was focused on a limited core of functions (budget, accounts, disbursement, reporting) and was procedurally driven. Automation supported the procedural reform by matching the periodic improvements in procedures.

This is an appropriate case for other developing countries for several reasons. First, it is based on first hand experience over ten years unlike much of the literature which is based on static second and third hand descriptions and, in many cases, interpretations, of outcomes at particular points in time. Second, it is an example of an effective financial reform which has been supported by an appropriate financial information systems strategy (custom and iterative) in a difficult and unsupportive task environment.<sup>52</sup> This task environment is similar to that faced by most developing countries. Third, the information systems have been successful. Their success, however, cannot be fully separated from the broader reform in which they were embedded.

There are several criteria by which we argue that the systems were successful. They work. They never failed. They were promptly delivered and never delayed the procedural rollout. They were rapidly expanded to meet new user needs. They were relatively inexpensive. They have been continuously upgraded and are now technically robust and sophisticated and meet international standards. They were

inextricably linked to dramatic improvements in the performance of budgets and accounts.<sup>53</sup>

The example of the automation of the Ethiopian budget and accounts system provides five key lessons in automating financial reforms in developing countries.

- (1) *Institutional factors* are far more important than the *technical choice* in determining the outcome of automation;
- (2) information technology should not be the driver of financial reform—indeed, if it had been, the Ethiopian reform would probably not have been implemented;
- (3) there is no a priori technical reason to favor either an off-the-shelf (OTS) or a custom solution: the choice depends on the circumstances. However, the opportunities created by a custom solution for learning by doing and creation of ownership provide strong arguments to balance the putative advantages of an OTS solution.
- (4) effective project selection and management is a major factor in success of automation;
- (5) a financial and social cost benefit analysis should be undertaken in reviewing a policy of introducing and/or continuing with a custom system or upgrading to an OTS solution.

#### **#1: Important institutional factors in determining the outcome of automation**

The literature contends that success of an IFMIS depends upon strong high level commitment and support.<sup>54</sup> Such commitment is not always to be found in developing countries, where bureaucratic rivalry, limited technical competence at the top, reluctance to change (which is often well founded) may all be factors. The example of Ethiopia demonstrates that even when there are ‘saints’<sup>55</sup> and high level commitment, this does not ensure effective reform because it is the middle level officials who have to implement change.

The DSA project managing the Ethiopian reform of budgets, budget planning and accounts faced benign neglect, and in many ways, as described earlier, this benefited the reform. 'Optimal obscurity' can be a key factor in the success for development projects more broadly. Projects that are optimally obscure do not have the high expectations and scrutiny of highly visible and political projects which spares them the criticism and unrealistic time frames. Optimal obscurity allows projects to learn by doing, to make mistakes, and to progress incrementally.<sup>56</sup> Large-scale OTS IFMISs are not optimally obscure. They are hugely expensive which alone makes them visible and prone to delays and corruption, and there are unrealistic expectations about functionality and schedule.

In the developing country context high level commitment to any reform will at best be modest and episodic. Financial reforms and the information systems that support them are by their nature long term endeavors. So long term support, however defined, is required. Equally if not more important to high level commitment, is acceptance and use by the middle echelons of the government. It is here that the systems are introduced, used, or ignored. Obtaining middle management commitment involves four factors: trust, need, help, and urgency.<sup>57</sup> Government officials, especially middle level managers, need to trust the contractors providing the solution which takes time. They have to see the need for the change and how the solution will help them. Finally, there has to be urgency to implement the change.

There needs to be realistic expectations by the foreign aid community about the limits and time scale of financial reform and the computer systems that support them. Improving supporting manual systems are as important as introducing the automation of some of the modules. While there are no quick hits in financial reform, ironically, it is often possible to have relatively more rapid improvement in manual procedures than in the automation of procedures. Foreign aid agencies

need to consider support for improvements in both manual and automated procedures. Foreign aid agencies tend to overstate the benefits of a process of innovation approach, and underestimate the complexities and risks of this approach. Foreign aid agencies need to better understand the process change approach and its virtues. The experience of IFMISs, particularly in Africa, has shown that contractor failure or poor performance has been a major risk. In evaluating the selection of contractors consideration should be given to their understanding of and experience with process change, not just process innovation. The critical task for any contractor is integration of the computer system with the organization and staff. This requires familiarity and experience with the local context.

**#2: Information technology should not be the driver of financial reform.**

- Typical OTS IFMIS systems do not have all of the core modules necessary for good financial management. Good financial management requires both manual and automated procedures and IT alone is not enough. IT systems should support sound financial procedures, not define them.
- Because IT takes a long time to develop, procure, and implement, it allows for time to start with changes in financial procedures which can be done quickly. Procedural reform gets the user requirements right and user requirements are determining factors in the success of information systems – getting them right.
- A focus of IT as a driver means that more serious institutional issues are not addressed or can be finessed. Experience from Ethiopia clearly demonstrates that institutional issues are far more important and far harder to manage than technical issues.
- One reason IT is a driver of reform in AID dependent countries is that is a conditionality of foreign aid agencies as it is presumed to improve financial management. The high failure rate of IFMISs suggests this is not a route to

improve financial management. This is a negative, harmful, conditionality that imposes inappropriate levels of risk to weak financial systems. The appropriate strategy is to gradually strengthen weak financial systems through process change, not innovation.

### **#3: There is no a priori reason to favor an OTS or a custom solution**

- The conventional wisdom is that an OTS solution is preferable to a custom solution. Research has not shown this to be the case. It is not clear whether the characteristics of OTS are related to the high failure rate of IFMISs. As noted above, it is increasingly believed that large scale complex information systems (whales) are more prone to risk than small scale iteratively developed systems (dolphins). In the case of Ethiopia the rapidly changing fiscal devolution combined with the adequacy of the baseline financial systems meant that a custom iterative automation strategy was appropriate from the standpoint of user requirements and availability of financial resources.
- All large scale financial information systems involve risk, whether developed by a custom or OTS solution. The central question for developing countries is which approach, in principle, best minimizes risk in a given context. The Ethiopia case suggests that a custom system was appropriate in that context. The institutional issues required flexible approach and custom systems, by definition, are more flexible. Moreover, a small scale iterative approach on technical side minimizes risk. All told, custom systems are better in many cases. Research has not related the approach (OTS vs. Custom) to the failure of IFMIS. We argue above that institutional factors far outweigh technical factors and institutional factors require a flexible approach to automation. A custom system by definition, is small scale in this sense, and the decision between an OTS versus a custom solution, while



important, is not critical. A *flexible* OTS solution or a custom solution both could in principle both be appropriate in a particular context.

- The problem with OTS systems is not just lack of flexibility in meeting user requirements. OTS systems lock countries in for many years. Technology is rapidly improving and becoming more flexible, less expensive, and more accessible every year. Locking countries into OTS systems precludes developing countries from taking advantage of new technologies. One new technology, the new XBRL protocol, (extensible Business Reporting Language) allows a custom financial application to share data across multiple systems.<sup>58</sup>

**Table 3**

**Pros and Cons of OTS vs. Custom IFMISs**

	<i>Pros</i>	<i>Cons</i>
Off the shelf (OTS) IT systems	Standardized Tested Continuity of vendor	User has to come to the system Originally designed for private sector High customization costs Proprietary Long lead time for procurement
Custom/iterative IT systems	System has to come to the user Lower cost Rapid delivery Meets exact user specifications	System design not proven Lack of continuity of developer

#### **#4: Effective project selection and management is a major factor in the success of automation.**

- A central risk in implementing financial information systems is the project, not the package. Contractors are a major risk in the implementation of financial information systems regardless of whether it is an OTS or custom solution. In Nigeria, for example, implementation of a high end OTS IFMIS (SAP) failed because a reputable international consulting firm failed to properly integrate the solution to the business processes. The system integration process failed. As Dorsey notes, even for US corporations, hiring reputable international firms or purchasing expensive OTS systems does not mitigate risk. Effective financial information systems are based on an integral strategy of financial reform. It is important that there is a coherence between the broader strategy of financial reform, the breadth of it's content (e.g., budget, accounts, disbursement, commitments), and the IT solution. One reason financial reforms fail or under perform is the absence of this coherence. The Ethiopia case was unique in that these three factors were all under the same project which permitted a coherent approach. A critical task for governments is to ensure this coherence.
- A challenge for funders of aid-dependent countries is to also understand the need for that coherence and the long time lags required to implement financial reforms, including automation, and having governments take it over.

#### **#5: Financial and social cost benefit analysis**

- One of the main reasons that aid – dependent countries adopt OTS systems is the availability of concessionary aid for these systems coupled with the belief by the providers of this aid that an OTS systems are superior and the most cost effective solution for improving public financial

management (OTS's reduce their fiduciary risk). This assertion is not substantiated.

- As noted in the framework above, budget is a key variable affecting the scope and thus the risk of a financial system. Without a hard budget constraint the scope of information systems expand and their schedules extend – i.e., their risk increases.
- Financial and social cost benefit: One benefit of a custom solution is the social benefit of the development of a local computer industry. For example, the State of Andhra Pradesh in India adopted a 'middle ware' solution to link its existing/legacy systems together rather than procuring an expensive foreign OTS IFMIS. The government of Andhra Pradesh was able to do this because of the existence of a robust computer industry in Andhra Pradesh. This custom solution was very inexpensive and effective. Similarly, in Ethiopia, the computer staff of the DSA project are principally local Ethiopians or Ethiopians returning from the *Diaspora*. The value of building such local capacity extends far beyond the particular financial application and supports the broader process of endogenous economic growth. Moreover the risks associated with the introduction and sustainability of IFMISs are reduced if local contractors can do it.

Many years ago Goran Hyden concluded his study of rural development in Tanzania by observing that there are no shortcuts to development.<sup>59</sup> This is true of financial reform and the development of financial information systems. The conventional wisdom of both needs to be reassessed. This paper has argued for a more balanced view of the technical recommendations for IFMISs. The conventional wisdom is not working.

## References

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<sup>1</sup> I am grateful to Adam Abate, Eric Chijioke, and Perran Penrose for helpful comments, exchanges of ideas, or references, some of which influenced me quite a bit, although none should be held responsible.

<sup>2</sup> For example, many authorities have recently demonstrated the near universal failure of IFMIS systems to meet their objectives. I do not analyze these cases, but take them as generally accepted. See Diamond, Jack, Khemani, Pokar (2006).

‘Introducing Financial Management Information Systems in Developing Countries.’ *OECD Journal on Budgeting* Volume 5, No. 3. The IMF has also found IFMISs to be disappointing and significantly diverts its technical assistance staff in developing countries see, International Monetary Fund, (2006). ‘Selected African Countries: IMF Technical Assistance Evaluation—Public Expenditure Management Reform,’ p. 53. Large scale information systems are risky with estimated failure rates from fifty to eighty percent in the private sector in developed countries See, Dorsey, Paul (2002). ‘The Top 10 Reasons Why Systems Projects Fail,’ [www.dulcian.com](http://www.dulcian.com). Dorsey is an authority on large scale systems development and Oracle applications.

<sup>3</sup> Diamond and Khemani, (2006). On the advice of foreign aid agencies to adopt IFMISs see, Hashim, Ali and Allen, William (1999). ‘Information Systems for Fiscal Management,’ Annex X. In Schiavo-Campo, Salvatore and Tommasi, Daniel, *Managing Government Expenditure*, Asian Development Bank, Manila.

<sup>4</sup> Davenport, Thomas (1993). *Process Innovation: Reengineering Work through Information Technology*, Harvard Business School Press, pp. 11-15.

<sup>5</sup> Varon, Elana (2004). ‘For the IRS There Is No Easy Fix,’ *Australian CIO*.

<sup>6</sup> Lienert, Ian (2002). ‘Comparison Between Two Public Expenditure Management Systems in Africa,’ *IMF Working Paper No 03/2*, Washington, p. 31.

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<sup>7</sup> 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.

<sup>8</sup> 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.

<sup>9</sup> World Bank (2002). 'Design and Implementation of Financial Management Systems: An African Perspective,' *Africa Region Working Paper Series No. 25*, p. 13.

<sup>10</sup> OECD (2001). 'The Hidden Threat to E-Government: Avoiding Large Government IT Failures.' *PUMA Policy Brief No.8*. 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,

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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.

<sup>11</sup> 'Best practice' is a much misused concept, particularly when applied to systems that are not yet fully proven. After all, financial reforms in OECD countries have been under way for many years, and are continually evolving: it would be a mistake to categorize changing systems under the static rubric of 'best practice'. IFMISs are considered best practice but generally don't work. It should also be noted that IFMISs are not common practice in most OECD countries, see Wynne, Andy (2005). 'Public Financial Management Reforms in Developing Countries: Lessons of Experience from Ghana, Tanzania and Uganda.' African Capacity Building Foundation *Working Paper* No. 7, p. 17.

<sup>12</sup> For developing countries, Heeks 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.

<sup>13</sup> Heeks (2002). p. 110.

<sup>14</sup> Dorsey, (2005), p. 9.

<sup>15</sup> Deepak Bhatia of the World Bank provides the following specification (which is the accepted convention) of what the core of an IFMIS should be. The core functions are: 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

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management information. See Bhatia, Deepak (2003). 'IFMS Implementation: Aspects for Consideration,' World Bank.

<sup>16</sup> The Tanzanian reform had to customize at considerable expense the OTS IFMIS (Epicor) to include budgeting and commitment. Wynne, 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).

<sup>17</sup> In the Kenya reform, four of these modules (budget, commitments—votebook, cashbook and accounts) were automated with a stand alone system. Since the reform was in a sector ministry, the cash management component was not automated—it was assumed that Treasury would fund the warrants—an assumption that was often not forthcoming in the fourth and even third quarters of the fiscal year. The accounting system was stand alone. See Peterson S, Kinyeki C, Mutai J, Ndungu C. (1996). 'Computerizing Accounting Systems in Developing Bureaucracies: Lessons from Kenya.' *Public Budgeting and Finance*, Vol. 16, No. 4, Winter, pp. 45-58.

<sup>18</sup> Lienert, p. 22.

<sup>19</sup> World Bank (2002).

<sup>20</sup> 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*.

<sup>21</sup> One weakness of the Uganda IFMIS was the absence of a parallel manual system, see World Bank (2002).

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<sup>22</sup> 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.

<sup>23</sup> A virtue of having a manual system is that it puts a structure—an architecture to the system.

<sup>24</sup> 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.'

<sup>25</sup> IBEX stands for the Integrated Budget and Expenditure system.

<sup>26</sup> Chijioke, Eric (2004). 'Managing Large-Scale Information Systems Development: A Dymystifying Approach.' Presentation to the Executive Program in Public Financial Management, John F. Kennedy School of Government, Harvard University, July 17, 2004.

<sup>27</sup> Getting the requirements of an information system of course, is the most important factor determining its success.

<sup>28</sup> According to the contractor, the Government of Tanzania adopted a 'risky' strategy of using an OTS IFMIS [Epicor] because the financial procedures were



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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 P, Bhatt H.(2004) ‘Integrated Financial Management in Tanzania, p. 168.

<sup>29</sup> 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.

<sup>30</sup> East Afritac conference on IFMISs, Nairobi Kenya, November 2004.; Executive Program in Public Financial Management, John F. Kennedy School of Government, Harvard University, Summer 2006.

<sup>31</sup> Even in the private sector of developed countries, large scale information systems projects have failed and the hiring of large established consulting firms or brand named applications is no guarantee of success, see Dorsey (2005).

<sup>32</sup> Dorotinsky, William (2003). ‘Technology and Corruption: the Case of FMIS.’ The World Bank.

<sup>33</sup> Procurement of an IFMIS in Ethiopia has been underway for ten years and still has not been done. For an explanation of the most recent two year delay in this program, see the whimsical and self-exculpating handover report by the IFMIS advisor. What is amusing is his distinction between ‘as per plan’ and ‘reality’. Walsh, R (2006). ‘Completion Report: Integrated Financial Management System Pilot Phase.’

<sup>34</sup> Participant, Executive Program in Public Financial Management, Harvard University, Summer 2006.

<sup>35</sup> Parry, M (2005). ‘Why Government IFMIS Procurements so Often Get it Wrong.’ *ACCA International Public Sector Bulletin*, Issue 4.

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<sup>36</sup> Peterson, S (1998). 'Making IT Work: Implementing Effective Financial Information Systems in Bureaucracies in Developing Countries.' In Jenkins, G. (ed). *Information Technology and Innovation in Tax Administration*.

<sup>37</sup> The Decentralization Support Activity (DSA) Project which is implemented by the John F. Kennedy School of Government, Harvard University, was contracted to implement the budget, accounts and expenditure planning reforms under the Government of Ethiopia's Civil Service Reform Program. The project began in January 1997 and is in its fourth phase. This case study is about the experience of the DSA project in implementing these reforms. This section draws heavily upon a recent summary of the DSA project: Decentralization Support Activity (2006). 'Overview of the DSA Project: Reform Strategy, and Components of Reform (Budget, Budget Planning, Accounts, and Financial Information Systems).' Project report M-70, June.

<sup>38</sup> Schick, A (1966). 'The Road to PBB: the Stages of Budget Reform,' *Public Administration Review* 26, pp. 243-255.

<sup>39</sup> Schick, A (2002). 'Opportunity, Strategy and Tactics in Reforming Public Management, *OECD Journal of Budgeting*. Vol 2, No. 3, pp. 7-34.

<sup>40</sup> Amhara regional state attempted to implement both the budget and accounts reforms simultaneously and failed. Tigray regional state, a much small and homogeneous area, implemented both reforms simultaneously but it was extremely difficult.

<sup>41</sup> Peterson, S (2001). 'Financial Reform in a Devolved African Country: Lessons from Ethiopia,' *Public Administration and Development* Vol. 21, pp. 131-148. See also, Peterson S (2006). 'Wax and Gold: The Ethiopian Financial Reform Ten Years on.'

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<sup>42</sup> 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.

<sup>43</sup> There are several versions of the BDA system.

<sup>44</sup> The migration was from Microsoft Access to Microsoft SQL Server.

<sup>45</sup> Introducing the IBEX was a prudent strategy even if the government decides to procure an OTS IFMIS because full implementation will take several years.

<sup>46</sup> Adam Abate, IT director, DSA Project, Ministry of Finance, Government of Ethiopia.

<sup>47</sup> IBEX requires only minimal bandwidth because only those parts of the interface that need to be refreshed (reloaded) are reloaded. *Ibid.*

<sup>48</sup> DSA Project (2005), 'IBEX: Executive Summary,' Project Report No. 026.

<sup>49</sup> IBEX uses 'Siteminder' security software by NetIntegrity.

<sup>50</sup> Peterson, S (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.

<sup>51</sup> The evolutionary reform strategy followed three stage: comprehending the existing system (documentation and training); improving the existing system (procedural change); and, expansion (introducing new procedures—e.g. moving from single to double entry bookkeeping). See Peterson, S (2001). 'Financial Reform in a Devolved African Country: Lessons from Ethiopia.' *Public Administration and Development*, Vol. 21, pp. 131-148.

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<sup>52</sup> Assessment of the DSA Project, ARD Inc, June 2006.

<sup>53</sup> For example, monthly reports from weredas (districts) are now processed within two months by the regions where the reform has been implemented. Previously these reports took up to two years to produce. The back log of accounts in Ethiopia has been reduced from six years when the reform began in 1997 to less than one year in the current fiscal year.

<sup>54</sup> Diamond J, Khemani P (2006).

<sup>55</sup> Peterson (1998).

<sup>56</sup> Albert Hirschman's theory of the 'hiding hand' of development projects contains many of these attributes which he considered essential for success. Hirschman argued that 'preplanned' projects often failed. See Hirschman, A (2001). *Development Projects Observed*. David Korten also argued for the value of a 'learning' rather than a 'blueprint' approach for successful development projects. See Korten, D (1980). 'A Learning Process Approach,' *Public Administration Review*.

<sup>57</sup> Peterson (1996).

<sup>58</sup> The XBRL standard is a free and open standard. Its development to date has been principally used to link business to government information in developed countries and most major accounting software companies are working to support this standard. The implications of the XBRL protocol are that facilitates linkages across a variety of software thereby allowing greater flexibility in applications. See Bishopp, R. (2006). 'Deepening Decentralization in Amhara Regional State and Tigray National Regional State and Restructuring of Nine Urban Local Governments: Local Urban Computerization of Income and Expenditures ('LUCIE').' Report prepared for the Ministry of Federal Affairs, Federal Democratic Republic of Ethiopia.

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<sup>59</sup> Hyden, G (1983). *No Shortcuts to Progress: African Development Management in Perspective*, Heinemann, London.