

Challenges when auditing e-Government

SAI Certification of Financial Management Information Systems

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With increasing number of countries moving towards integrated financial management systems, there has emerged a need for financial managers to install Enterprise Resource Planning (ERP) systems that have surfaced as logical extensions of package based software suites. Traditionally, government financial management set-ups have been attuned to consolidating information with the help of independent software modules usually developed for organization specific requirements. Accordingly for the purposes of certifying the health of financial statements produced by such systems, the government auditors were satisfied with the development of data extracting and analytical tools. These tools essentially bypassed the requirements of *auditing through the computer* because, instead of testing the program logic, data security, control environment, and system's cost effectiveness, most of the CAATs were designed primarily for extracting data from the system for auditors' analysis. To be fair to them, they were even advertised as Data analysis Tools. Such tools and techniques were acceptable to the auditing profession because the financial systems remained separately identifiable and could be examined from the periphery. With the blitzkrieg of ERPs, the auditing profession has been increasingly hard-pressed to combine the characteristics of financial auditing with information systems auditing so that the overall system certification does not remain fragmentary. ***This paper seeks to identify some of the issues facing the SAIs in an environment where access to testing methodologies for enterprise-wide systems has become an imperative in the wake of governments' transition towards installing integrated management information systems. The paper also gives an overview of the system testing methodology developed by the SAI of Pakistan for verifying the implementation of a countrywide integrated financial management system.***

Broad Features of Countrywide Information Systems

Until recently, governments and state entities were content with arrangements where information generated by diversified sub-systems was *artificially* consolidated with the help of aggregation softwares. Artificially, because in most cases the abstract level information generated by sub-systems was used as input data for aggregation purposes; hence the essential link between the transaction-based line data and the aggregated information was severed at the aggregation node. Such an arrangement afforded a possibility for manipulation of data at the aggregation node for projecting results desired by the financial managers. Although the system auditors were required to certify the validity of the aggregated data, but the geographical dispersal of line data, batch processing operations, and use of different softwares by different sub-systems made it practically impossible for the auditor, and for that matter for the financial manager, to form opinions on the working of the systems on a consistently reliable basis.

Verification problems were further compounded where the accounting arrangements were decentralized. In decentralized systems each budget and cost centre enjoyed the liberty of managing the line data as it chose. Complacency of continuing with custom made legacy systems and the familiarity of personnel with the relatively simple operations have been found to be the main reasons for lack of standardized information systems in various organizations. Persistence of non-generic customized softwares in decentralized systems leading to

formidable integration problems has created a genuine demand for establishing standardized core accounting systems as the source of information for all policy and execution nodes.

In a fiscal management environment a typically integrated system comprises sub-systems for

- Macro Economic Forecasting
- Budget Preparation and Approval
- Budget Execution, Accounting, and Fiscal Reporting
- Cash Management
- Debt Management
- Revenue Administration
- Personnel Management

Hashim and Allan have delineated the details of each one of these in *Information Systems for Government Fiscal Management* published by the World Bank in 1999. As a matter of fact each of these can be viewed as an independent system consolidating information from geographically dispersed line-data stations. Since the concept of a Single Treasury Account combined with a need for establishing the primacy of the core accounting system have become fundamental to successful financial management, there has emerged a demand for robust software solutions.

For a similar demand from the private sector for enterprise-wide integration of information, the software industry has responded by offering ERPs that can be defined as *software solutions that address the enterprise needs taking the process view of an organization to meet the organizational goals tightly integrating all functions of an enterprise.*¹ A standard ERP comprises suites for Manufacturing, Sales, Warehousing, Project Management, Human Resources, and Financial Management. These function specific suites are strung along the General Ledger in a way that all transactions taking place at various functional nodes automatically get registered in the main accounting system. When an industry standard ERP is used in the government sector, usually the Financial Management, Human Resources, and Project Management suits are considered adequate to meet the financial and personnel management needs, except that where an HR suite does not integrate the Pension and Provident Fund functionalities, separate suites for these functions are also required.

How to ensure comprehensive testing of enterprise-wide information systems?

Although there is an increasing trend towards opting for ERPs for business solutions, there are no tried and tested methodologies to assure the users of a reasonably successful implementation. In recent years some of the ERP developers have released software programmes for verification of successful configuration of their products, but to attain a level of comfort the clients seek independent verification. There is a likelihood that, in not too distant future, a special class of software implementers would emerge that would specialize in testing and verifying ERP functionality as configured for client specific requirements. But it is equally likely that such testers and verifiers would focus on the private business sector. The public sector might, even then, be left to its own resources which would mean that the SAIs around the world would be required to develop the requisite expertise for testing and verifying the functionality of enterprise-wide software networks.

¹ [http:// www.erpfans.com](http://www.erpfans.com)
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The task of developing standard tests for verifying the public sector functionality may have been made easier by the release of *Public Sector Accounting and Reporting Standards*². Let me elaborate.

Once the basis of accounting is determined, the principal functionality of a fiscal reporting system becomes clear. An underlying assumption for issuance of accounting and reporting standards is that the countries adopting them would be standardizing their practices and procedures. A commonality of processes and procedures can be assumed in systems that operate on a common basis of accounting. Given this, it may not be impossible to develop standardized functional modules meeting the requirements of a particular basis of accounting. Once this is achieved, the remaining task would be to develop benchmarks for networking the transaction nodes. In view of the multiplicity of models determined by the geographical dispersal of data in various countries, I suspect that the size and nature of the communication network, and the number of nodes in a network, would always remain country specific. But, of course, these are the areas that the SAIs need to focus on. For the time being I would like to focus on summarizing the main features of an ERP testing methodology that Pakistan has developed for verifying the implementation of SAP R3 for the country-wide accounting and financial reporting system.

Pakistan moves towards an Integrated Financial Management System

Under a World Bank financed project the government of Pakistan opted to modernise its centralised accounting and financial reporting system. The century old legacy system is presently in the process of being replaced with an arrangement that is in conformity with the Public Sector Accounting and Reporting Standards postulated by the INTOSAI and IFAC. Such an enterprise required a complete Business Process Re-engineering (BPR) keeping in view the technology requirements emanating from the need for an integrated financial management system. BPR was carried out with the assistance of international consultants, and the new accounting and financial reporting model has been codified in seven volumes of manuals. While initiating to implement an industry standard pre-packaged software solution for financial management in Pakistan, the entire system functionality was first identified and then defined in the following modules.

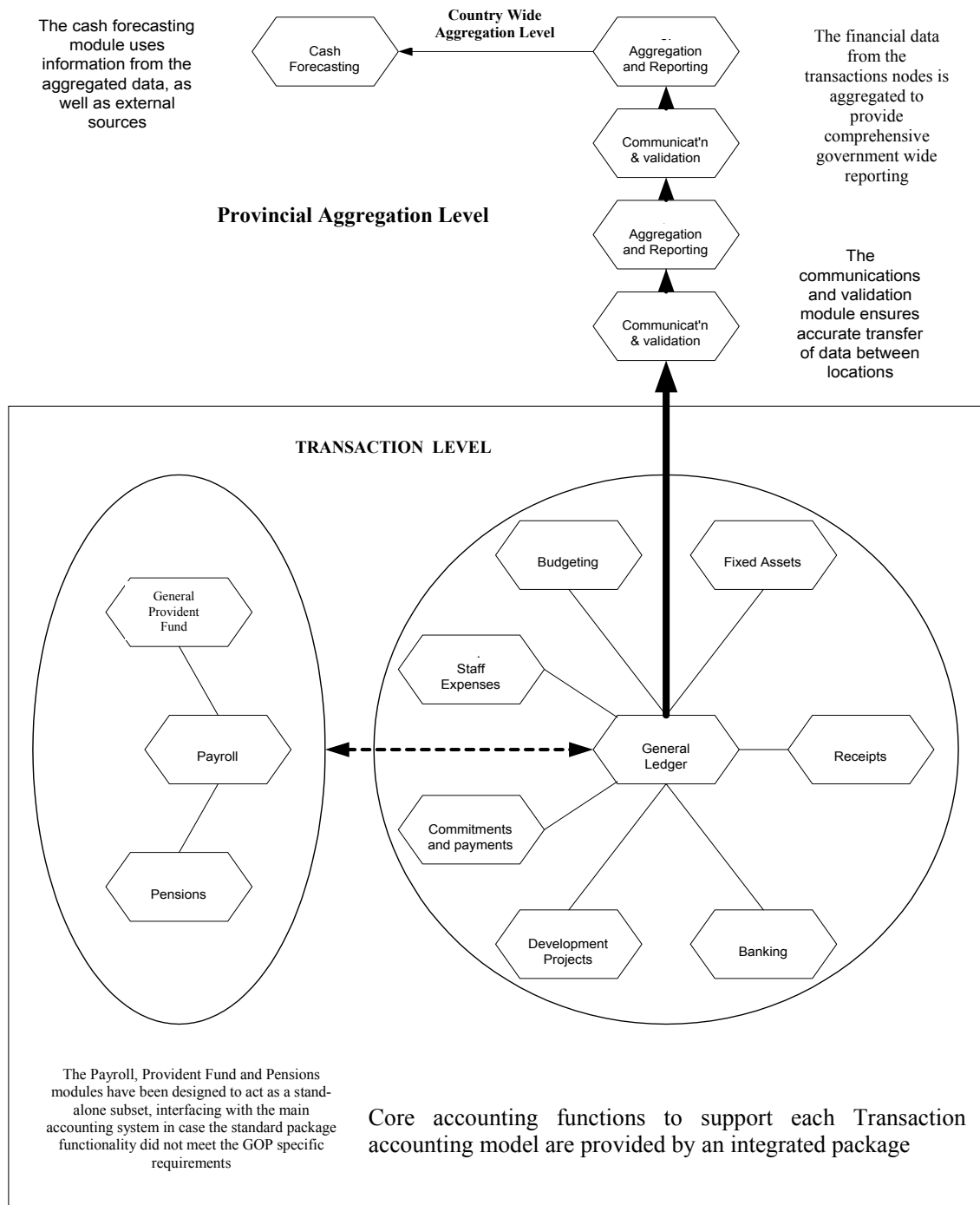
- General functionality and security
- Commitments and payments
- Receipts
- General ledger
- Budgeting
- Aggregation and reporting
- Fixed assets
- Banking
- Cash forecasting
- Development projects
- Payroll
- General provident fund
- Pension
- Staff expenses
- Communication

² Public Sector Accounting and Reporting Standards have been released by the IFAC and INTOSAI.
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The new system is expected to provide a comprehensive range of budgeting and accounting functionality. Principal functionality of the new countrywide budgeting, financial accounts and reporting system is summarized below:

1. Preparing the annual budget, supplementary and revised budgets (current and development) on a timely and accurate basis including production of various budget statements and full functionality in respect of budget release and budget execution
2. Accounting for commitments and issuing (or suppressing the issue of) purchase orders, incorporating a funds availability check which prevents processing when the transaction makes total expenditure plus total commitment exceed the funds available
3. Managing payments to creditors, including Foreign and Domestic Debt, (though in the context of the cash basis of accounting under which expenses are not recognised in the accounts until they are paid), and generating and accounting for payments
4. Accounting for personal expenses, including advances (an asset), generating and accounting for payments
5. Accounting for cash receipts, including the collection of public debt and grants
6. Full payroll functionality, including managing salary rates at a global level, calculating net pay due, taking account of salary, allowances and deductions for tax, loan repayment (a reduction in the value of an asset), Provident Fund and Pension, generating and accounting for payment
7. Accounting for pensions, including maintaining personal pension records and history (including deductions and payments), calculating deductions, pensions levels due
8. Maintaining a fixed asset register which includes holding, maintaining and generating management reports on asset values, and incorporating adjustments for purchase, creation, depreciation, and disposal according to GAAP but which does not include incorporating these values or adjustments in the financial accounts (below the line accounting)
9. Full general ledger functionality, including transaction recording (financial and non-financial), journal entry, bank reconciliation, budget compilation, management and recording, aggregation and reporting
10. Accounting for development projects, including funding, expenditure, project lifetime accounting, donor and sponsor reporting

(see diagram on the next page for an overview of the integration process)



Requirements of testing an ERP

Testing of information systems generally encompasses verification of:

- **System functionality:** This requires testing of key base parameters like setup parameters, control parameters, input ability, output ability, and reporting.
- **Business processes:** A high level of business process testing is required to ensure that all business processes as specified in various functional modules of the system are capable of being met. Identification of key business processes pivotal to the system is the key to this exercise.
- **Business concepts:** A high level of business concept testing is required to ensure that all the throughput and interrelationships are working according to the intended design concept. Key business concepts that are to be tested include interfacing with other modules, file upload for aggregation, file transfer for aggregation, budget file downloads into system, upload and download file verification, and report writer capability.
- **Data volumes:** Tests in this group are purported to check that the time required for entering, processing and printing out typical volumes of data is acceptable.
- **Stress testing:** Robustness of the system is also required to be tested by subjecting the programs to heavy loads or stresses over a short span of time.

System Testing Methodology -- The Pakistan Case

Keeping in view the above themes, the SAI of Pakistan has envisaged that toolkits, designed for testing the implementation of the proposed integrated information system, must cover all the elements that are critical to the successful operation of the system. The areas selected for detailed testing include the following:

System Functionality (base parameter verification)

The base parameters that have been determined essential for the operation of the system encompass the following:

- Static (maintenance) data
- Transaction (input) data
- Enquiries
- Reports to be generated by each module and the entire system.

Base parameters for each functional module of processes and procedures have been detailed to avoid any omissions by the verifiers.

Business Process (module testing)

The business processes, for which the software functionality is to be tested, have been identified on the basis of functional specifications and their criticality to the entire system. Normally, the functional design, which forms the basis for system

configuration, contains all the processes and procedures. It has been measured that while testing successful implementation it may not be necessary to test all processes, but care has been taken to ensure that no critical procedure is omitted from the testing process. After identification of processes critical to system operation, specific tests were required to be designed for ascertaining their successful configuration. I shall revert to the specific tests later.

Business Concept (through put and inter relationships testing)

This area of testing focuses on verifying the interfaces between different functional modules and nodes. The approach that has been adopted in this regard is to develop diagrams that detail the schematic of the required interrelationships between the modules and nodes. Key business concept interrelationships that are to be tested have been identified with a view to ascertaining the completeness of system.

System Testing Environment (Volume and Stress testing)

Defining the system-testing environment is of critical importance, because quite often initial satisfactory verifications prove to be inadequate when applied to remote locations and infrequent, peculiar, and non-standard processes. It is therefore essential that all the typical and atypical nodes and processes are carefully identified detailing their inter relationship with the overall testing environment. In certain cases it may also be appropriate to carry out additional testing at a sub set level to complete the system testing cycle. Keeping these factors in view, the testing environment in Pakistan has been defined to ensure

- coverage for all typical and atypical processes and nodes irrespective of their location and frequency of integration with the main system
- subjecting the software and the hardware to heavy loads and stresses over a relatively short span of time, and to ensure that
- typical data volumes are run through the system during testing so that the entering, processing, and printing operations are verified for acceptable time limits.

With a view to ensuring that the general and specific objectives of system testing are adequately met, a detailed exercise was launched to develop a consensus between the functional users and the IT specialists on what constitutes successful testing of information systems. Difference of opinion contributed to comprehensiveness of the testing procedures and the exercise culminated in the development of

- **Operational acceptance test plan**
- **Detailed test scripts**
- **Test data, and the**
- **Expected results from the tests.**

Operational acceptance test plan

In the agreement with the supplier of the information systems it has been provided that operational acceptance testing will be carried out at different stages to ascertain whether the system conforms to the technical requirements and meets the agreed standard of performance including the functional and technical performance requirements. Since the System is being implemented in phases, it has been planned that operational acceptance testing will be carried out at the end of each phase. System implementation has been envisaged in the following phases.

- Test and development phase in which the system will be configured in a test site
- Pilot phase when the tested system will be implemented on selected sites representing various functional and operational nodes
- Roll-out phase where the system will be rolled out to a larger number of sites to achieve around 80% coverage in terms of transaction volumes, and finally the
- Replication phase when all the remaining sites will be covered

It has been planned that at the end of each phase operational acceptance testing will be carried out and implementation in a subsequent phase will be contingent upon successful testing of the preceding phase.

Detailed test scripts

In order to avoid inconsistencies in the testing process, test scripts detail the measures and steps to be taken by the system tester. A test script is a kind of checklist that is expected to oblige the tester to follow the minimum standard of verification. Separate tests have been designed to ascertain successful configuration of ***the system functionality*** by verifying the base parameters in respect of all the functional modules pertaining to the static and transaction data, enquiries, and reports. Similarly, tests for verification of ***business process and business concept***, have been carefully designed to include all steps and stages required for a transaction to finally appear in a financial statement. The comprehensiveness of the exercise can be assessed from the fact that over 270 tests scripts have been developed for the verification of the base parameters alone. Each test script clearly states

- ***the objective of the test,***
- ***the steps to be performed by the tester,***
- ***a cross reference to data to be verified, where required, and***
- ***the result expected from the test***

Test data

It has been planned that at the end of the development stage, the system configured by the implementers will be tested with the help of three months live data from all the transaction nodes that will cover all data elements. It has also been planned that at this

stage some simulated data will be used for verifying certain classes of static and transaction data that are not likely to be covered in the three months data. In order to meet this requirement, specific data packs have been developed to ensure inclusion of atypical and infrequent transactions. For all the subsequent phases of the project live data will be used for operational acceptance testing

Expected results from the tests

In most cases the test scripts clearly state the results expected from the tests. For the purposes of aggregation and consolidation, the reports designed under the new accounting arrangement and codified in the Financial Reporting Manual are planned to be used to determine whether the System meets all the reporting requirements.

The information regarding the entire testing process has been fully documented in the form of Test Data Packs.

Conclusion

Main purpose of this paper is to underline the increased responsibility of the SAIs around the world in the wake of the increased use of integrated financial information systems. It is envisaged that in due course the SAIs would be expected to combine the results of financial attest with findings from the audit of information systems. With a view to avoiding a fragmentary approach to auditing systems, there is a need to launch a comprehensive project that

- identifies issues facing the SAIs when they undertake audit of information systems which use organization-wide integrated software,
- outlines the possibilities of using a standardized business design for a given *Basis of Accounting*,
- aims at producing a system testing methodology, which is independent of the software, and provides assurance on proper implementation of a selected integrated software, and
- identifies areas of training in which programmes need to be designed and delivered by institutions like IDI and its regional initiatives like LTRTP.

Issues for further discussion

1. System verification based on checking processing of data can assure the certifier that the transactions are being processed correctly, but it may not provide comfort on whether the system has been configured taking into consideration the international best practices
2. At times the built-in functionality of an ERP does not squarely and neatly meet the business requirements of a client. In such situations the easy way out for system developers is to produce add-ons with the help of programming tools. Such add-ons, since they are not woven into the functionality of the ERP, are not

- integrated with the upgrades and new versions. Resultantly at the time of upgrades the entire add-on effort is to be done afresh thus making the implementation least cost-effective.
3. It is also possible that systems are configured to meet the “output” requirements of the business. For instance, a system can be configured to convert the initial transaction data into a particular reporting format without actually providing for all the prescribed authorization controls. In such situations, the systems certifiers would be required to carry out additional tests to certify the existence and operation of effective internal controls.

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