

Information System Model of A Work-Plan Budget

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Abstract—As a form of accountability in carrying out its duties, functions, and authority, a government agency must prepare a budget and work plan. The budgeting process in many government agencies utilizes manual processes with various documents, resulting in long processing time, numerous errors, and difficulty in data searching. Furthermore, the lack of data integration interferes with the need to meet requirements, standards, and budget-planning deadlines. The research methods were conducted through field observations, interviews, and models based on literature review. The proposed model was designed with the unified model language (UML), class diagram, use-case diagram, sequence diagram, and activity diagram. The result is an information system model of work-plan budget that can successfully support the management performance of a government agency in performance-based budgeting. This system model is both integrated and computerized to accommodate the requirements and support for the agency's internal management performance.

Index Terms—work plan, budget, government agency, information system model

I. INTRODUCTION

There are several issues on the present budgeting process that must be addressed. Among these are the matching of proposed activity plans with predetermined cost as presented in the budget. Moreover, the proposed budget shall comply with the provisions, regulations, and standards cost that have been established during the current fiscal year. Additionally, information received in the budgeting process should be current and integrated.

The expected solution needed to address these issues was through the use of a computerized and integrated information system on work-plan budget preparation; that is, a system that can assist and support the management of the organization in terms of its budgeting system performance. Fig. 1 shows the business planning process with regards to budgeting.

The Ministry/Agency's budgeting process commences in January after the Ministries of Finance and of Planning has evaluated the baseline and new initiatives plan. Then,

between February and March, the Planning Bureau of the Ministry/Agency receives the Indicative Ceilings that is established by the Ministries of Finance and of Planning, leading to the assignment of national development priorities (this is outlined in the preliminary design of the Government Work Plan in March). Afterwards, the Planning Bureau of the Ministry/Agency compiles a work-plan budget in March with reference to the letter regarding the Indicative Ceilings. The work-plan budget is prepared with a performance-based approach, a medium-term expenditure framework, and an integrated budgeting that includes policies, programs, and activities. Subsequently, the Ministry/Agency discusses the preparation process of the work-plan budget with the Ministries of Planning and of Finance.

In April, the Ministry/Agency delivers the work-plan budget to the Ministries of Planning and of Finance as a part of the preliminary design improvement for the Government's Work Plan as well as the preparation of details on the ceiling based on organizational units, functions, programs, and activities; all are discussed as a part of the discussion on the preliminary budget draft.

By the end of June, the Ministry/Agency receives budget ceilings, which is specified according to organizational units and programs, and guided by fiscal capacity as well as the amount of Indicative Ceilings, Work Plan, and Performance Evaluation. At this time, the Ministry/Agency compiles a Work-Plan Budget that accommodates new initiatives based on Budget Ceilings, Government and Parliament's Work Plan Agreement in the preliminary discussion of the Draft State Budget, and Cost Standard. Ultimately, the Ministry/Agency conducts the discussions on Work-Plan Budget with the Parliament in order to draft a preliminary budget. The discussion focuses on consulting the new proposed initiatives. In addition, adjustments to the new proposed initiatives are compiled based on the Work-Plan and performance targets achievements so as to prevent exceeding the Budget Ceiling.

At the end of July, the Ministry/Agency conducts a review on the Work-Plan Budget. This is performed in an integrated manner, and includes the evaluation of the budgets' adequacy for performance targets and consistency of performance targets with regards to the Work-Plan Budget.

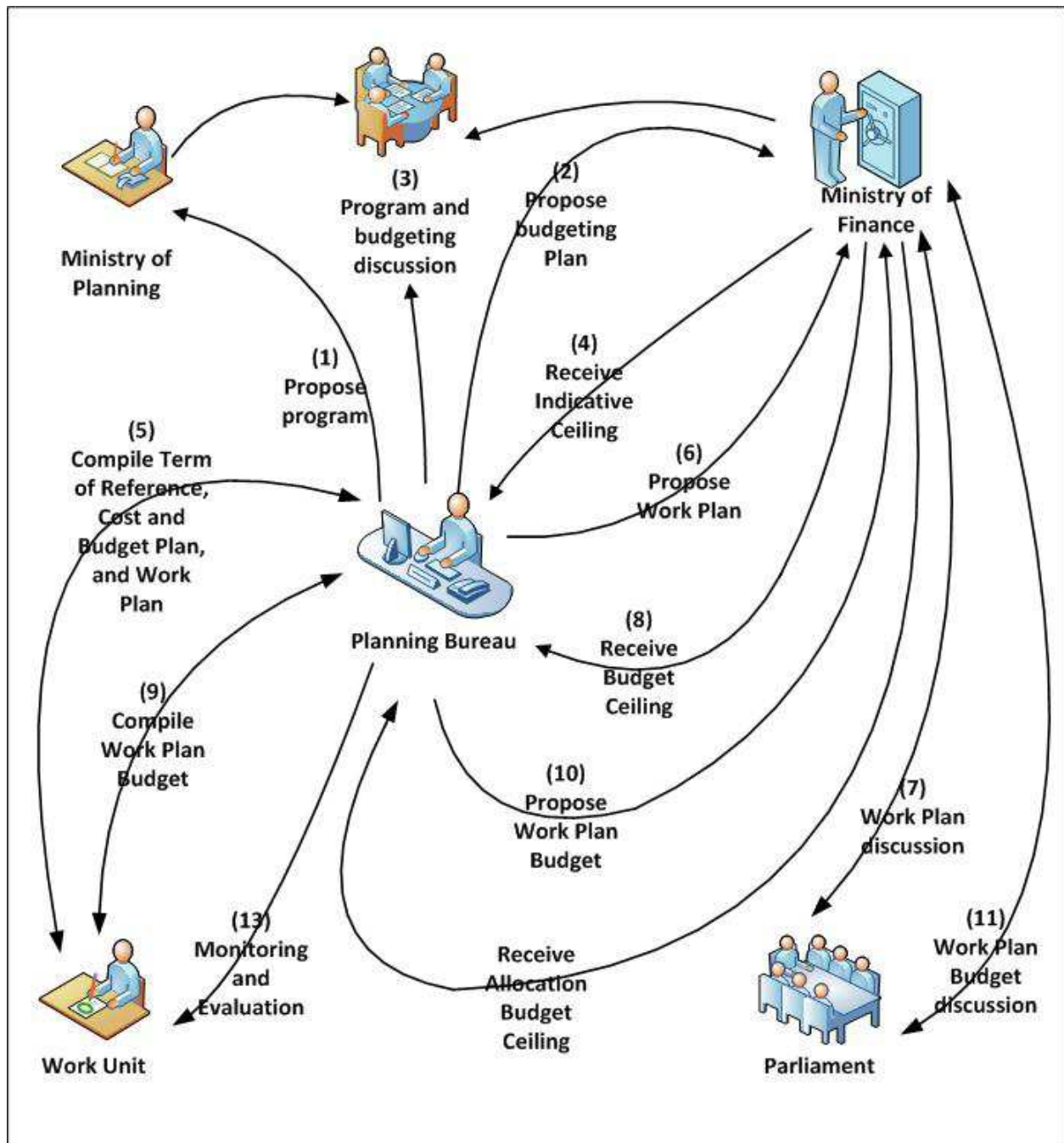


Figure 1. Budgeting Planning Process

During August through December, the Ministry/Agency conducts discussions that are related to the Draft State Budget and Draft Law on State Budget with the Parliament by no later than the end of October. These discussions aim to optimize the budget ceilings in accordance with the policy direction set by the President. The Ministry/Agency then implements the adjustments on the Work-Plan Budget based on the discussion results on the Draft State Budget and Draft Law with regards to the final budget that was presented by the Minister of Finance. By the end of November, the Ministry/Agency receives the final budget allocation. Finally, the Ministry/Agency compiles the budget implementation documents using the final work-plan budget that is

approved by the Ministry of Finance by no later than December 31st. Fig. 2 and 3 show the process of compiling the budget plan.

A budget can be interpreted as a financial plan that reflects an organization's policy options for a certain period in the future (Mawardi, 2005). As a planning tool, the budget serves as a guideline, providing directions and targets for the government agencies. Budgeting as the blueprint for activities at an institution should reflect the priority on resources allocation (Puspaningsih, 2002). Ekananta (2006) states that budgeting is a financial planning to perform resource allocation for one year in support of programs that have been implemented.

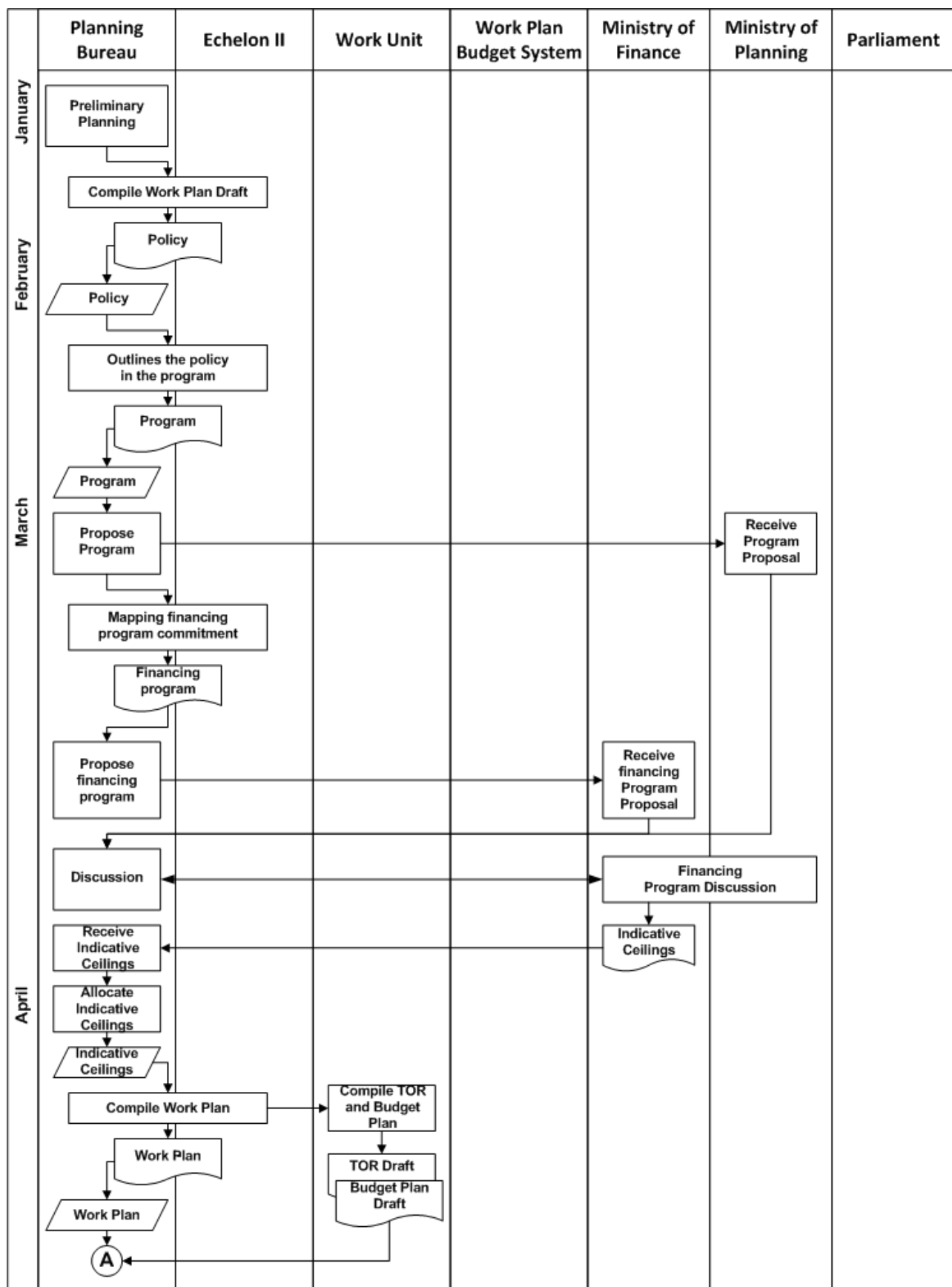


Figure 2. Budgeting Process of Compiling Budget Plan

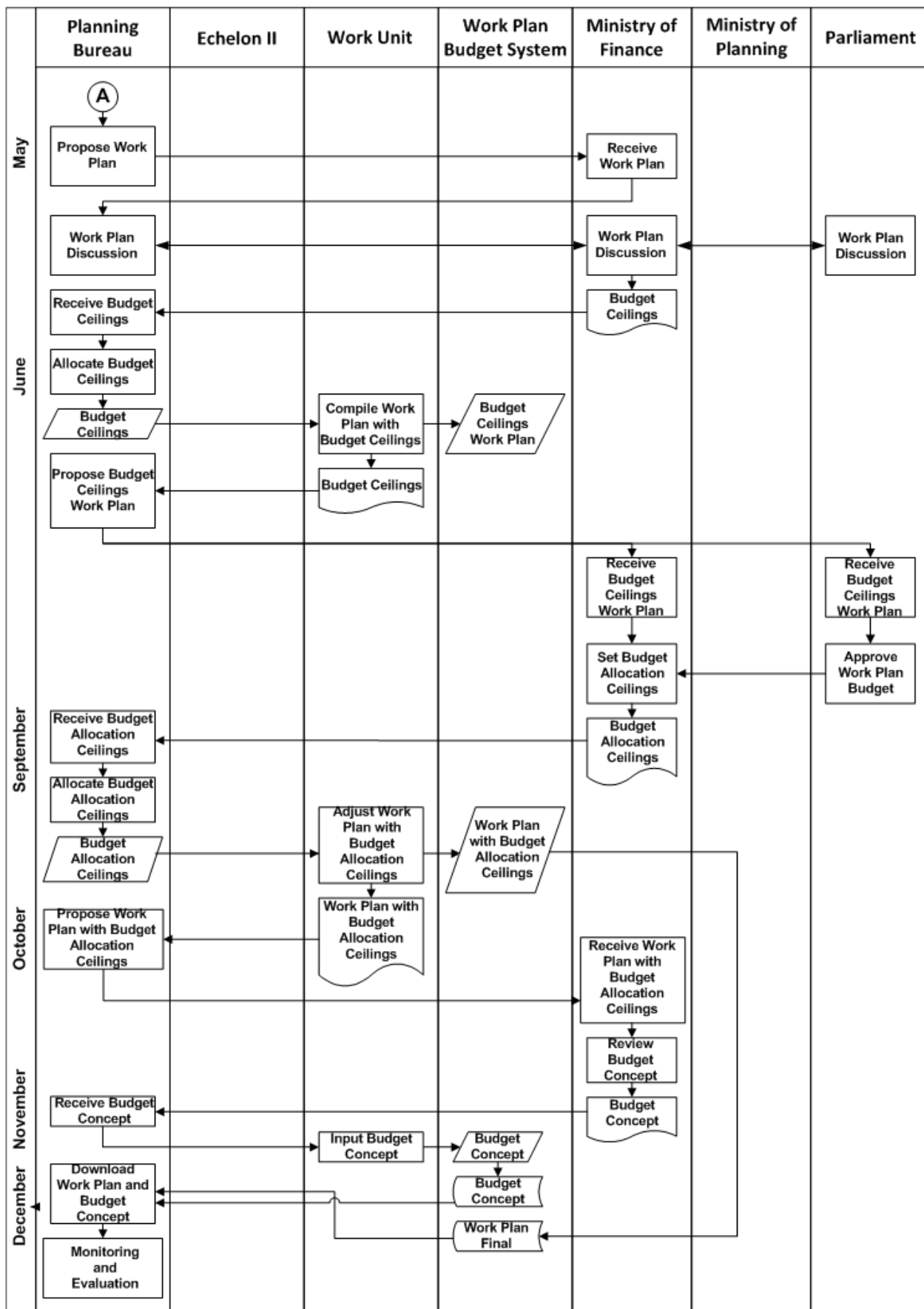


Figure 3. Budgeting Process of Compiling Budget Plan (continued)

Budgeting activities have an important role in the overall planning and management control of an institution, which then leads to goal achievements (Sundjaja, Arta, Tundjung, & Puspita, 2011). The key to an effective performance is the achievement of budget goals with participation playing a crucial role in goal realization (Chris, 1955). When subordinates have better information than their superiors, the participatory management control system permits subordinates to disclose information that can be included in the budget during the time of performance assessment.

The main purpose of creating a Budgeting Information System (Tescic, 2011) is to provide quality information to the management for decision-making processes, and to allow financial streamlining that is a key component in meeting the needs of all management levels. A study conducted by Sundjaja, Arta, Tundjung, and Puspita (2011) relates the internal control in budgeting with the object-oriented design methods through the use of Unified Marking Language (UML) notation. The formulation of Budgeting Information System design meets the planning objectives, supervision, as well as the performance measurements/report (a comparison between the budget and actual activities). Budget Information System is intended for use in the regular budget office for quick and accurate data management, especially since the budget drives the course of activities (Nugraheni, 2003). Hruby (nd) describes the mapping between typical workflow concepts with UML concepts and designs can browse the suggested structure of information between the business process definition and object-oriented software design. This structure assumes that business processes can be regarded as the collaboration among business objects, team roles, as well as other case examples within business systems; this is based on four interrelated design patterns that represent classifier relationships, interactions, responsibilities, and life cycle.

Thramboulidis (2004) utilizes the UML notation to generate a control system model. The UML profile for scheduling, performance, and time was used to develop and analyze the scheduling process of a system that can be used during a decision-making process. Using UML in modeling can produce a clear picture and provide ease in system analysis and design (Sumarta, Siswoyo, & Juhana, nd). UML has three main categories: structure diagrams, behavior diagrams, and interaction diagrams. Each of these categories has a diagram that describes the system architecture and integrates with one another (Haviluddin, 2011). UML uses semantics notation for all the structural and behavioral models (Michael, 2004). Structural models (static models) emphasize the structure of objects in a system, involving classes, interfaces, attributes, and relationships between components. Behavioral models (dynamic models) emphasize the behavior of objects in a system, including methods, interaction, collaboration, and state history.

The design of an effective system architecture requires an understanding of the organization's business processes. The researchers conducted a careful review of

the environment/object periodically and observed the business processes. Observations and interviews were conducted with key persons from each unit. Document analysis was also performed to gain a clearer picture of the existing business processes (Li, Huang, & Lin, 2007). With a computerized system, manual data processing can be minimized, thereby reducing human error, processing time, and redundancy through improvements in data integrity/quality. Subsequently, reports can be produced to support and shorten decision-making time, leading to better services and updated information to users (Ang & Brahmawong, 2009). After observing the business process, performing data collection, and conducting Object Oriented Analysis and Design (OOAD), a computerized workflow was created through the process of designing the component model, component functions, database, and user interface components, thus, producing a new system. The novel system improves company performance and meets the elements of good internal control system, resolving many of the company's previous issues (Heripracoyo, 2009).

II. METHODOLOGY

The study began with an evaluation of the business process with regards to the government agency's budgeting system. These included conducting field studies and literature studies. During the observation, it activities in each unit of work were identified in terms of budgeting system, especially in the Planning Bureau that handled the entire budget process.

Data collection was performed through observations at each work unit and the Planning Bureau, interviews of the Ministry of Finance and intended Agency staff, and literature studies.

The design method of the system model consisted of a conceptual method using UML (Unified Modeling Language) tools to create an information system through the use of class diagrams, use case diagrams, sequence diagrams, and activity diagrams. Additionally, a list of page on view model was presented.

III. RESULTS

A Work-Plan Budget Information System was designed to process data and provide information on the work-plan budget. The system was intended for use in the budgeting process and control the budget proposal to fit the target and the applicable provisions of the budget, provided information about the budget schedule and smooth communication between work units to support the budgeting process, and helped the user in charge of coordinating, monitoring, and accurate decision making. The system supported the integrated budget process that consisted of the Bureau of Planning, work units, the Agency head, and the first secretary. Users involved in the work units were officers and staffs who were assigned as budget compilers. The data center was located in the Bureau of Planning. Work-Plan Budget Information System was a web-based application, which ran on any

operating system platform, accessed through an Internet browser like Internet Explorer, Firefox, Chrome, Safari, or Opera. The Work-Plan Budget Information System helped compilers and budget controllers use the system through its tools and facilities to ease data and information access for the implementation of the budget process. The system definition is detailed in Table I.

TABLE I.
SYSTEM DEFINITION WITH FACTOR

F (Functionality)	The system is made for creating an effective and efficient proposed budget (in the current year), with automatic control of both targets, provisions, and time frame. System can provide data with a standardized and integrated, so information is easily accessible, real time, and up to date. The resulting information can be a basic consideration for the authorized user in performing coordinating, monitoring, and accurate decision making.
A (Application Domain)	The parties who will use this system include the Bureau of Planning, Unit, Echelon II, and first secretary. The system will allow authorized parties to interact with a forum to support the implementation of the budget process.
C (Condition)	The system is designed to assist in the budgeting process, producing the budget document, presenting the budget information, all of which is expected to address the problems faced by agencies in the budgeting process. Conditions must be met in the modeling system and consider aspects of budgetary rules enforced in Indonesia.
T (Technology)	The system is web-based so it can be used at any time, on any PC (Personal Computer) and the notebook is connected to the Internet network throughout Indonesia. Can be used on all operating system platforms using the internet browser that is connected through a LAN (Local Area Network), WLAN (Wireless Local Area Network), and the internet.
O (Object)	In this system, the object is the staff in various units, staff, and officials at the Bureau of Planning, Echelon II, Principal Secretary, Program and Financing, References, Budget Plan (RAB), Term of Reference (TOR), Indicative Ceiling, The budget ceiling, ceiling Allocation Budget, Budget Execution.
R (Responsibility)	Responsibility for overall system administration tool that is as reliable in recording the proposed budget, as it is in providing information that supports the internal budget process in the agency.

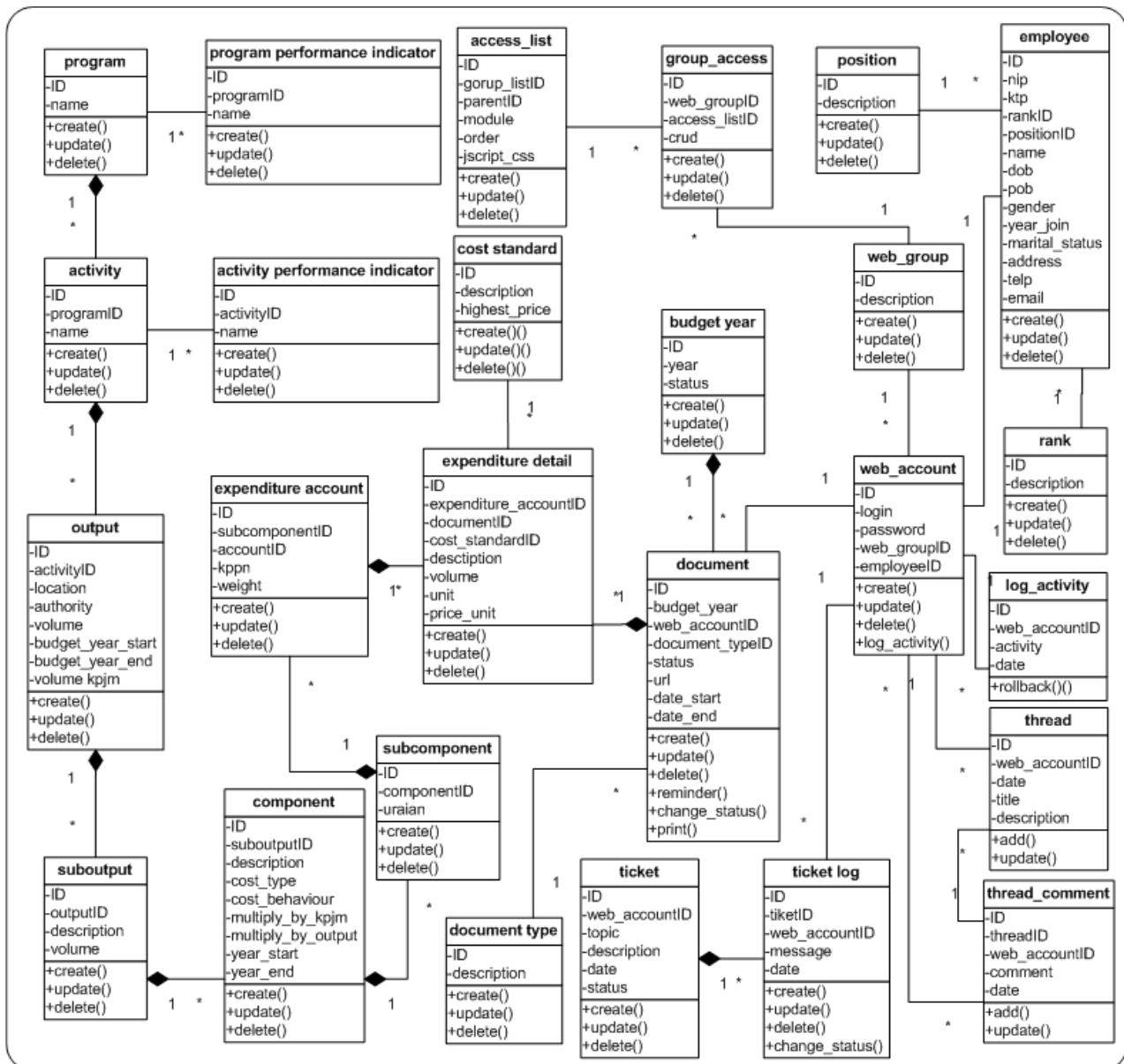
The work flow of the Work-Plan Budget Information System started when The Planning Bureau has received the Letter Circular Ceiling (Indicative, Budget, and Budget Allocation) from the Ministry of Finance. The Planning Bureau logged-in to the Work-Plan Budget Information System. The Bureau then set a schedule of stages and allocated budget ceiling for each program and activity. Email notifications were sent automatically by the system to each work unit to prepare the Draft of

Program and Financing Proposal up to a certain time limit.

Then, the work unit logged-in to the Work-Plan Budget Information System to begin preparing the Draft Proposed Program and Financing. The system limited the input so that the work unit cannot exceed the ceiling. After completing the Draft Work Plan, it would then be locked; thus, temporarily, it cannot be updated by the work unit. Email notifications were sent automatically by the system to Echelon II (typically the head of the Agency) to be approved. Draft Action Plan was then examined and approved by the Echelon II, and email notifications were sent automatically by the system to the Bureau of Planning for review and revision of the Draft Proposed Program and Financing. When the Bureau of Planning had completed the revision, email notifications were sent automatically by the system to the Principal Secretary for the approval of Draft Proposed Program and Financing. If the Principal Secretary has given its approval, email notifications were sent automatically by the system to the Bureau of Planning to print Draft Program and Financing Proposal with a digital signature of Principal Secretary to the Ministry of Finance. The relationship between classes in the Work-Plan Budget Information System can be seen in the class diagram in Fig. 4.

There were 26 classes used in the Work-Plan Budget Information System. The Program was a policy instrument that contained activities undertaken by the institution in achieving the goals and objectives as well as gaining budgetary allocations, and/or agency activity coordinated by the ministries/agencies.. Program performance indicator measured the outcome related to the achievement of the performance/success of the program. Each program consisted of performed activities and utilized resources to produce the desired output. The success of activities related to the performance achievement of the of activities in order to achieve performance results (outcomes) of the program measured by activity performance indicators.

Output is defined as the goods or services produced by the performed activities to support the performance achievements, which were related to the accountability organizational unit Echelon II. Output consisted of sub-output, the form of goods or services to support the achievement of the output activity. Component was an output stage of the process of achieving sub-output, in the form of work packages. Each component had sub-components and a detailed expenditure groups, which were arranged in order to facilitate the implementation of the component. Subcomponent consisted of an account that detailed expenditure and could not exceed cost standard, a budgeting tool for non-determination on a certain amount without any possibility of change (up/down) since changes in the parameters used as a reference.



Budgeting required and delivered documents in the process of each budget year which the program implemented. Each document is categorized into types such as Budget Plan, Term of Reference, etc.

Each employee of the Ministry/Agency had a position, rank, and profile information. In order to access the Work-Plan Budget Information System, each employee must register and obtain a web account with username and password for logging into the system. After login, user was categorized in a web group (role) that had limited access to each module in the access list. Any user activity was recorded in the log activity and allowed the system to return to the state before an error occurred and showed who triggered the action. Users can establish interaction through ticket and forum. Ticket was used to ask questions or request something related to budgeting process to the Planning Bureau. Forum was used as a

media-sharing platform among users, which was categorized into threads.

As shown in Fig. 5, there are four actors who used cases in the Work-Plan Budget Information System. The Planning Bureau used cases of Review Program and Budget Draft, Receive and Allocate Indicative Ceilings, Review TOR and Work Plan, Receive and Allocate Budget Ceilings, Review Work Plan and Budget Ceilings, Receive and Allocate Allocation Budget Ceilings, Review Allocation Budget Ceilings, Upload and View References, Ticket Interaction, and Forum Interaction. The Working Unit used cases of Compile Program and Budget Draft, Compile TOR and Work Plan, Compile Work Plan and Budget Ceilings, Compile Allocation Budget Ceilings, Upload and View References, Ticket Interaction, and Forum Interaction. The Echelon II used

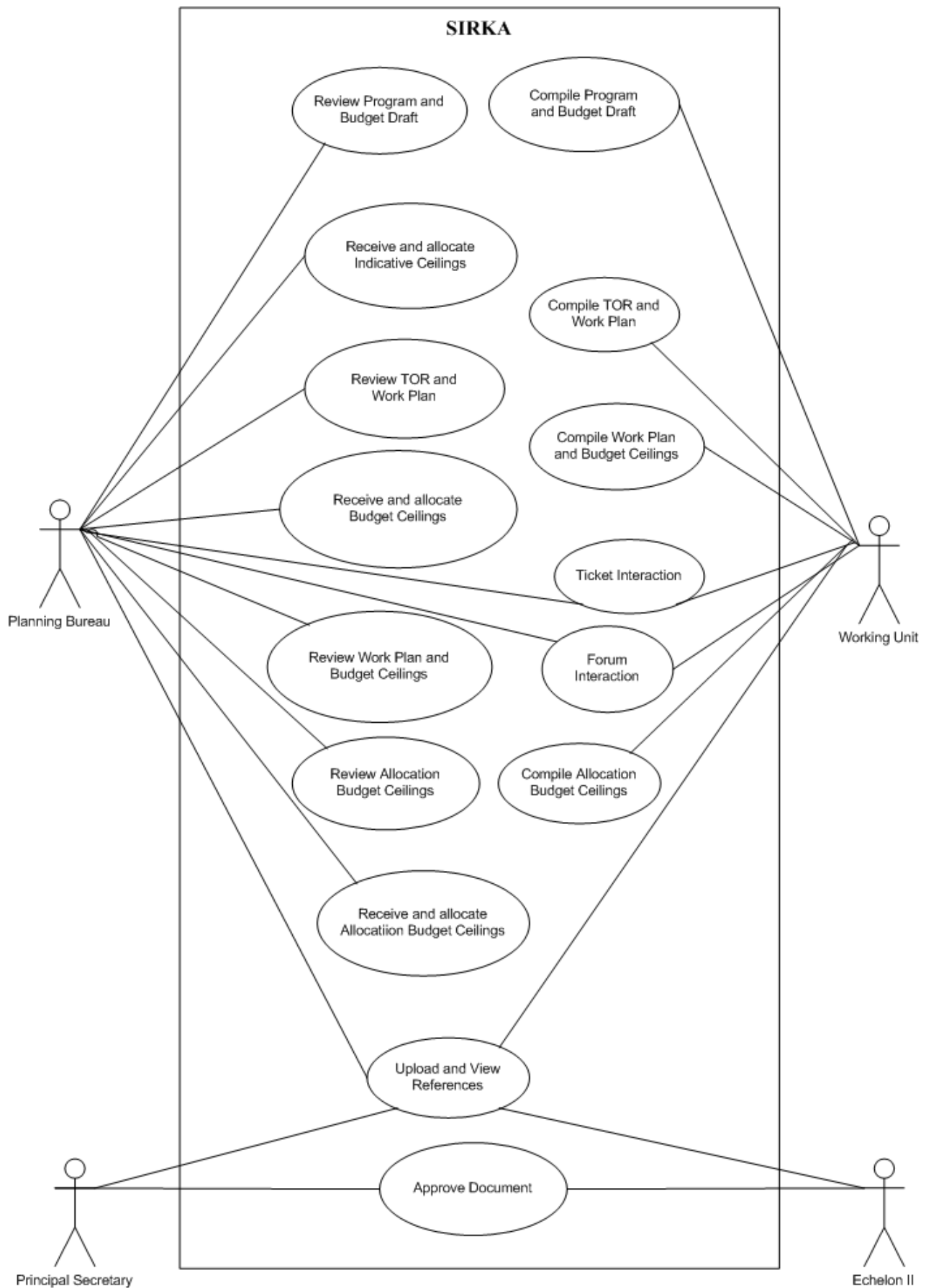


Figure 5. Use Case Diagram

cases of Approve Document, Upload and View References. Lastly, the Principal Secretary used cases of Approve Document, Upload and View References.

The Work Unit sequence diagram is shown in Fig. 6. The activity diagram of Work Plan Budget Information System is depicted in Fig. 7. The process began when the Bureau of Planning received Indicative Ceilings Circular

Letter of the Minister of Finance. It followed by logged into the Work-Plan Budget Information System. Then, it sets a schedule of stages and allocated budget ceiling for each program and activity. Email notifications were sent automatically by the system to each unit of work to prepare the Draft Proposed Program and Financing of up to a certain time limit.

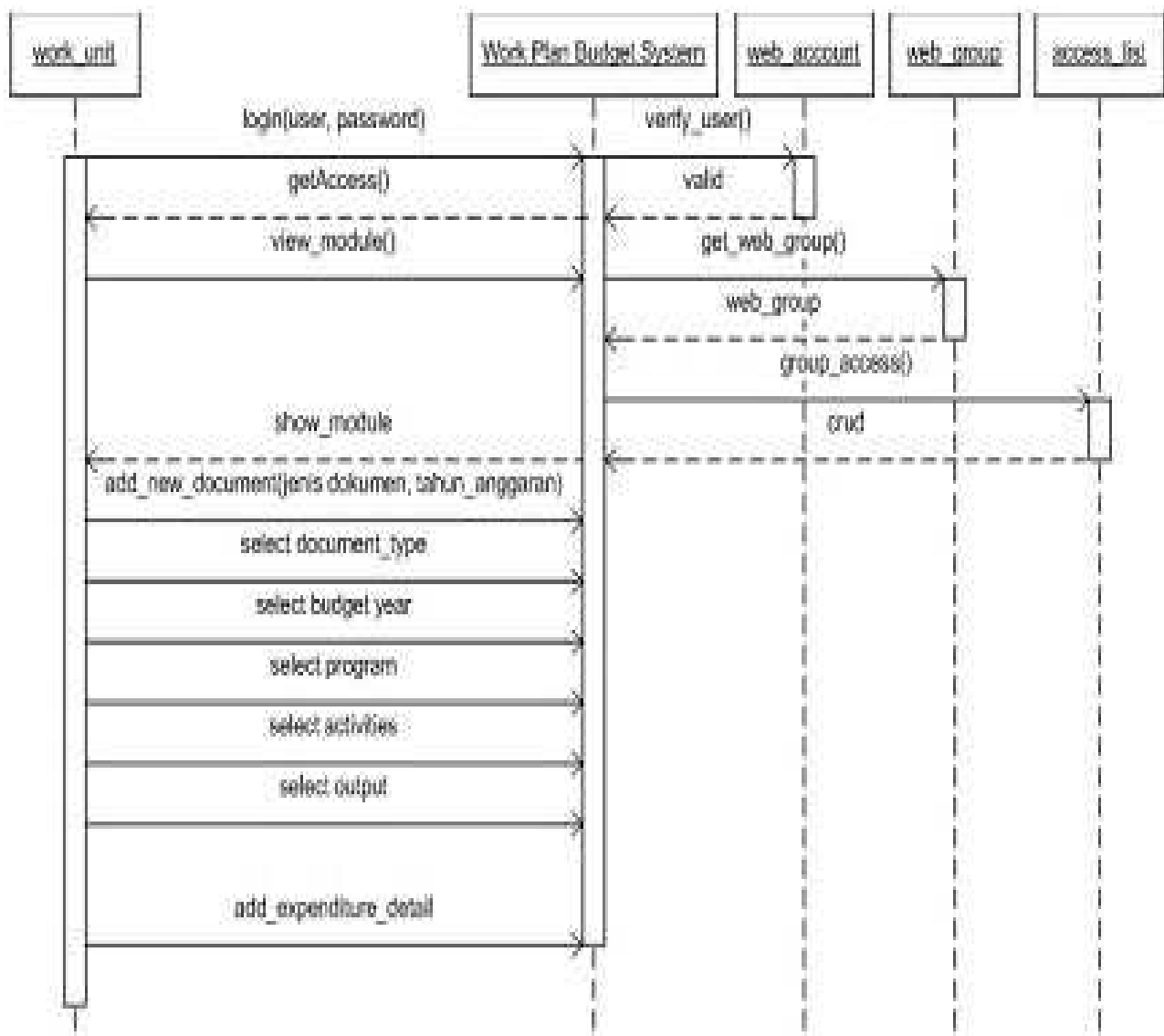


Figure 6. Sequence Diagram

The Work Unit started by logging into the Work-Plan Budget Information System, to begin preparing the Draft Proposed Program and Financing. The system limited its own input so that the work unit could not exceed the ceiling. After completing the Draft Work Plan, it would be temporarily locked, preventing any updates. Email notifications were sent automatically by the system to Echelon II for approval. Draft Action Plan was then examined and approved by the Echelon II, and email notifications were sent automatically by the system to the Bureau of Planning for review and revision of the Draft

Proposed Program and Financing. When the Bureau of Planning had completed the revision, email notifications were sent automatically by the system to the Principal Secretary for the approval of Draft Proposed Program and Financing. If the Principal Secretary approved it, email notifications were sent automatically by the system to the Bureau of Planning to print Draft Proposed Program and Financing with a digital signature submitted to the Ministry of Finance's Secretary of Budgetary Directorate General.

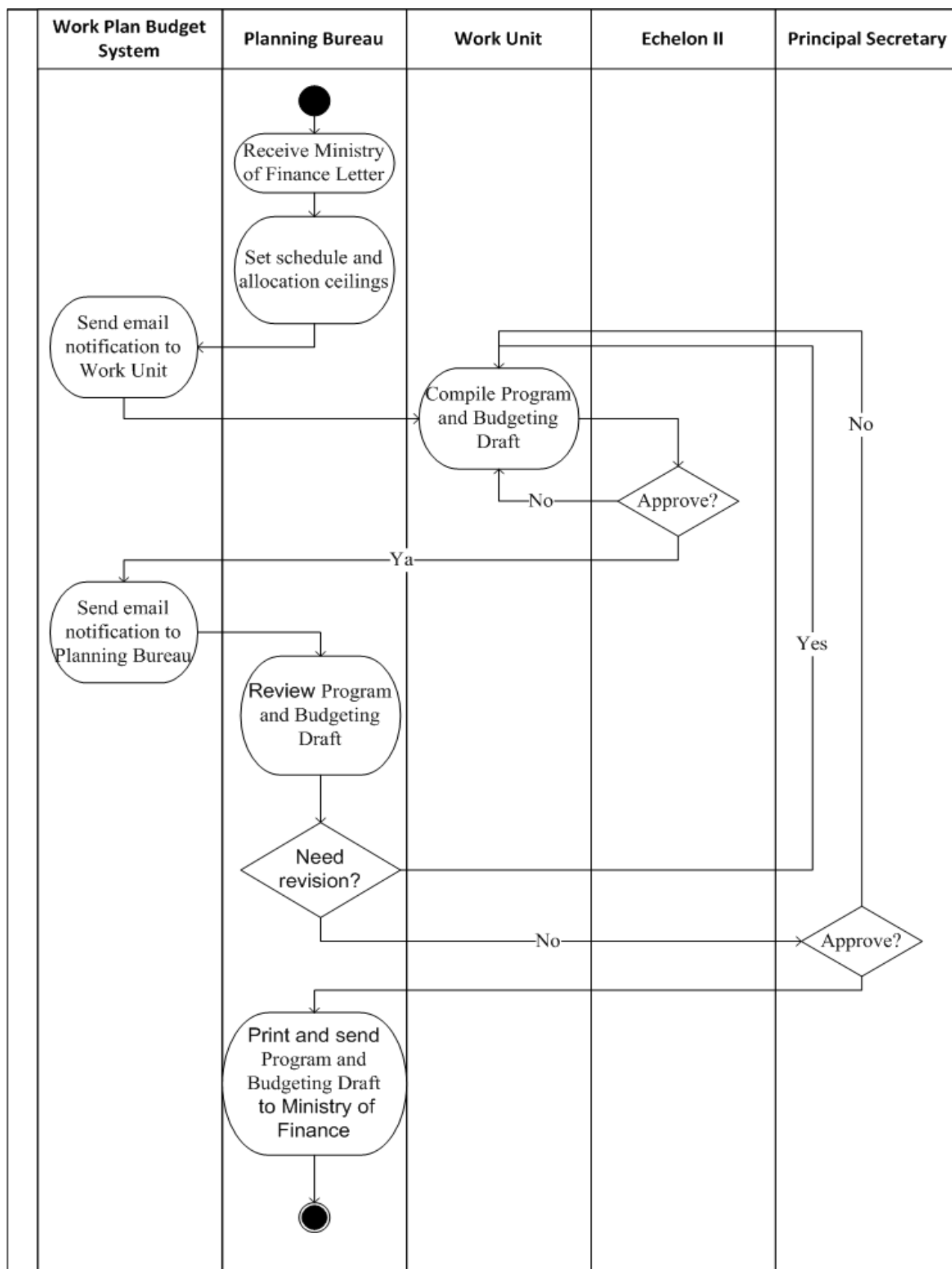


Figure 7. Activity Diagram

The design of the dialogue style for each user interface that represented each of the classes was important in

supporting the transaction records involved in the budgeting process, as shown in Table II.

TABLE II.
PAGE LIST PRINT-OUT

Page	Print-out
Login	
Home	
Update Account	
Employee	Employee list, employee profile
User Group	
User Management	
References	Document Requested
Access Right	
Schedulling	
Budget Allocation	
Cost Standar	
Cost Budget Plan	
Ticket	
Forum	
Approval	Work Plan Budget Approved Document

To access the Work-Plan Budget Information System, a user must first login. Each user is classified based on user groups/roles, rights, and restrictions of access to each module. After log-in, a user is directed to the home module. On the menu, the user can only see the modules with granted access. There is a link in the header to change the language, and a link to the user's account information page. In the update account page, a user can change password and to maintain security, users are advised to change password on a monthly basis. User can view and print the list of employees in the employee page. At the top, there is a filter based on the first letter of the employee's name and user role. There is also a button to add new employee data. In the header table, underlined text can be clicked to sort the data alphabetically in that column. On each line, underlined name can be clicked to see and print detailed employee information. In the Action column, there is a button to upload a profile photo and key employees to change employee data. User grouping is managed in the user management page. Each user group has a set up on access rights for each module. On the left side of the module management page, there is a navigation-shaped hierarchy, so that the drill-down can be done for each module group. On the right, there are buttons for adding and changing modules. User can input the scheduling of any budget process in the scheduling page. The system would generate and send an automatic email to the user to notify that the preparation process has begun and terminates on a specified date. On reference page, users can upload and download documents required for budget preparation. There is a filter to facilitate a search by the document's title. User can enter a budget allocation in budget allocation page. There is a filter in the budget and budgeting phases to facilitate data

retrieval. This budget allocation limits the input to the module Budget Plan as to not exceed the ceiling limit which has been allocated. On the standard cost page, the user can enter a standard cost. There are filters and unit costs to facilitate data retrieval. The standard cost limits the input to the Budget Plan module so that it does not exceed a predetermined standard cost. User can enter details of expenditure in the budget plan page. There is a filter code of the program/activity, description of expenditure accounts, the budget year, and the process of drafting the ceiling to facilitate data retrieval. Standard costs and budget allocations restrict input to this module so as to not exceed specified limits. The work unit can ask questions or submit request to the planning bureau in the ticket page. Each case gets a ticket queue for progress tracking and follow-up until the case is resolved. On the forum page, each user can share knowledge, problems, and opinions relating to the budgeting process. Finally, Echelon 2 and Principal Secretary can view, print, and approve expenditure details in approval page. Approve buttons only appear on certain status.

The Work-Plan Budget Information System is web-based application that runs on any operating system platform by using an Internet browser, such as Internet Explorer, Firefox, Chrome, Safari, or Opera. The technology used in the model for the Work-Plan Budget Information System consists of an Apache web server that delivers web pages requested through Hypertext Transfer Protocol (HTTP) and Mercury mail server (which manages incoming and outgoing emails). Additionally, the PHP server script produces dynamic web pages, the Client script consists of javascript, HTML, and CSS that produces graphical user interface, and MySQL database organizes data collection.

IV. CONCLUSION

The Information System Model of a Work-Plan Budget has proposed a solution to the problems that occurred, such as: non-current time of receipt of the budget information, discrepancies between proposed budget and predetermined time frame, difficulties in data access between the units of work, data errors in meeting budget targets and conditions, length of time the process manually, and inefficiency in the processes. This system allows the staff to carry out the budget preparation plans by optimizing the infrastructure and integrated computerized technology, as well as providing the function of control, approval. It also facilitates communication between work units and delivers current information.

REFERENCES

- [1] Ang, S., Brahmawong, C (2009). Object Oriented System Analyze and Design of Revenue Information System using UML, *Special Issue of the International Journal of the Computer, the Internet and Management*, 17 (1), pp. 1-6.
- [2] Chris, A (1955). Organizational Leadership and Participation Management, *The Journal of Business*, 28 (1), pp. 1-7.

- [3] Ekananta (2006). Teknologi Informasi dalam Sistem Perencanaan Keuangan Perusahaan, *Seminar Nasional Aplikasi Teknologi Informasi*, pp. 41.
- [4] Havaluddin (2011). Memahami Penggunaan UML (Unified Modeling Language), *Jurnal Informatika Mulawarman*, (6) 1, pp. 1-14.
- [5] Heripracoyo, S (2009). Analisis dan Perancangan Sistem Informasi Akuntansi Pembelian dan Persediaan pada PT. Oliser Indonesia, *Seminar Nasional Aplikasi Teknologi Informasi (SNATI)*, pp. 93-100.
- [6] Hruby, P (n.d). Specification of Workflow Management Systems with UML, pp. 1-11.
- [7] Li, S.H., Huang, S.M., & Lin, Y.C.G (2007). Developing a Continuous Auditing Assistance System Based on Information Process Model, *Journal of Computer Information Systems*, pp. 2-13.
- [8] Mawardi, S (2005). Kerangka Konseptual Anggaran yang Memihak Orang Miskin, Lembaga Penelitian SMERU, pp. 60-67.
- [9] Michael, E (2004). Component-Based Software Development with Aspect- Oriented Programming, *Journal of Object Technology*, 4 (3), pp. 21-26.
- [10] Nugraheni, E (2003). Sistem Informasi Anggaran Rutin (SIAR), Pusat Penelitian Informatika – LIPI, *Pemaparan Hasil Litbang*, pp. 273-281.
- [11] Puspaningsih, A (2002). Pengaruh Partisipasi dalam Penyusunan Anggaran terhadap Kepuasan Kerja dan Kinerja Manajer. *JAAI*, 6 (2), pp. 68-70.
- [12] Sundjaja, Arta, M., Tundjung, H., & Puspita, I (2011). Sistem Informasi Budgeting untuk Perguruan Tinggi, SemnasIF, *Seminar Nasional Informatika*, pp. 146-152.
- [13] Sumarta, T., Siswoyo, B., & Juhana, N (n.d). Perancangan Model Berorientasi Objek menggunakan Unified Modeling Language (UML) Studi Kasus Sistem Pengolahan Parkir Pada PT. TRIKARYA ABADI, *Jurusan Teknik Informatika*, pp. 1-8.
- [14] Tesic, B (2011). Model of Quality and Effectiveness of Management of Information Systems of Local Treasuries Budget Accounting, *5th International Quality Conference*, pp. 379-386.
- [15] Thramboulidis, K.C (2004). Using UML in Control and Automation: A Model Driven Approach, *2nd IEEE International Conference on Industrial Informatics INDIN*, pp. 1-7.

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