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Using Activity Based Modelling to Design Financial Management Systems

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SUMMARY

This paper proposes the use of Soft Systems Methodology (SSM) for designing financial management reforms. The SSM approach is contrasted to the "hard" systems approach implementing computer-based Integrated Financial Management Systems (IFMIS). The authors argue that a hard systems approach to IFMIS fails to take account of the requirement for organisational transformation, increases the risk of project failure and is likely to result in such projects failing to realise potential benefits.

Activity modelling is a conceptual tool within SSM, which supports a systemic approach to analysing and understanding complex organisational relationships. Activity modelling offers iterative learning in which conceptual modelling supports a progressively greater understanding of the nature and activities of a real-world purposeful system. Activity based modelling is a high level tool. It does not map logical flows or entities, but provides valuable inputs to more detailed techniques at a later analytical stage.

Government financial management can be conceived as a purposeful system and conceptual models are developed to learn about real-world situations. Furthermore, financial management can be conceived as a hierarchy containing two systems: (i) an information system supporting financial management (accounting and forecasting systems), and (ii) an operational system comprising budgeting, budget execution, cash and debt management. The former system serves the latter, and together the two systems comprise government financial management.

A top level of government financial management is created for a fictitious, but typical, Country X, and then the model is disaggregated by one level. This exercise serves to demonstrate that activity based modelling can be applied to government financial management, and describes the major activities fundamental to such a system.

The authors conclude that the model demonstrates:

- Government financial management is part of a complex organisational process within which change is both difficult and slow, and SSM provides a valuable tool to support the process of change.
- Since no software packages exist specifically for an integrated government financial management system, activity based modelling assists in the evaluation of available software packages against organisational requirements
- A SSM approach encourages a holistic approach to systems implementation that is likely to maximise the benefits from new systems implementation.

Finally, it is suggested that the generic IFMIS activity model needs to be developed to reflect alternative government environments as a systematic basis for comparing government financial management systems, and as a tool for systems design.

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LIST OF ABBREVIATIONS

A	Accounting
BE	Budget Expenditures
BR	Budget Resources
DFID	Department for International Development (UK)
EE	Expenditure Execution
ICGFM	International Consortium on Governmental Financial Management
IFMIS	Integrated Financial Management Systems
IMCL	International Management Consultants Limited
IMF	International Monetary Fund
PE	Plan Expenditures
PR	Plan Resources
RM	Resource Mobilisation
SSM	Soft Systems Methodology
TL	Top level

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1 BACKGROUND AND PURPOSE

1.1 Introduction

International Management Consultants Limited (IMCL) has for the last ten years been involved in the design, implementation and review of government financial management systems in a number of countries in Europe, Africa, Asia and the Pacific. This work has included the implementation financial management systems based on both custom developed and packaged software. This provides us with a perspective of the problems and issues resulting from considerable “hands-on” experience.

The introduction of Integrated Financial Management Information Systems (IFMIS) has been the subject of a number of presentations at previous ICGFM conferences, and is increasingly becoming the theme of donor funded projects in both poor countries and newly emerging democracies. Such projects tend to be focused on implementing a computer based IFMIS - treating this as a “hard” project analogous to building a dam or new airport.

In our view this “hard” systems approach fails to recognise the potential of new computer systems to enable organisational transformation, will often lead to projects that fail at a technical level and almost inevitably leads to disappointment with the failure of the new systems to achieve “real” change in the way governments behave. In other words, the hard systems approach will fail to realise the potential benefits of the hard systems themselves.

We believe an alternative approach that recognises organisational complexity and diversity and the need to use technology to enable change, whilst more time consuming to implement, will in the long run lead to real improvements in financial management supported by appropriate and sustainable technologies.

This paper proposes the use of the well established Soft Systems Methodology (SSM) as a structured and holistic approach to change, which better enables the design of appropriate technical solutions. In doing so we have used activity modelling, an important conceptual tool within SSM, to develop a generic model of government financial management systems. This generic model can be compared with real-world government financial management systems, used to learn about these situations, and thus lead to improved IFMIS implementations.

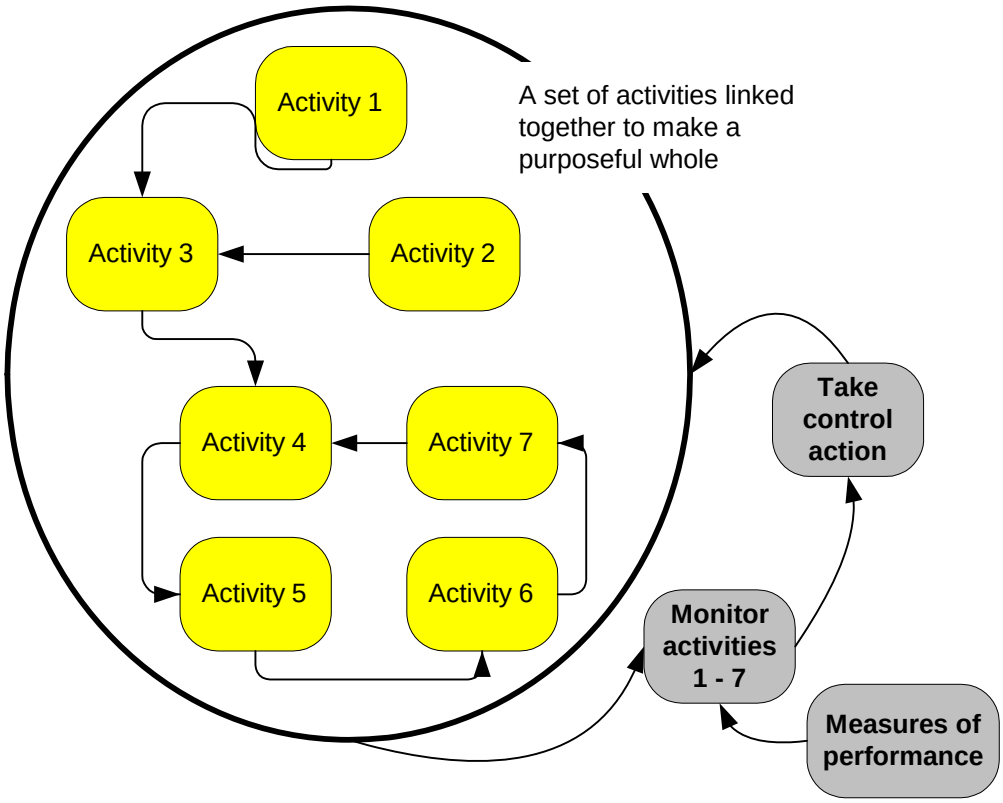
1.2 The nature of Soft Systems Methodology

Soft Systems Methodology (SSM) is a rigorous approach to problem solving that has emerged from a 30 year programme of action research (still ongoing), that started at Lancaster University (UK) in the early 1970's, and was led by Professor Peter Checkland. SSM structures a process of enquiry that is particularly useful in complex situations where there is a need to take account of a variety of viewpoints, to deal with multiple relationships, to recognise external influences, and to understand boundaries. SSM has achieved international prominence and is widely used in academic research, in industry (and in particular large international organisations), and is in widespread use in the public sector. It is especially useful at the early stages of analysing information systems requirements, using rich pictures and purposeful activity models, to bring clarity to often confused situations and so provide a design overview.

SSM is rooted in the familiar systems ideas of emergence, hierarchy, communication and control. Used together these lead to the concept of an adaptive whole. In this paper we have constructed a series of activity models. Thus we have used SSM to create a learning system, which guided us to the generic overview model we sought. These are activity models, so by definition the modelling language is based on verbs. The models do not describe entities, data or logic flows.

The top level model shown in this paper can be expanded to provide lower level models of increased detail around specific activities. We have only taken this to one level below the top model; country specific models would need to go into greater detail of specific processes. Thus we have described a broad sequence, but not a sequential flow or the logical loops within the systems. Exhibit 1 below shows the full version of an activity model, where a monitoring and control system, relevant to the system being modelled, is included.

Exhibit 1: General form of an activity model

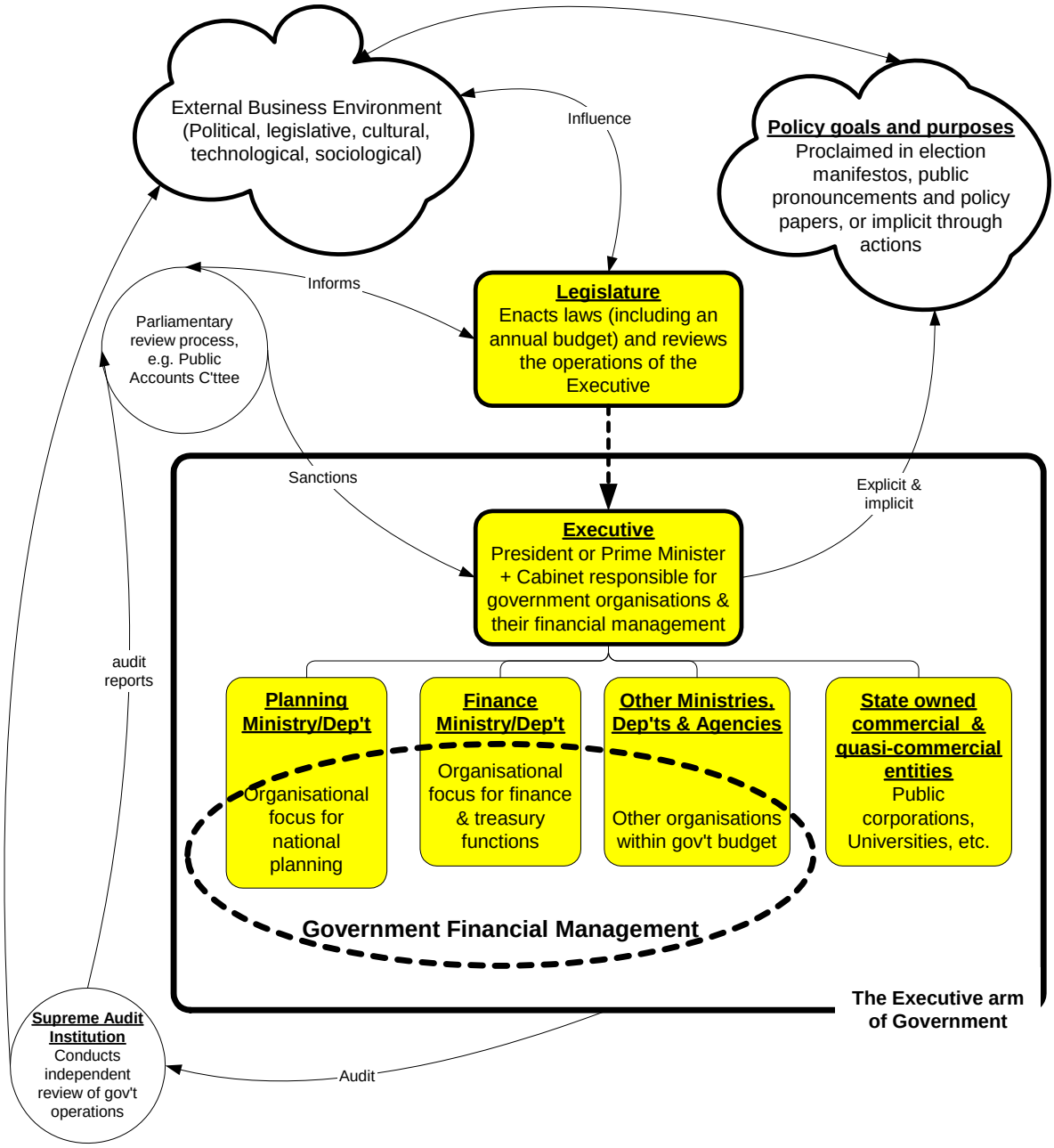


Note that activities are only broadly linked in a sequence, and it is quite legitimate to have several initiating activities, as in the general overview above. All systems must have boundaries and be subject to some form of monitoring against measures of performance, leading to control actions.

1.3 The organisational context

Government financial management is the purposive system by which governments plan resources and activities, combine these into a budget which is enacted as law, implement the budget and other laws, account for financial flows, then report back on the stewardship the government has exercised. Financial management therefore involves the relationship between the legislature (representing the electorate as a whole) and the executive organs of government.

Exhibit 2: Context of financial management



The description above is of a typical financial management pattern followed by democracies, which will also incorporate standardised institutional monitoring processes, in particular an independent audit by the supreme audit institution of the country, and some form of legislative review process (e.g. a Public Accounts Committee). An overview is provided in Exhibit 2, above. Note that this is not an activity model, but rather a description of organisational relationships.

In most democracies, legislative control over the Executive is very limited. Once appointed, the President or Prime Minister controls government organisations and directs their activities, in accordance with policy goals and purposes that are rarely made fully explicit. Parliament is restricted to enacting legislation and conducting a review of the operations of the Executive. The Supreme Audit Institution, which should be an organ of the legislature, makes an important contribution to the legislative review process through its access to information and its public reporting. The external environment plays a significant role in determining the action of the Executive and attitudes of the legislature, for example through the media and pressure groups, and will itself be influenced by government actions and audit reports.

Financial management is the purposive system within the executive arm of government to manage government finances, create and execute the budget, provide money for organs of government to carry out their functions, and report back on outcomes. It is characterised by the following features:

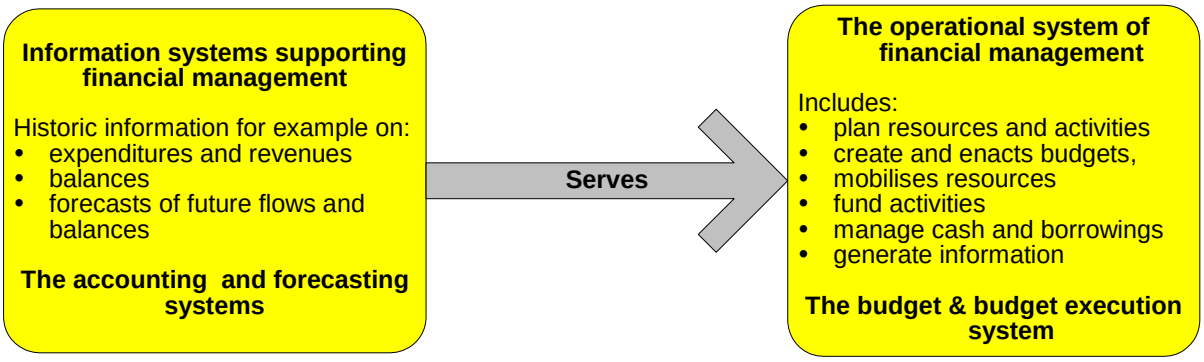
- The Ministry or Department responsible for finance (often called "The Treasury") will have administrative responsibility for finance functions, including procedures, regulations and information systems.
- Where there is a separate planning function, this will have a significant role in the financial planning and budget aspects of financial management.
- All other Ministries, Departments and Agencies also have roles within financial management, both in preparing budget estimates and in using public money to execute their functions.
- Commercial and quasi-commercial organisations are not part of government financial management, and flows to or from them are treated as flows to external entities (this is in accordance with the IMF GFS approach).
- This model is of a unitary government. A federal structure is more complex, and depends on constitutionally defined relationships, but the underlying principles remain unchanged.

Note that financial management embraces some of the activities of all Ministries (or Departments, depending on the nomenclature used). Financial management is focussed on the Department of Finance. However, even for the Department of Finance, financial management does not represent the whole of the Department's activities. There is no "one to one" match between financial management and any one government organisation.

1.4 What is being modelled – the purposive system

Financial management contains, within itself, two purposeful systems, one serving the needs of the other: a financial management system is served by an information system. Clarity about the system served (in this case the financial management system) will enable better understanding of its information needs and hence inform the development of appropriate information systems.

Exhibit 3: The two systems within financial management



These two systems are combined within a single financial management model, but the dichotomy explains in part the emphasis of economists and development advisers on the budget aspects, whereas accountants and financial managers emphasise the accounting aspects.

1.5 Purpose and goals of government financial management

Campos and Pradhan[1] have identified three goals of government financial management: fiscal management, resource allocation and efficiency of expenditure. They also identify transparency and accountability as advantages of good financial management. This analysis provides a sound basis for the identification of goals proposed below.

Exhibit 4: Goals of government financial management

Goal	Comment
Fiscal management of the economy	To manage fiscal flows, balances and risk in accordance with government policy
Appropriate resource allocation	Resources are allocated through the planning and budget processes, and their subsequent execution. Since governments represent coalitions of interest. it is not meaningful to talk of optimal allocations, but the allocations should be appropriate within the explicit and implicit policy goals
Value for money in expenditure	This comprises efficiency, effectiveness and economy
Accountability for stewardship of public resources	Achieved through compliance with ethical standards, legislation and regulation, and avoidance of corrupt practices
Transparency	Achieved through transparent processes and publicly available financial information and reports in accordance with the IMF Guidelines on Fiscal Transparency

[1] "Budgetary Institutions and Expenditure Outcomes", Ed Campos and Sanjay Pradhan, World Bank Policy Research Department, September 1996

1.6 The generic financial management system

Our original idea was that the essential homogeneity of government financial management transcended differences of terminology so that a "one fits all" model could be developed that embraced all countries. However, closer examination indicated that such a comprehensive model was not feasible, because:

- Most industrialised countries do not have a separate "planning" function, yet such a function is normal in many third world countries.
- In many advanced countries administration has become so departmentalised that the model would have to be significantly changed to recognise the degree of decentralisation.
- The authors lacked the detailed knowledge of the systems used in Francophone and Latin American countries to be confident of the applicability of the model to such countries.
- The transitional economies of the former Soviet Union are seeking, in different ways, to move from their previous approaches of government to new models, and could not easily be dealt with in a general model.

Therefore, the model was narrowed to developing countries that have been influenced by an Anglo-Saxon model of government. This would include all of the non-Francophone counties of sub-Saharan Africa, South and East Asia, most of the Pacific and some of the Caribbean. However, even within this narrower model, there will be differences, in particular the extent to which the country has adopted current thinking, such as medium term budgets, output budgeting, and so on. Additionally, even in these countries, decentralisation has been implemented but without standardisation of systems.

So we have conceived of a fictitious country, X, that contains most of the characteristics of the group of countries described above. Country X is described as follows.

> *Country X could be anywhere in the regions described above. It is a developing or middle-income country, with significant dependence on official development assistance (ODA). It has a unitary government structure. Country X has a distinct planning function that generates perspective (e.g. five year), plans, screens and selects projects. It has adopted a medium term budget system, but the legislative process remains based around the annual budget. It has not adopted output budgeting. It has a centralised process for managing cash and debt, and it could use either cash or accrual accounting.*

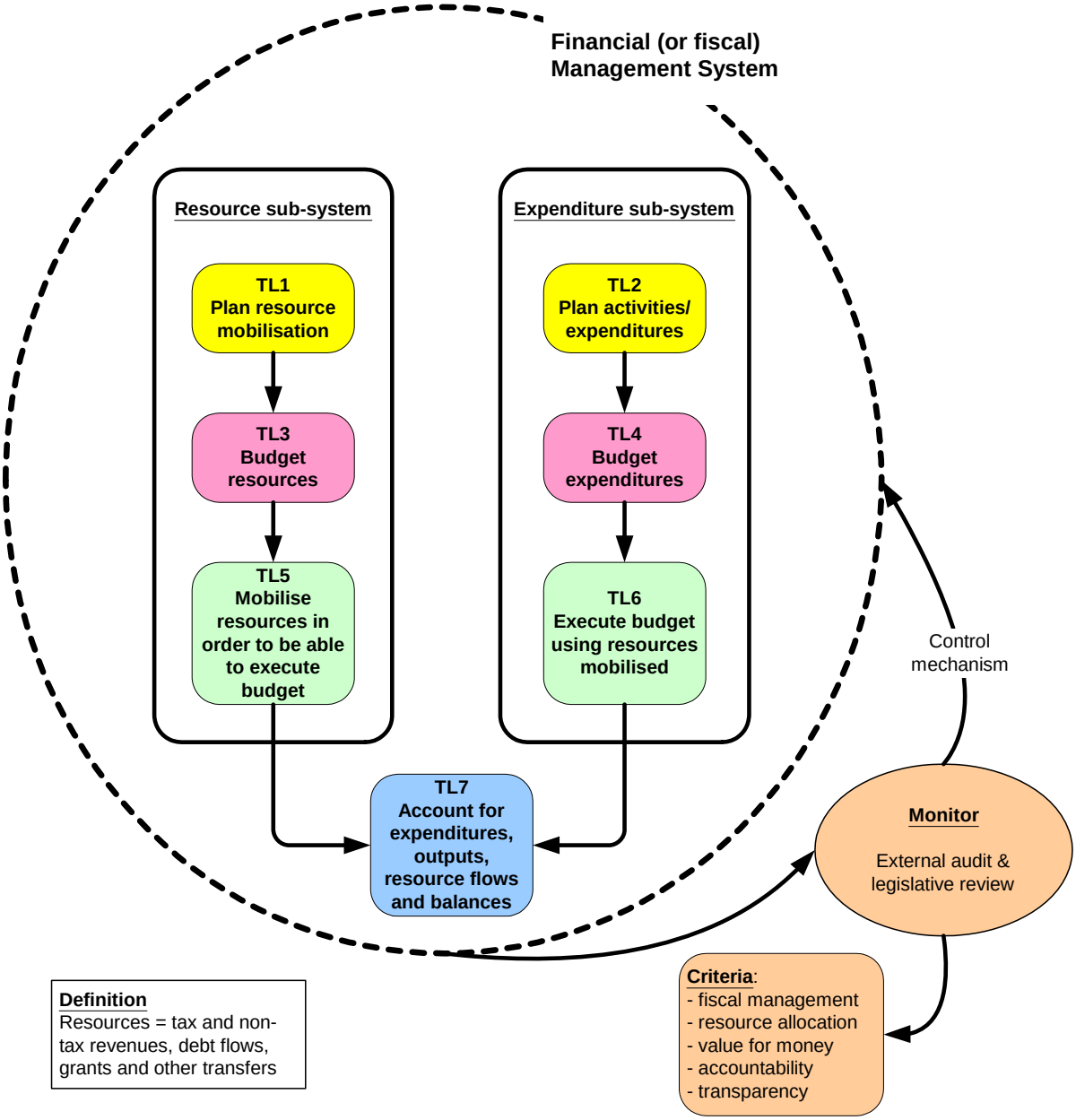
Although the generic model has been narrowed to a particular type of country, we still consider most of the characteristics above apply to any country, and the model could be modified relatively easily to embrace such specific variations as are necessary. For simplicity we have omitted, in the versions shown in this paper, the monitoring and control elements of the sub-systems. Activities in the models are numbered for reference purposes only and do not imply any particular order.

2 ACTIVITY MODEL OF A GOVERNMENT FINANCIAL MANAGEMENT SYSTEM

2.1 The top level model

Using the SSM approach, the top-level model provides an overview of the financial management activities and their relationships. This is complicated because within financial management there are two sub-systems, each with its own control process, as indicated in Exhibit 5, below.

Exhibit 5: High level model of government financial management



This is the top level activity model of financial management. Each activity is indicated by a box, and the arrows represent the broad sequence, but, as indicated, this is not a sequential model. Each of these top level activities is disaggregated by one level in the models that follow. Note that because this is an activity model, the information feedback loops are not always shown.

There are two major sub-systems:

- The resource sub-system, covering the cycle of planning through to mobilising resources, and
- The expenditure sub-system, covering the cycle from planning activities through to actual executing those activities.

In the disaggregation of the top level activities that follows, we relate the activities within these two sub-systems at each stage, because there is an iterative relationship. Resources dictate which activities can be undertaken, but desired activities influence the policies to generate resources. This is why a medium term budget must comprise both resource and revenue budgets, since one without the other is meaningless.

The whole financial management system is subject to external monitoring, both by the Supreme Audit Institution and by the legislature. This analysis does not further explore these important control mechanisms, though this was in part addressed by a paper delivered by one of the authors at last years Miami ICGFM Conference.

Finally, for the purpose of this paper we regard the terms “Financial Management System” and “Fiscal Management System” as synonymous.

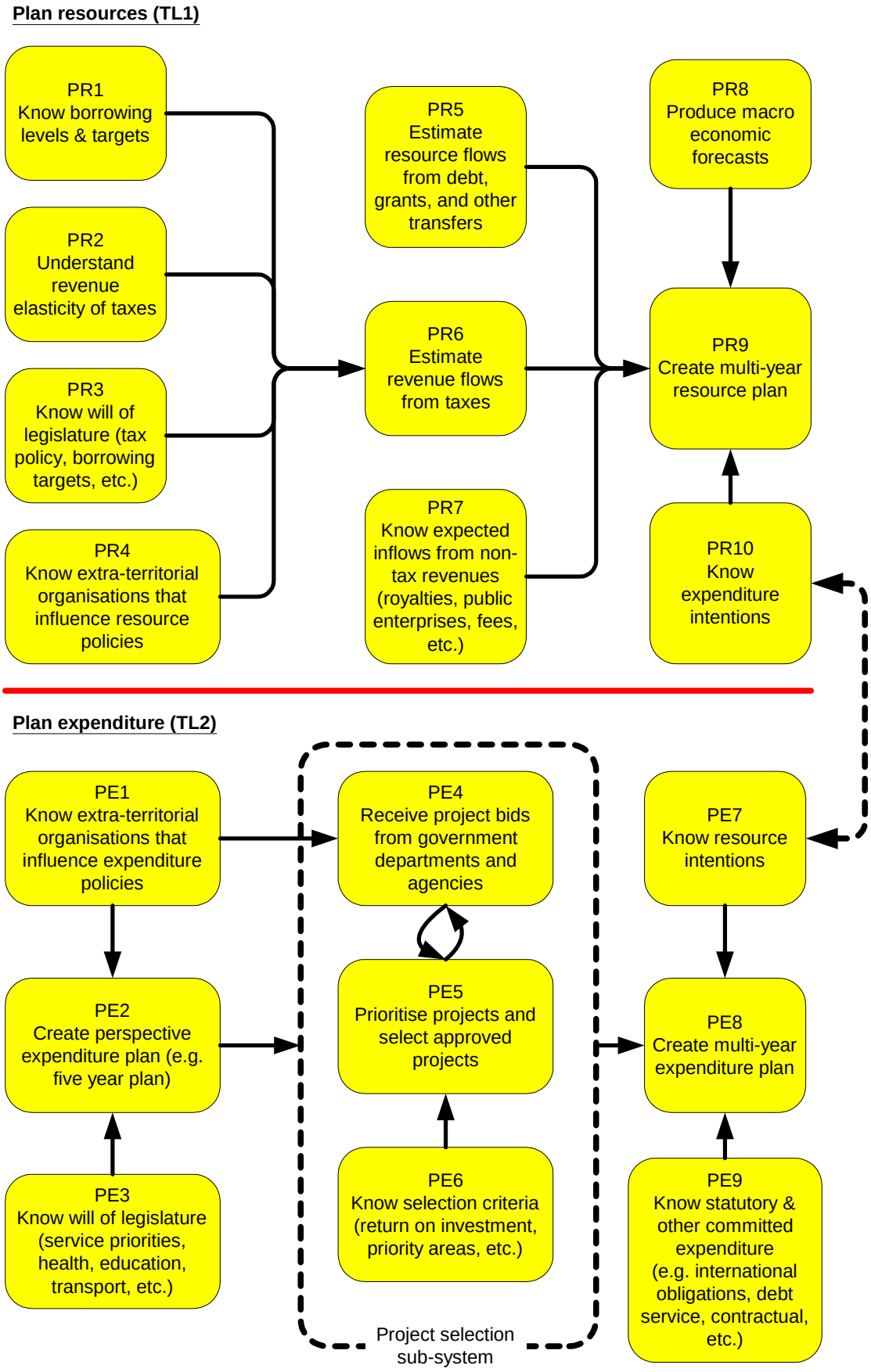
2.2 The planning stage

The planning stage comprises the two top level activities:

- TL1 - plan resource mobilisation
- TL2 - plan activities/expenditures

Each of these is disaggregated by one level in the following models. For country X, the planning stage is regarded as a planning exercise leading to a multi-year resource and expenditure plan. Note the two top level activities are linked by an iterative relationship between resource and expenditure intentions. Note also that within expenditure planning there is a sub-system relating to the identification and selection of development projects.

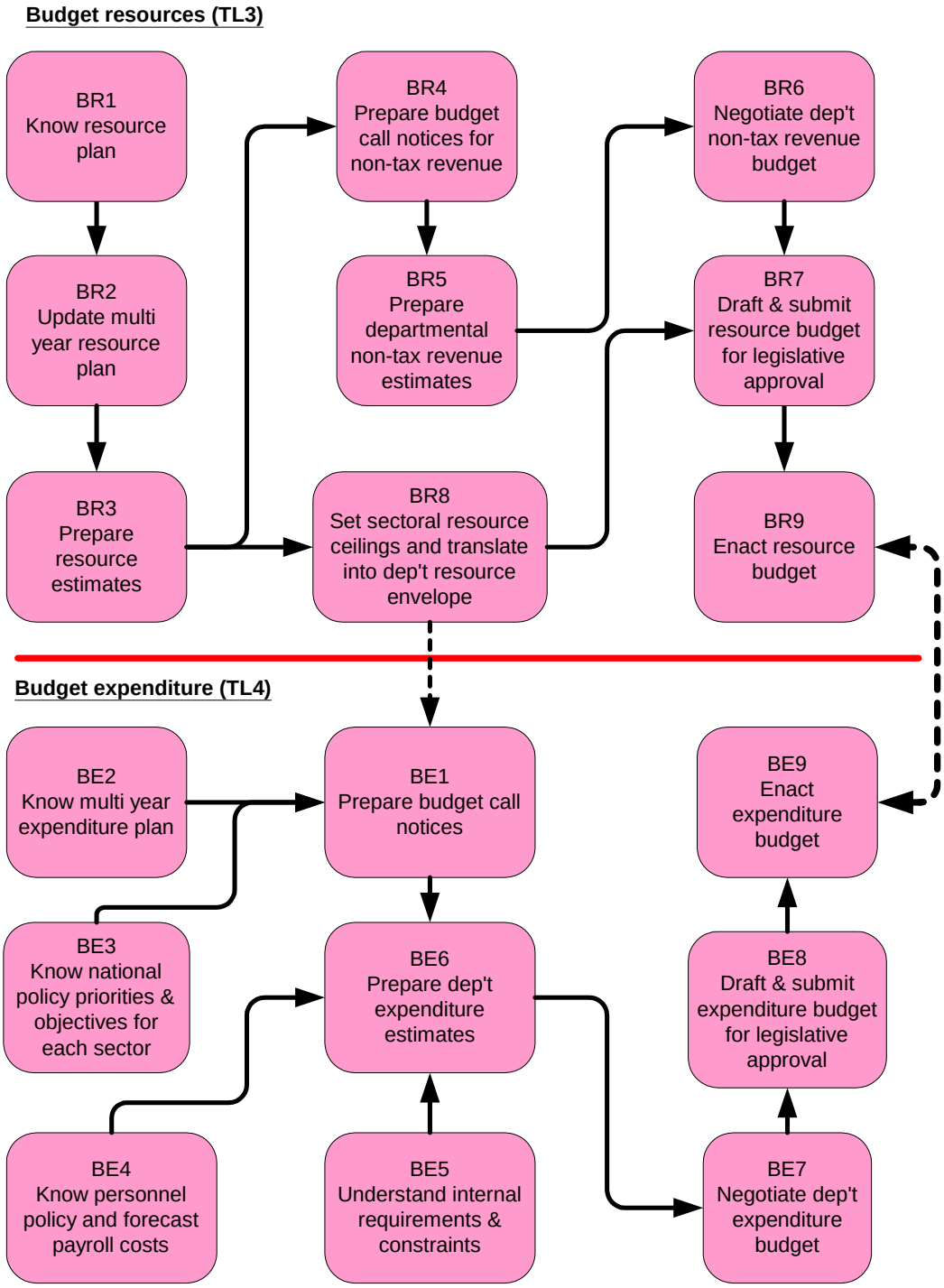
Exhibit 6: The planning stage



2.3 The budget stage

In most countries, multi year plans, even if approved by the legislature, do no provide legal authority for raising revenues and incurring expenditures. Such authority is provided by the budget, and many countries have a Constitutional requirement for an annual budget. The budget therefore becomes a law, and in this sense has a great significance in government financial management. The legal status of the budget is a major difference between public and private sectors - in the latter the budget, though important, is no more than a plan, which can be adhered to, varied or simply ignored at the discretion of management.

Exhibit 7: The budget stage



Note that a number of activities embraced within the planning stage are covered by BR2 "Update multi-year resource plan". This would include, for example, updating forecasts of tax revenue and debt flows. Typically, once tax and borrowing policy has been decided, the resource budget becomes an exercise in forecasting. The one exception is often departmental non-tax revenues, which can be the subject of negotiation.

On the other hand, the expenditure budget normally involves an extensive negotiation process between departments and the Treasury (Department of Finance). In an ideal world, the resource ceilings would identify what each department has to spend, but this is rarely a complete solution and in some countries resource ceilings are either not issued or are largely ignored. In any event the budget cycle will always involve a negotiation process. It is desirable that departments should as far as possible make their own expenditure decisions within the finally agreed ceilings, because of the "asymmetry of information" (higher organisation levels have better overall information, lower organisational levels have better information on how to actually implement activities).

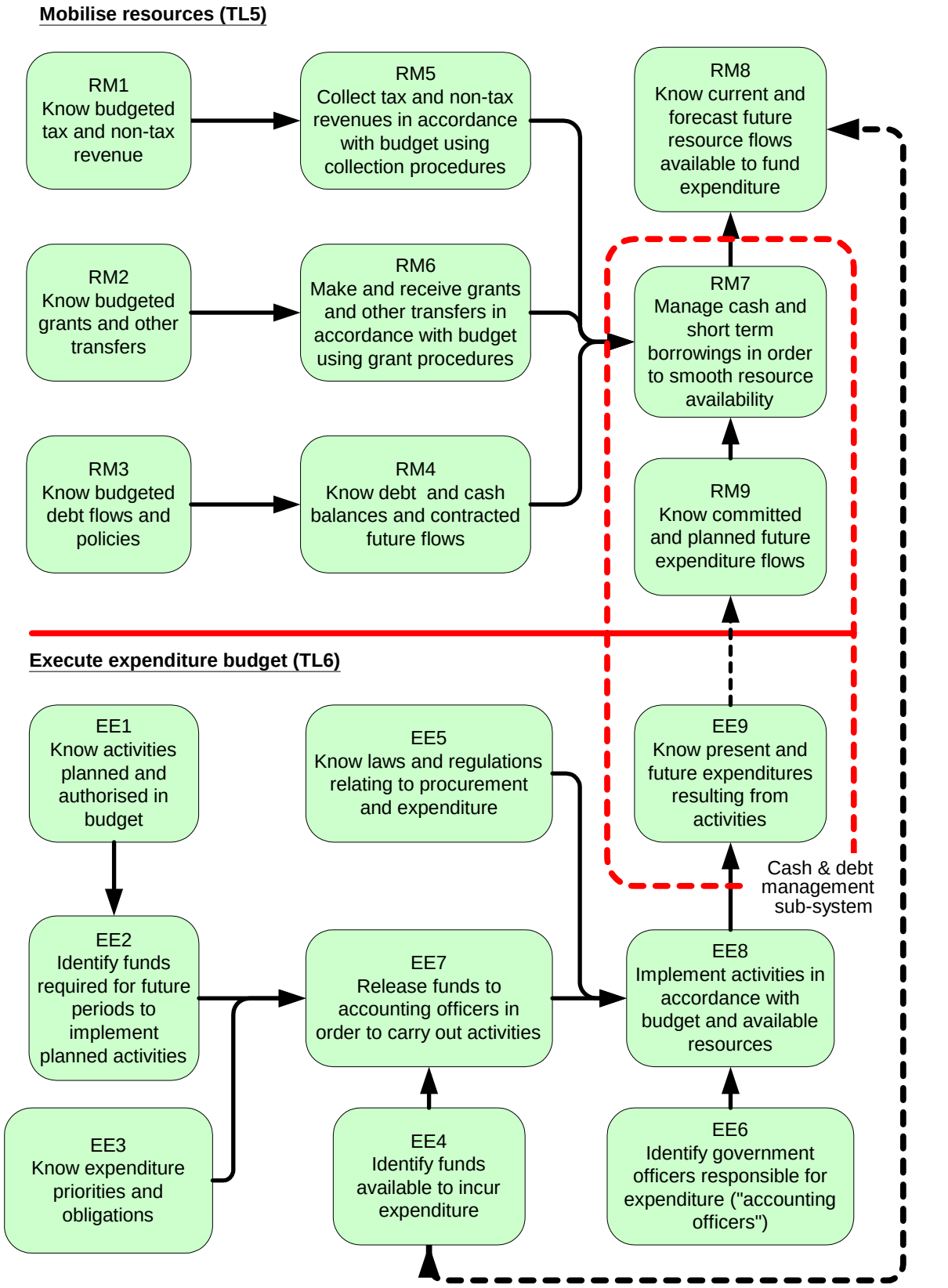
Payroll forecasting is shown separately because the forecast will derive from the human resource and payroll systems and is essentially incremental when other budget items are not. Typically payroll will account for a large proportion of total government expenditure, and the payroll cost forecasting exercise could well be regarded as a separate sub-system in its own right.

2.4 The budget execution stage

The implementation of the enacted budget involves raising resources and spending monies in order to achieve the planned outputs. This is a complex process, and each of the activities in this second level model could themselves be further broken down. One specific sub-system is identified, that related to cash and debt management. In all countries, some form of cash management is required to use short term borrowing to smooth resource flows with expenditure flows - because the time pattern of the two flows may not match.

However, in some countries, cash management has a much more critical role in the budget execution process. In such countries, budgets typically comprise unrealistically optimistic forecasts of resources, and hence activities that cannot be carried out. Often such forecasts are to satisfy political imperatives. Where this over-optimistic budgeting exists, the "real" budgeting is performed through the cash management sub-system by matching resources against priority expenditures. Such processes may meet political needs and enable fiscal control, but will be dysfunctional as a tool to allocate and manage scarce resources.

Exhibit 8: The Budget Execution Stage



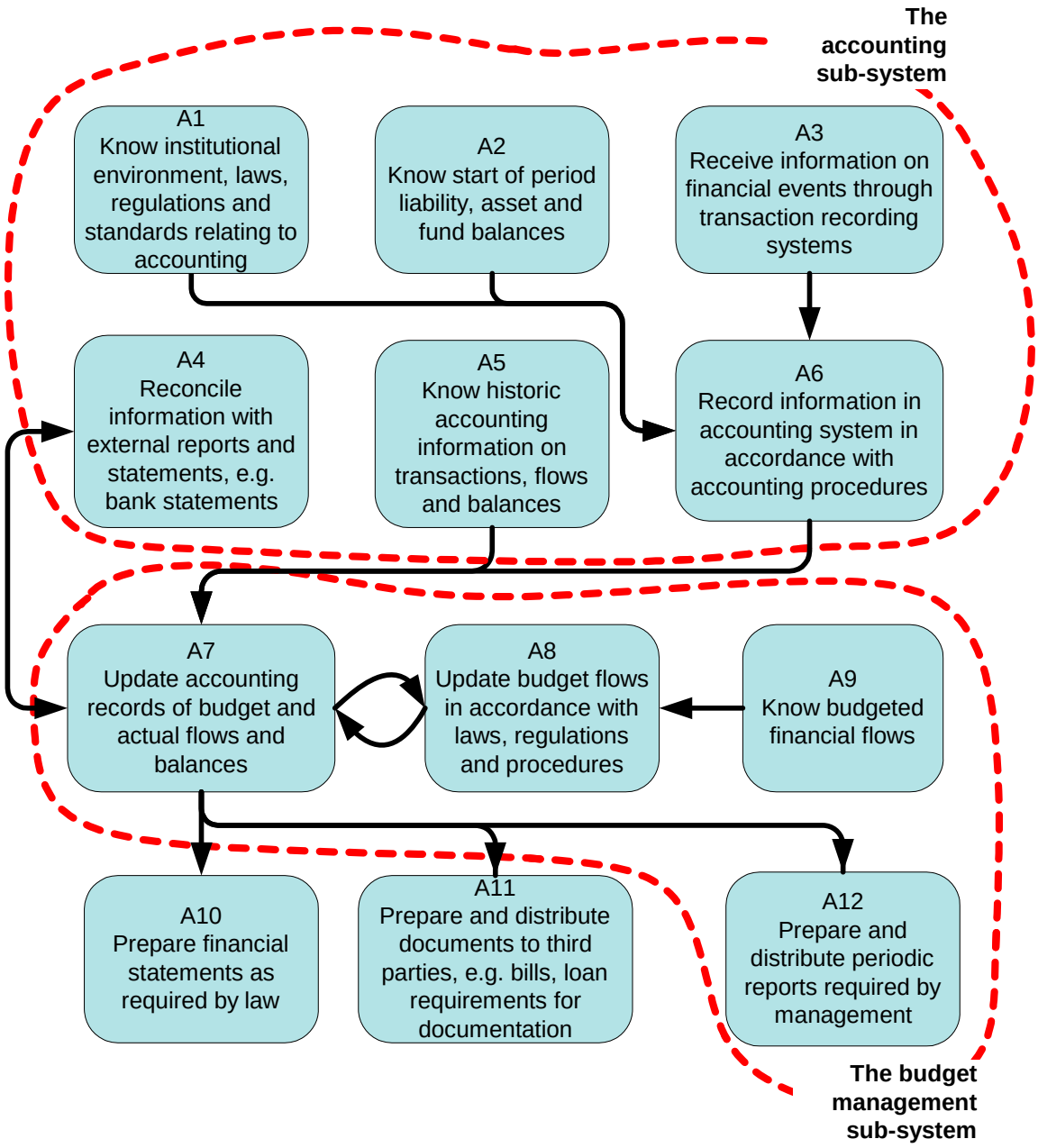
2.5 The accounting stage

Within accounting, two sub-systems are identified:

The accounting sub-system — Describes the activities involved in recording transactions within an accounting system. The model in Exhibit 9 is a generic description that could apply to a manual or computer system. In order to relate it to a particular situation, the accounting activities would need to be broken down to sub-activities

The budget management sub-system — Could be treated either as part of the budget system, as here as part of the accounting system, or indeed as a separate system in its own right. In any event it forms an essential part of financial management, and again would need to be further disaggregated to describe a particular situation.

Exhibit 9: The Accounting Stage



2.6 Comments on the generic model

The main objectives of developing a generic model of government financial management have been:

i. To show how activity based modelling can be used to describe government financial management systems, and

ii. To use this to develop a model which describes the major activities fundamental to such a system.

The authors recognise that the generic model requires further refining, possibly changes to "Country X" to increase its coverage, and the inclusion of boundaries and control mechanisms. The models are therefore offered as an initial effort to promote discussion.

3 CONCLUSIONS AND THE NEXT STAGE

3.1 What has been achieved

We believe this exercise has achieved three objectives:

i. We have demonstrated that activity based modelling is a useful tool to describe the activities necessary for the operation of financial management systems, and furthermore that the technique provides a tool for the high level description of such systems.

ii. The models provide an insight into a typical financial management system, describing the parameters, relationships, high level controls and major relationships as well as the activities themselves.

iii. The models provide a basis for applying SSM and developing activity models for financial management systems in specific countries. Besides their inherent usefulness within an SSM approach, such models could provide a consistent basis for making comparisons between countries.

However, the danger of developing generic activity based models is that the focus may become the model itself, rather than using the modelling approach as a learning tool to understand how systems work within a particular environment. Our emphasis at the start of this paper is the need to move away from viewing the implementation of computer-based financial management systems as an exercise in hard systems engineering, and instead to view financial management as a series of activities serving a complex set of organisational relationships and needs.

3.2 The role of SSM and activity models when implementing computer-based government financial management systems

As indicated at the start, we believe that computer-based integrated financial management systems have the potential to significantly improve, not just financial management, but the whole process of government. The use of public money for public benefit is fundamental to the process of government, and to have available on demand relevant, reliable and up-to-date financial information has the potential to transform the management and operation of government itself.

However, we also believe that the "hard" engineering approach to implementing such systems fails to recognise the complexity of change involved, the nature of financial management software (i.e. accounting, budget and Enterprise Resource Planning (ERP) packages), or the potential benefits of new systems. This is a strong statement, and we seek to justify it below.

We believe that the generic models developed in this paper have served to demonstrate that even at a high level, government financial management systems are part of complex organisational processes involving many actors, groups, and relationships, both formal and informal. Experience of all of those who have attempted it is that to achieve change in such organisational environments is difficult, takes time and requires a detailed grasp of activities and purposes for which such activities are carried out. SSM provides a structured approach to the required analysis, and a sound basis for initiating reforms.

Secondly, it must be recognised that there is no such thing as a software package specifically for integrated **government** financial management information systems. Enterprise Resource Planning (ERP) software has been developed for commercial environments, and in our experience is not easily adapted to government needs. In particular, such packages prescribe workflow patterns that may be difficult for governments to implement, often lack adequate budget modules, and frequently have problems with particular requirements of governments. All financial management software packages are developed to meet the needs of a specific business model, and then extended to meet the needs of a broader range of environments. Therefore, evaluating a package is a two-stage process:

Stage 1 How well does the package works in terms of the business model for which it was created?

Stage 2 How closely does the business model for which the package is designed match a particular government's activities?

Activity based modelling provides a tool for the Stage 2 evaluation. The business model for which the package has been designed can be compared to the activity model of financial management within a particular government.

Finally, a real problem with computerised systems is that they can automate certain processes without changing the manner in which organisations operate. To take a very simple example, it is not enough to automate cheque signing - the need is to automate the whole process of approving payments, initiating the payment process, and transferring funds. By describing the whole activity sequence, activity based modelling makes such transformation more feasible. At a higher level, by identifying the activities of managers, their information needs and timing can be better understood and a system designed that initiates real improvement in the process of government, as indicated above.

Our conclusion is that by using the soft systems approach of SSM, change can be made more effective and sustainable, the risks inherent in introducing "hard" computer based financial management systems can be reduced, and there is a better prospect of realising the potential benefits of such reforms on the whole process of government.

3.3 Where next

Firstly, we would like to see the generic model being refined and developed to describe a broader base of systems, for examples those in Latin America. Possibly this might mean a series of generic models for three or four different approaches to financial management. The development and publication of such models would inform an understanding of the differences and commonality between alternative approaches government financial management.

Secondly, we would like to see the development and publication of activity models of actual financial management systems employed by various governments, and this used to develop a fact based approach to prescribing systems. Although there are a number of manuals produced by donors on government financial management, none of these use any consistent approach to describing and comparing alternative systems and approaches. Activity modelling could provide such an approach.

Finally, and as indicated above, we would advocate the use of the SSM approach in identifying needs and designing systems, and as a tool in the realisation of the potentially enormous benefits of computer based integrated financial management systems.

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