CHAPTER 3

PRINCE2 METHODOLOGY

Projects and project management are becoming increasingly important roles in industry, commercial and public sector organizations. In past decade, project management was thought of as primarily applying to the oil, chemical, defense and construction industries. Nowadays, the application of project management has extended far beyond those mentioned industries to various sectors like airplane industry and space program. In addition, new tools and techniques for project management have been developed in response to the growing need for managing more complicated, bigger size and higher technology projects. In this chapter, a number of processes, tools and techniques in project management especially from PRINCE 2 methodology, which to be used in managing case study project will be discussed.

3.1 Project Management

3.1.1 Definition

According to the official Project Management Institute (PMI), the definition of 'project' is identified in the Project Management Body of Knowledge (PMBOK) as 'temporary endeavor undertaken to create a unique product or service'. Normally a project contains series of activities and tasks that:

- have well-defined objectives to be completed within certain specification
- have definite start and end date
- have funding limit
- consume resources (i.e., money, people's time, equipment)

The term project management is used to describe the application of knowledge, skills tools, and techniques to project activities in order to meet or exceed the project objectives in term of scope, time, cost, quality and customer's satisfaction.

3.1.2 Project Life Cycle

Project is unique and involved with some degree of novelty and uncertainty. Therefore, in order to increase chance of project success, project is normally separated to several phases for better control and effective management. Phase boundaries or milestones

for project management are set up according to completion of deliverables. Deliverable is an achievement of tangible and verifiable project work such as a conceptual design, a working prototype.

The project phases are collectively called project life cycle. An example of project life cycle may consists of phases as follow:

i) Conceptions:	Goals, bidding, forming project management team
ii) Planning:	Budgeting, Make-or-buy decision, Scheduling, Define Target
iii) Implementation:	Manage Contracts, Tracking, Correcting Problem, Re-Plan
iv) Phase out:	Reward Personnel, Re-assign Personnel, Review

Normally project life cycle consists of four or five phases as above mentioned, but it can be more depending on type of business, corporate, product, etc. However, most project life cycle has a number of common characteristics.

- Project expenditure and staffing level are low at start, increase to the end and drop rapidly when project termination.

- Risk and uncertainty are high at start, but gradually decrease when project proceed. That means probability of successful completion get progressively increase as the project continues.

3.2   Project in Control Environment (PRINCE2)

The content of this section is written based on the 'PRINCE2' manual. This document is official manual for PRINCE2 methodology. It is provided by the Central Computer and Telecommunication Agency (CCTA) who developed PRINCE2 methodology.

3.2.1 History of PRINCE2

PRINCE methodology (Project in Control Environment) is developed based on PROMPT methodology (Project Resource Organization Management Planning Technique) originally formulated in UK in the mid 1970s. A private sector company

Simpact System Limited, established the PROMPT methodology to provide a suitable frame work within which to manage strategy, feasibility study, development and support of information technology system through a structured project management approach. PROMPT was adopted by CCTA (Central Computer and Telecommunication Agency) in 1979 as the standard to be used for all government information system project.

PRINCE was developed in April 1989 with full documentation and formal introduced into public sector in January 1990. The PRINCE methodology is adopted by the UK government as standard for managing major projects. In addition, it has been widely used by private sector companies both for managing government project, and in many cases for their own internal use.

PRINCE2, the latest version of PRINCE, was formally launch by CCTA in London on October 1, 1996. PRINCE2 is process-driven methodology and is improved for wider base of project (IT and Non IT), Programs of works, Smaller Projects. It concerns about Customer-Supplier Issues and also introduces change to the PRINCE version 1 Organization component.

3.2.2 Scope of PRINCE2

Figure 3.1 presents position of PRINCE2 in a business and project environment. PRINCE2 is not developed to cover all subjects in project management. Normally, project management tools and techniques are adopted based on project type and corporate environment. There are also a number of tools and techniques that are already proven and widely used, therefore they are excluded from PRINCE2. Sample of those aspects are:

- people management techniques such as motivation, delegation and team leadership
- generic planning techniques such as PERT/CPM, GANTT Charts
- creation and management of corporate quality management and quality assurance mechanism
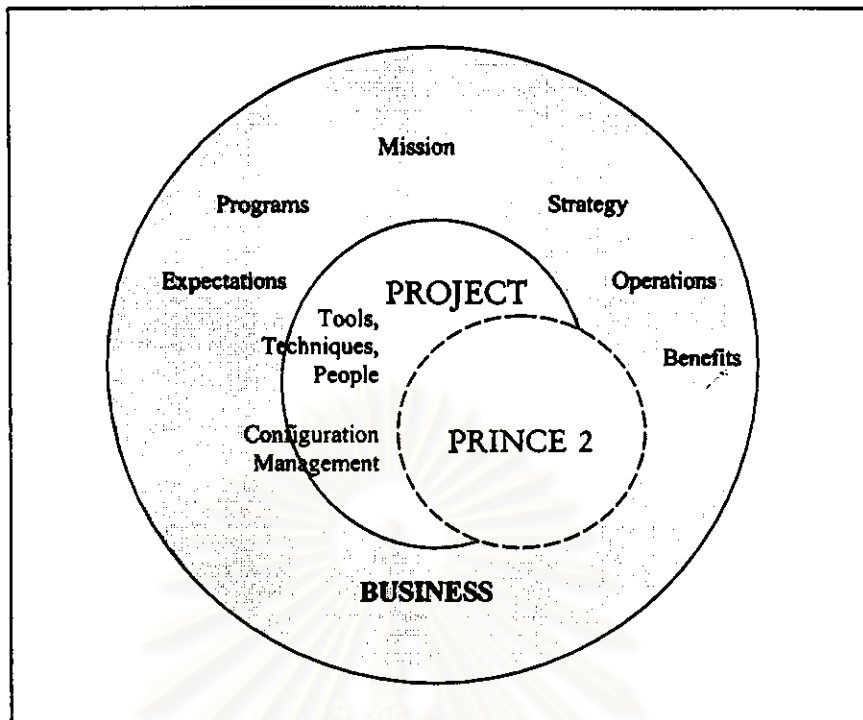- Financial Management, budget control and Earned Value Analysis

Figure 3.1: The PRINCE2 relationship with projects and business *(CCTA, 1998)*

PRINCE2 covers the management of the project, and the management of the resources and activities involved in carrying out the project product. But it does not cover the technical techniques involved in the creation of the products. That is the work of other methods, nevertheless, PRINCE2 provides interface with such method as estimating in order to forward information for managing project.

3.2.3 Overview of PRINCE2

PRINCE2 is a structured method for effective project management. PRINCE2 is designed to be used on any types of project in any environment. It contains a complete set of concepts and project management processes that are the minimum requirement for a properly run and managed project. However the way PRINCE2 is applied to each project will vary considerably, and tailoring the method to suit the circumstances of a particular project is critical to its successful use.

PRINCE2 methodology applies three key elements in managing a project. The three key elements are processes which drive the project management, components and techniques which are used by each of the processes to affect the management of the

project. Figure 3.2 shows the components and techniques positioned around the central process model. The PRINCE2 process model consists of eight inter-dependent management processes, cover the whole project life cycle, from start-up project, through controlling and managing the project's progress, to the termination of the project.

Figure 3.2: PRINCE2 processes, techniques and components

1) PRINCE2 Process

Process is a set of integrated actions which are carried out in order to achieve a particular results. The PRINCE2 process model consists of eight inter-dependent management processes, cover the whole project life cycle, from start-up project, through controlling and managing the project's progress, to the termination of the project.
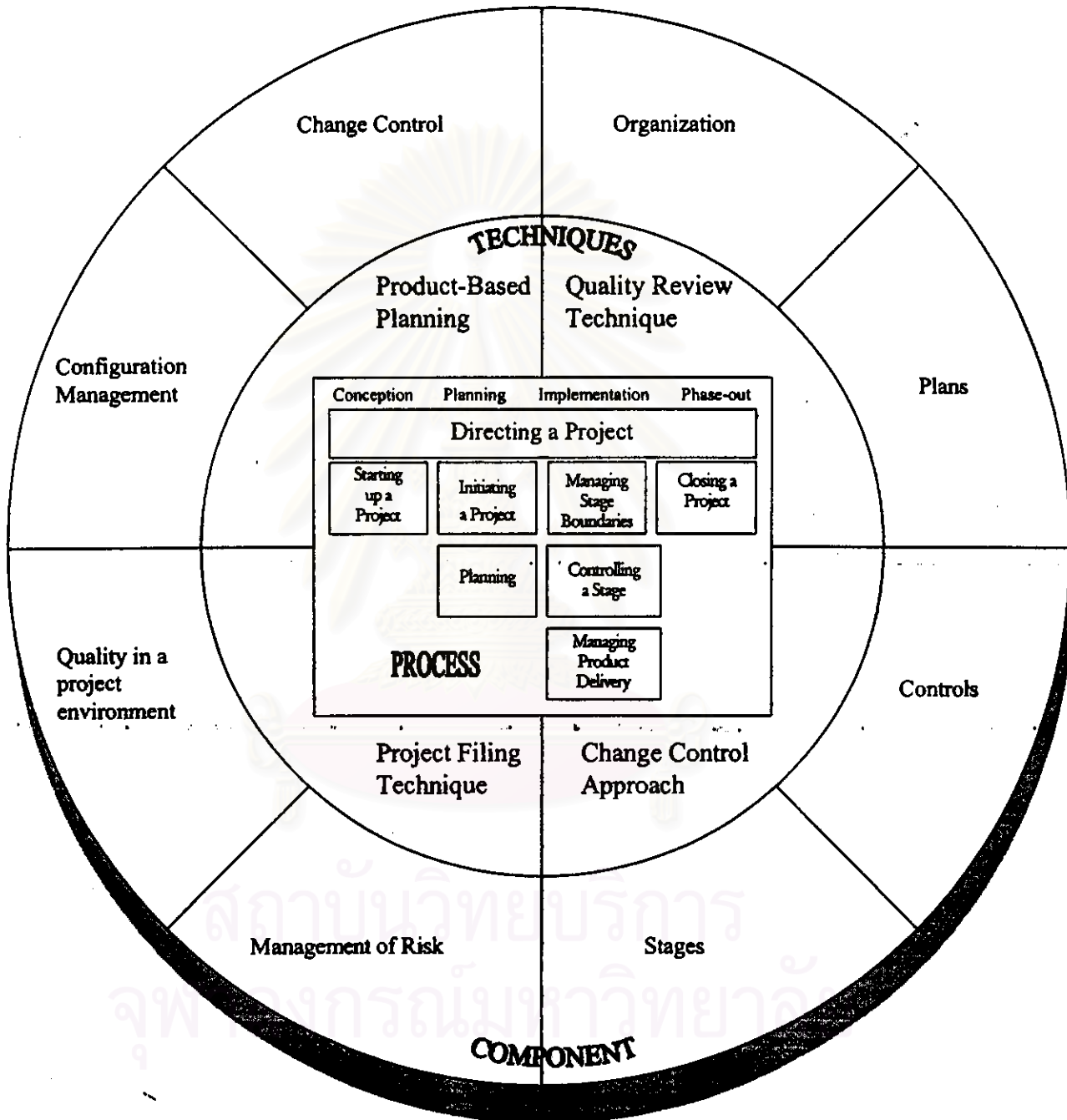
There are eight processes which are introduced in PRINCE2

- ➢ Starting Up a Project process (SU)
- ➢ Initiating a Project process (IP)
- ➢ Directing a Project process (DP)
- ➢ Controlling a Stage process (CS)
- ➢ Managing Product Delivery process (MP)
- ➢ Managing Stage Boundary process (SB)
- ➢ Closing a Project process (CP)
- ➢ Planning a Project process (PL)

These processes are applied in managing a project based on work function and life cycle of the project. For example the 'Initiating a Project (IP)' process is used by project manager during planning phase while the 'Managing Product Delivery (MP)' process is applied by staff or supervisor during implementation phase. In summary, PRINCE2 process are guideline for managing project work for project management team from start-up till project phase out.

Each process consists of a number of sub-process as summarized in table 3.1. Concerning to the case study project, some process is not used. For example, the 'Closing a Project (CP)' process, which is used for organizing terminate a project. It is not applicable in this project because normally project is phase out when product was launched to service and it has run smoothly without fault for three months. However the scope of this case study project covers project work until company get acceptance from customer.

In addition, like PRINCE2 process, most of the sub-process are selected and used in managing the case study project, but not all, as an example, the 'Confirming project Closure (DP$_5$) process. Table 3.1 shows summary of each parent process and its

'children'. For the status of each sub-process, 'Exist' means that sub-process has been applied for the existing project management, 'Not Used' means that sub-process is not applicable to the case study project, 'Used' means that sub-process is adopted in the case study project.

Parent Process	Sub-Process	Sub-Process Name	Status
Starting Up A Project (SU)	SU_1	Appointing A Project Board Executive & Project Manager	Exist
	SU_2	Designing A Project Management Team	Exist
	SU_3	Appointing A Project Management Team	Used
	SU_4	Preparing A Project Brief	Not Used
	SU_5	Defining Project Approach	Not Used
	SU_6	Planning An Initiation Stage	Used
Initiating A Project (IP)	IP_1	Planning Quality	Exist
	IP_2	Planning A Project	Used
	IP_3	Refining The Business Case and Risks	Used
	IP_4	Setting Up Project Controls	Used
	IP_5	Setting Up Project Files	Used
	IP_6	Assembling A Project Initiation Document	Used
Directing A Project (DP)	DP_1	Authorizing Initiation	Used
	DP_2	Authorizing A Project	Exist
	DP_3	Authorizing A Stage Or Exception Plan	Used
	DP_4	Giving Ad-Hoc Direction	Exist
	DP_5	Confirming Project Closure	Not Used
Controlling A Stage (CS)	CS_1	Authorizing A Work Package	Exist
	CS_2	Assessing Progress	Used
	CS_3	Capturing Project Issues	Used
	CS_4	Examining Project Issues	Used
	CS_5	Reviewing Stage Status	Used
	CS_6	Reporting Highlights	Used
	CS_7	Taking Corrective Action	Used
	CS_8	Escalating Project Issues	Used
	CS_9	Receiving A Completed Work Package	Exist
Managing Product Delivery (MP)	MP_1	Accepting A Work Package	Exist
	MP_2	Executing A Work Package	Used
	MP_3	Delivering A Work Package	Exist
Managing Stage Boundaries (SB)	SB_1	Planning A Stage	Used
	SB_2	Updating A Project Plan	Used
	SB_3	Updating A Project Business Case	Used
	SB_4	Updating The Risk Log	Used
	SB_5	Reporting Stage End	Used
	SB_6	Producing An Exception Plan	Used
Closing A Project (CP)	CP_1	Decommissioning A Project	Not Used
	CP_2	Identifying Follow-on Actions	Not Used
	CP_3	Evaluating A Project	Not Used

Table 3.1 PRINCE2 Processes and Sub-processes

Parent Process	Sub-Process	Sub-Process Name	Status
Planning a Project (PL)	PL_1	Designing a Plan	Used
	PL_2	Defining & Analyzing Products	Used
	PL_3	Identifying Activities & Dependencies	Used
	PL_4	Estimating	Used
	PL_5	Scheduling	Used
	PL_6	Analyzing Risks	Used

Table 3.1 PRINCE2 Processes and Sub-processes (Cont)

2) **PRINCE2 Component**

PRINCE2 proposes eight components which are key elements and necessary in managing a successful project as follow:

> Organization
> Plans
> Controls
> Stages
> Management of Risk
> Quality in a Project Environment
> Configuration Management
> Change Control

Even though some of PRINCE2 component also exists in typical project management but they are different in details. For example, typical project management needs planning only in project-level, but for PRINCE2 , both in project-level and stage-level, keeping team-level and exception-level in optional.

Each PRINCE2 component consists of a number of elements. For this case study project, five components of eight are applied. They are all summarized in table 3.2

COMPONENT	Elements of PRINCE2 Component	Status
Organization	Organization	Not Used
Plans	Project Plan	Used
	Stage Plan	Used
	Exception Plan	Used
	Team Plan	Used
Controls	Tolerance	Used
	Project Issue	Used
	Risk Log	Used
	Checkpoint Report	Used
	Plan and Re-Plan	Used
	Project Highlight Report	Used
	Exception Report	Used
	Mid stage Assessment	Used
	End Stage Assessment	Used
Stages	Management Stage	Used
	Technical Stage	Used
Risk Management	Risk Analysis	Used
	Risk Management	Used
Configuration Management	Configuration Management	Not Used
Change Control	Authority Level	Used
	Integrity of Change	Used
Quality Review	Quality System	Not Used
	Quality Path	Not Used

Table 3.2: PRINCE2 Component

Some components of PRINCE2, such as quality in a project environment are not used in the case study because that components have been existed and running in an effective manner. For example, quality review is not applied since the company is already certified for the ISO9000 quality management standard, and all works have complied with the standard accordingly.

3) PRINCE2 Technique

PRINCE2 techniques are particular methods for assisting project manager in managing a project. Four techniques are introduced in PRINCE2. Three of four are applied in managing the case study project except the quality review technique because of the same reason as mentioned in Quality component.

Normally, each PRINCE2 technique can be divided into few steps in order to be ease to follow. Then each step is applied by the sub-process of PRINCE2 process. PRINCE2 techniques and their application procedures can be concluded as in Table 3.3

TECHNIQUE	PROCEDURE	Status
Product-Based Planning Technique	Product Breakdown Structure	Used
	Product Description	Used
	Product Flow Diagram	Used
Change Control Technique	Preparation in Project Issue Log	Used
	Impact Analysis	Used
	Take action or Escalate to Project Board	Used
Quality Review Technique	Preparation	Not used
	Review Meeting	Not used
	Follow-up	Not used
Project Filing Technique	Management section	Used
	Specialist section	Used
	Quality section	Used

Table 3.3 PRINCE2 Technique

4) Relationship between PRINCE2 elements.

Generally, in PRINCE2 compliant project, the project management team carries on their works according to PRINCE2 process. However PRINCE2 process just identifies why and what to do. Thus some components and techniques are applied by PRINCE2 sub-process so that project management team can know how the outcome of the sub-process will look like and how to achieve the sub-process's objective.

For example, both 'Planning a Project (IP_2)' sub-process and 'Planning a Stage (SB_1)' sub-process have quite similar objective which is to create plan to control project work. However, the IP_2 sub-process applies project level of planning component and that results in project plan, while the outcome of the SB_1 process is stage plan because of using stage level of planning component. in addition, to create both project plan and stage plan for the 'IP_2' process and the 'SB_1' sub-process, project manager can apply the product-based planning for both plans.

In conclusion, in managing project according to PRINCE2, the processes are selected as guideline based on work function and life cycle of the project. Furthermore, components and techniques are applied by some sub-process in order to successfully achieve the process's objectives. The relation of three elements of PRINCE2 in the case study project can be summarized as shown in Table 3.4

Process	SUB-PROCESS	Component	Technique
SU	SU₁	-	-
	SU₂	-	-
	SU₃	-	-
	SU₆	Plans (Stage Plan)	
IP	IP₁	-	-
	IP₂	Plans (Project Plan) Stages (Management Stage/Technical Stage)	-
	IP₃	Control (Risk Log)	-
	IP₄	Control (Tolerance, Checkpoint Report, Project Highlight Report)	-
	IP₅	-	Project Filing Technique
	IP₆	-	-
DP	DP₁	Plans (Stage Plan)	-
	DP₂	Plans (Project Plan) Control (Tolerance, Risk Log, Project Issue)	-
	DP₃	Plans (Stage Plan) Control (Tolerance, End Stage Assessment Risk Log, Mid Stage Assessment, Project Issue) Stages (Management Stage)	-
	DP₄	Control (Project issue Project Highlight Report) Change control	-
CS	CS₁	Plans (Team Plan) Stages (Technical Stage)	-
	CS₂	Control (Checkpoint Report)	-
	CS₃	Control (Project Issue) Change Control	Change Control (Preparation)
	CS₄	Control (Tolerance, Project Issue) Change Control	Change Control (Impact Analysis)
	CS₅	Control (Tolerance, Project Issue) Checkpoint Report, Plan and Re-plan	-

Table 3.4 Relation between PRINCE2 Process, component and Technique

Process	SUB-PROCESS	Component	Technique
	CS$_6$	Control (Project Highlight Report)	-
	CS$_7$	Control (Project Issue) Change Control	-
	CS$_8$	Control (Project Issue)	-
	CS$_9$	Stage (Technical Stage)	-
MP	MP$_1$	Plans (Team Plan)	-
	MP$_2$	Control (Project Issue, Checkpoint Report)	-
	MP$_3$	-	-
SB	SB$_1$	Stages (Management Stage) Plans (Stage Plan)	-
	SB$_2$	Control (plan and Re-plan) Plans (Project Plan)	-
	SB$_3$	Control (Plan and Re-plan)	-
	SB$_4$	Control (Risk Log)	-
	SB$_5$	Control (End Stage Assessment, Project Highlight Report, Tolerance, Project Issue) Risk Management	-
	SB$_6$	Control (Tolerance, Exception Plan)	-
PL	PL$_1$	-	-
	PL$_2$	-	Product-Based Plan (PBS)
	PL$_3$	-	Product-Based Plan (Product Flow Diagram)
	PL$_4$	-	-
	PL$_5$	-	-
	PL$_6$	Control (Risk Log) Risk Management	-

Table 3.4 Relation between PRINCE2 Process, component and Technique (Cont.)
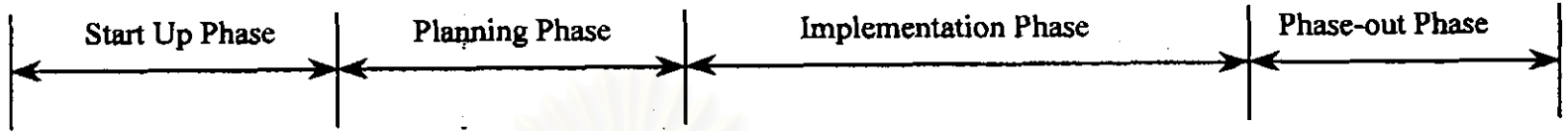
3.2.4 PRINCE2 Processes

PRINCE2 introduces processes that are necessary to manage a successful outcome for any project, however, it is not intended to encourage imitating any or all of them. The key to successful management of a project is to ensure that each of the PRINCE2 process is mentioned in one or another.

One of many useful features of PRINCE2 is *process-based approach*. All PRINCE2 processes are identified with what and why to follow the process, but leave the implementing organization to choose their own way in identifying how to meet the requirement of any given processes. The flexibility of method allows the organization already implement successful project management system to make just a little change in order to be compliant with PRINCE2. The PRINCE2 process model is summarized as in figure 3.3
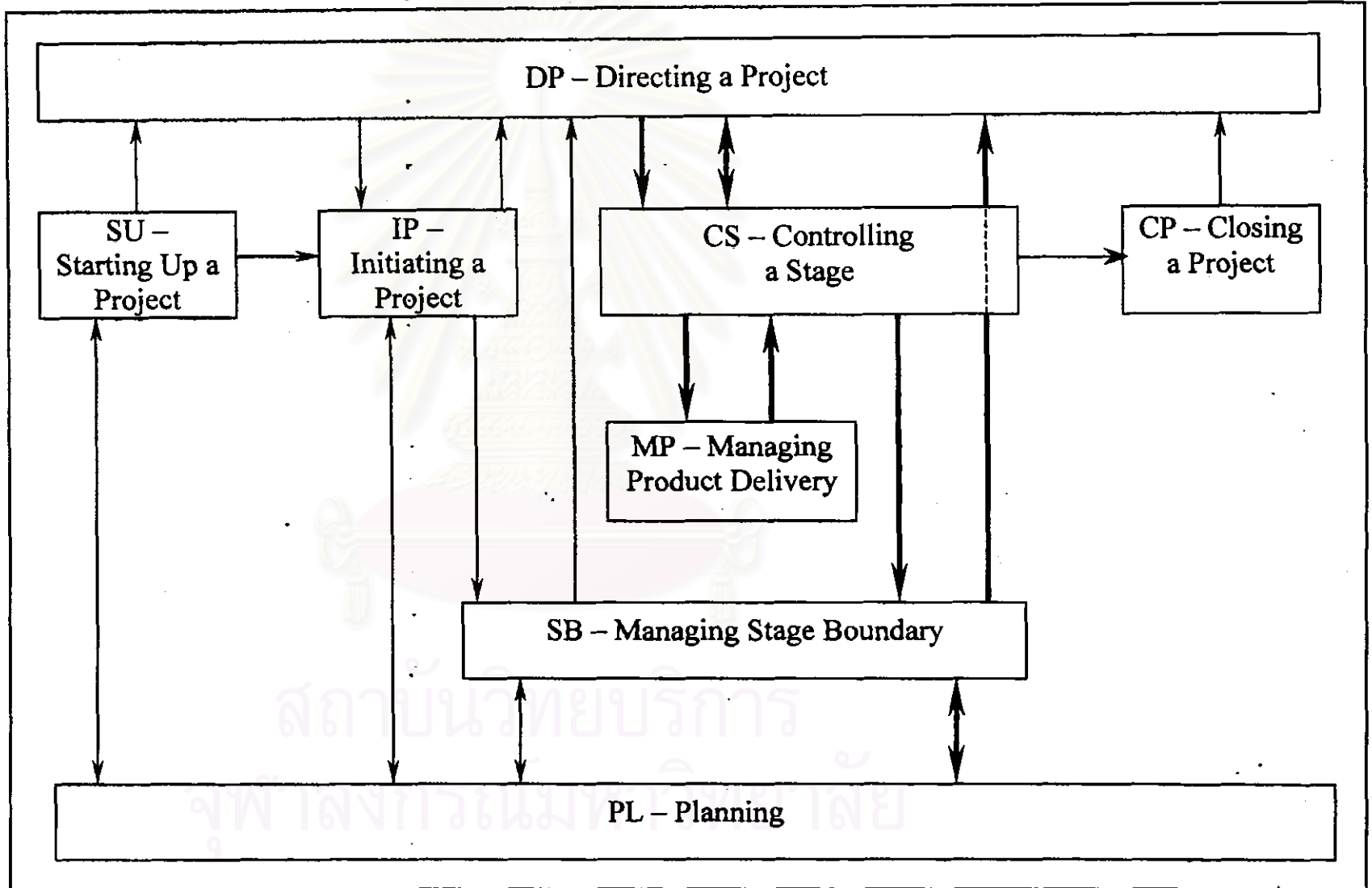
Figure 3.3: Structure Model of the PRINCE2 Process Model

| Typical Project Management | Start Up Phase | Planning Phase | Implementation Phase | Phase-out Phase |

PRINCE 2 Processes

DP – Directing a Project

SU – Starting Up a Project

IP – Initiating a Project

CS – Controlling a Stage

CP – Closing a Project

MP – Managing Product Delivery

SB – Managing Stage Boundary

PL – Planning

Each process, as shown in figure 3.3, has a number of sub-processes which drive the management of the project through the use of components and techniques, some of which are specific PRINCE2 techniques which are explained in 3.2.5, and some of which are generic used techniques which are mentioned in 3.3. This enable the use of any techniques which are suitable for project and reflect the flexibility of PRINCE2 methodology.

In this case study project, seven of eight processes are applied as follow:

I.   Starting Up a Project process (SU)
II.   Initiating a Project process (IP)
III.   Directing a Project process (DP)
IV.   Controlling a Stage process (CS)
V.   Managing Product Delivery process (MP)
VI.   Managing Stage Boundary process (SB)
VII.   Planning a Project process (PL)

I.   *Starting up a Project (SU)*

Fundamental Principles:

- Before project is started, and resources are committed, there must be a business requirement that triggers the project and it is certain that project is worthwhile and viable.

- Without defining key roles and responsibilities, project work should not start. This is to avoid problem relevant to lack of defining responsibility.

- Plan for the initiation stage must be created and approved by Senior Project Manager before Project Manager proceed to the Initiation Stage.
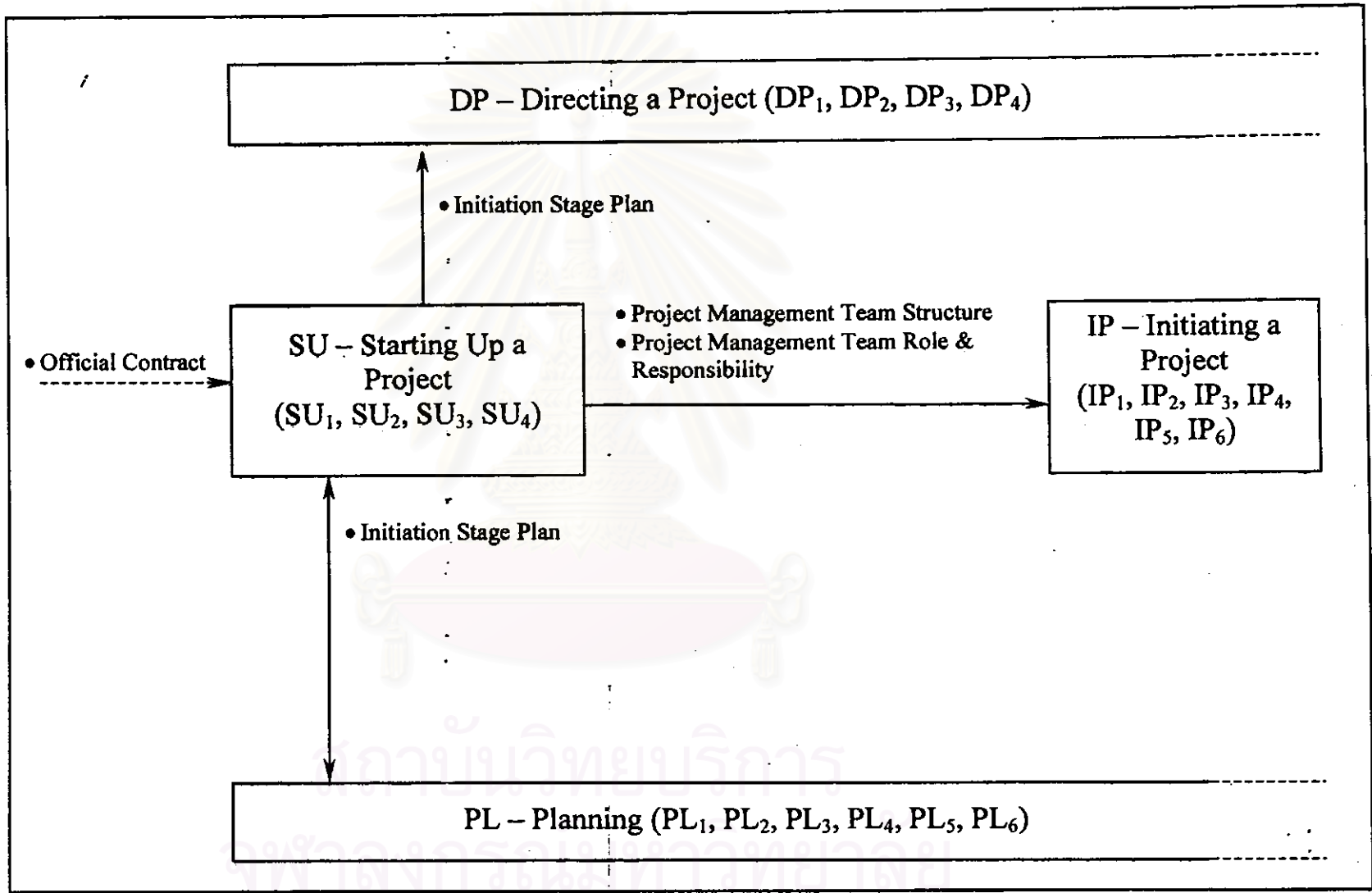
Figure 3.4: Starting up a Project (SU)

DP – Directing a Project (DP$_1$, DP$_2$, DP$_3$, DP$_4$)

- Initiation Stage Plan

- Official Contract

SU – Starting Up a Project (SU$_1$, SU$_2$, SU$_3$, SU$_4$)

- Project Management Team Structure
- Project Management Team Role & Responsibility

IP – Initiating a Project (IP$_1$, IP$_2$, IP$_3$, IP$_4$, IP$_5$, IP$_6$)

- Initiation Stage Plan

PL – Planning (PL$_1$, PL$_2$, PL$_3$, PL$_4$, PL$_5$, PL$_6$)

The objectives of Starting up a Project are to:

- create project organization structure and appoint project management team for undertaking the project
- make all necessary information available for creating term of reference for the project
- create plan for planning phase for Senior Project Manager to control work progress during planning phase

Responsibility: Senior Project Manager and Project Manager

1. Appointing a Project Board Executive and a Project Manager (SU₁)

Fundamental Principles: To initiate the project work, project need project board for making decision and project manager for planning.

Objectives: To appoint project board and the appropriate project manager for undertaking the initial works of project.

Input: Project Mandate (Official contract)

Output: Project Board and Project Manager

2. Designing a Project Management Team (SU₂)

Fundamental Principles: Project management requires resources with a range of skills and they must be available in the project management team.

Objectives: Design a project management structure based on size, nature of project and groups involved.

Input: Project Mandate (Official contract)

Output: Project management team structure

3. Appointing a Project Management Team (SU₃)

Fundamental Principles: An essential for a successful project is that every individual involved with project understand, accept and agree with their role and responsibility.

Objective: Appoint people to each position according to project management structure and ensure that they understand and committed to carrying out their role and responsibilities

Input: Project Management Team Structure

Output: Project Management Team Roles and Responsibilities

4. *Planning an Initiation Stage (SU₆)*

Fundamental Principles: Preparing project plan and project initiation document (PID) takes time and consumes some resource; therefore, the work should be planned and approved like other project work

Objective: Produce plan cover all works planned to perform during Initiation Stage

Input: Process map of the IP process

Output: Initiation Stage Plan

II. *Initiating Project (IP)*

Fundamental Principles: To ensure that the project can be successfully scoped and managed to its completion, project should observe the following principles

- a project is a finite process with a start and end
- project member has to understand obviously about what the project is intended to achieve, why it is needed, how the outcome is to be achieved and what their responsibilities are in that achievement so that project can gain genuine commitment from project team.
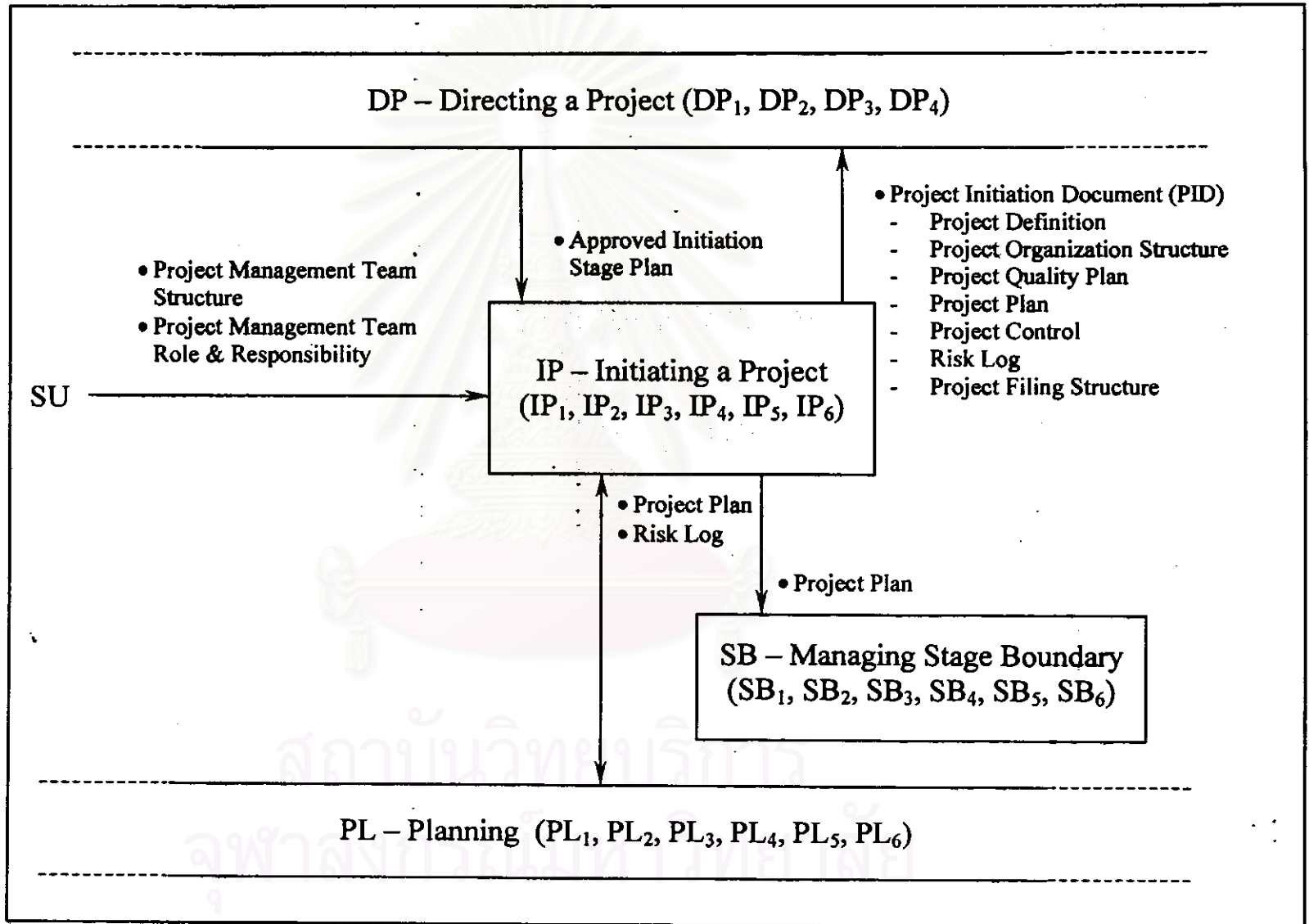- Well-managed project can increase chance of success

Figure 3.5: Initiating Project (IP)

DP – Directing a Project (DP$_1$, DP$_2$, DP$_3$, DP$_4$)

- Project Management Team Structure
- Project Management Team Role & Responsibility

SU

- Approved Initiation Stage Plan

IP – Initiating a Project (IP$_1$, IP$_2$, IP$_3$, IP$_4$, IP$_5$, IP$_6$)

- Project Initiation Document (PID)
  - Project Definition
  - Project Organization Structure
  - Project Quality Plan
  - Project Plan
  - Project Control
  - Risk Log
  - Project Filing Structure

- Project Plan
- Risk Log

- Project Plan

SB – Managing Stage Boundary (SB$_1$, SB$_2$, SB$_3$, SB$_4$, SB$_5$, SB$_6$)

PL – Planning (PL$_1$, PL$_2$, PL$_3$, PL$_4$, PL$_5$, PL$_6$)

Objectives of initiating project are to:

- ensure that project has a firm and acceptable business case
- encourage the Senior Project Manager to involved with project and agree to the commitment of resources to the project
- provide a firmed and accepted foundation for the decision-making process required during the project life
- track progress of initiating a project (IP) against the plan

Responsibility: Project Manager

1. Planning Quality (IP₁)

Fundamental Principles: Quality is one of the key success factor of most projects. To achieve the quality expectation, it is necessary that the quality expectation and the means of assessing quality are stated at the beginning of the project.

Objectives: Defining the overall quality criteria and quality audit method to be employed. In addition change which arise in the project must be controlled.

Input: Official Contract, Quality Management System

Output: Project Quality Plan

2. Planning a Project (IP₂)

Fundamental Principle: Before committing to budget on the project, the project plan identifying time scale and resource requirements must be established, so that the Senior Project Manager can evaluate and control project.

Objectives:

- understand at a high level the totality of the work which is about to be undertake such as major product, major activities, major risk, effort needed and estimated budget
- create project plan for Senior Project Manager in control project

Input: Official contract

Output: Project Plan

3. *Refining the Business Case and Risk (IP₃)*

Fundamental Principles: The business case needs to be refined before making final decision to start the project. It is also important to list all threat to project and create appropriate action to deal with them.

Objectives: Record any problems or threat into the risk log as well as modify project plan and business case according to any risk exposure activities.

Input: Project Plan

Output: Project Budget, Risk Log

4. *Setting up Project Control (IP₄)*

Fundamental Principles: Apart from effective project planning, project control is another key to successful management of any project. There is a need to be able to check the project status against plan in timely manner, so that problem in project can be tracked early and also solved correctly. Once the project is under way, there must be regular monitoring and control framework put in place.

Objectives:

- develop control which are consistent with risk and complexity of the project
- establish level of control and reporting for each level of management

Input: Project Plan, Risk Log

Output: Project Control

5. *Setting up Project Files (IP₅)*

Fundamental Principles: During project is running, it is important to keep track of all the information being produced regarding to the project. There is a need to be able to manage various report and different version of document, and to be able to retrieve information quickly and reliably. These problem can be relieved by setting up a sensible and practical project filing system at the beginning of project.

Objective: Establish a system of storing and retrieving information relevant to the project

Input: Project Plan

Output: Project Filing Structure

6. *Assembling a Project Initiation Document (IP₄)*

Fundamental Principles: It is necessary to have a collection of all information relating to the 'What', 'Why', 'Who', 'How', and 'When' which are used as a guidance for making decision during the life of project.

Objective: provide a basic for the decision to authorize start-up of the project and also all other decision throughout the project life. The PID consists of output document from the previous IP process.

Input: Official Contract, Project Management Team Structure, Project Management Team Role and Responsibility, Project Plan, Risk Log, Project Control, Project Filing Structure

Output: Project Initiation Document

III. Directing a Project (DP)

Fundamental Principles: Normally, implementing work of either project or stage need to consume resource and spend some cost. Therefore, no work should be commit to significant expenditure until Senior Project Manager verifies all related aspects and approve that it is sensible to do so.

In addition, Senior Project manager typically delegates charge of the project to a Project Manager. However, the accountability of success or fail of project still belongs to the Senior Project Manager, therefore Senior Project Manager must regularly exercise overall control and take the key decisions.

DP – Directing a Project (DP$_1$, DP$_2$, DP$_3$, DP$_4$)
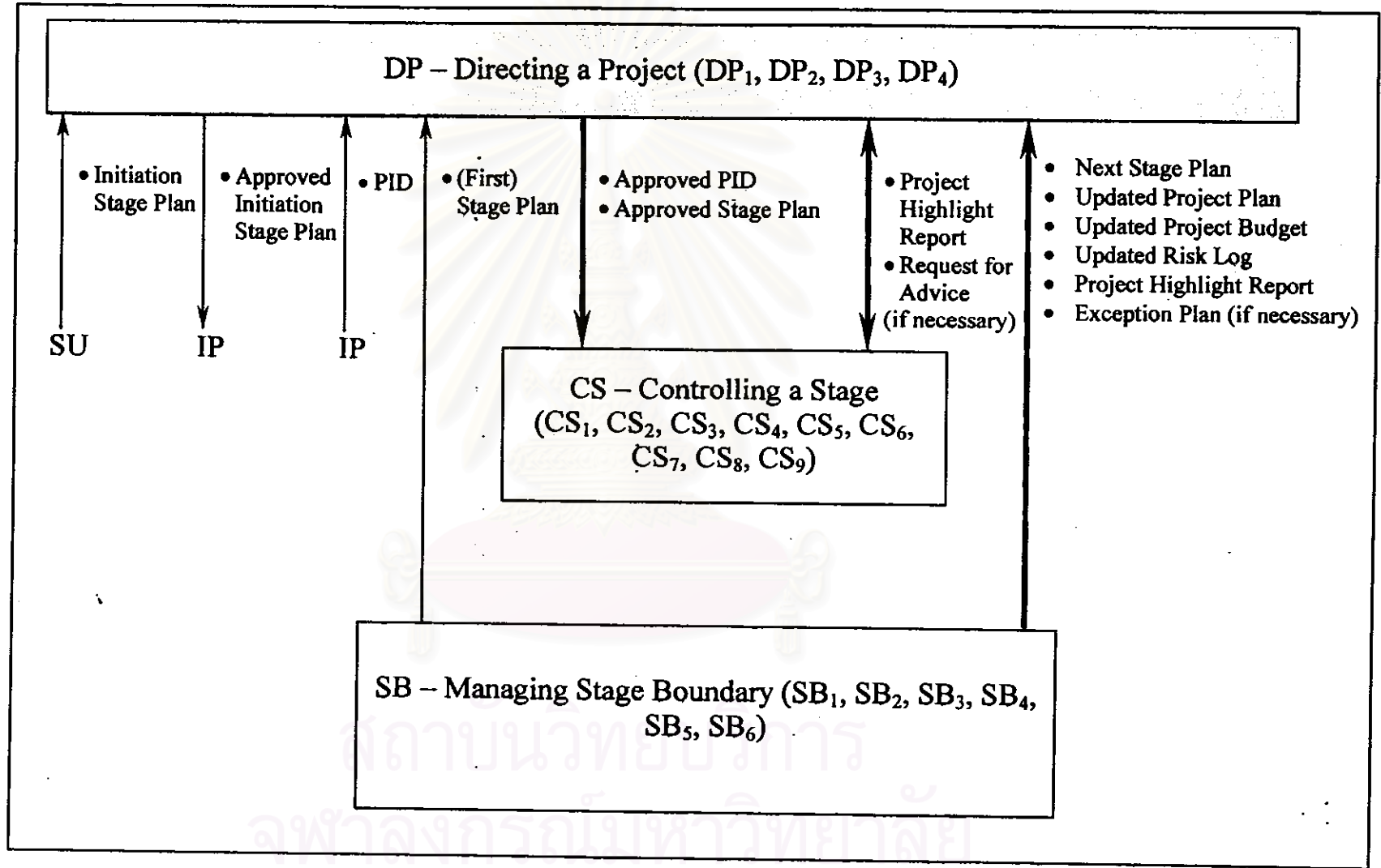
- Initiation Stage Plan
- Approved Initiation Stage Plan
- PID
- (First) Stage Plan
- Approved PID
- Approved Stage Plan
- Project Highlight Report
- Request for Advice (if necessary)
- Next Stage Plan
- Updated Project Plan
- Updated Project Budget
- Updated Risk Log
- Project Highlight Report
- Exception Plan (if necessary)

SU   IP   IP

CS – Controlling a Stage
(CS$_1$, CS$_2$, CS$_3$, CS$_4$, CS$_5$, CS$_6$, CS$_7$, CS$_8$, CS$_9$)

SB – Managing Stage Boundary (SB$_1$, SB$_2$, SB$_3$, SB$_4$, SB$_5$, SB$_6$)

Figure 3.6: Directing a Project (DP)

The objectives of Directing a Project are to:
- make sure project can success according to agreed time, cost and quality
- commit the require resources to project
- provide overall direction and guidance throughout project
- make decision on any change when requested by Project Manager and on exception situation

Responsibility: Senior Project Manager

1. Authorizing Initiation (DP₁)

Fundamental Principles: Before the expense on the project is entrusted to anyone, they should prove that it is rational to do so.

Objectives: to check and approve the plan for initiation stage prepared by the project manager and to commit required resource for the initiation stage.

Input: Initiation stage plan

Output: Approved Initiation Stage Plan

2. Authorizing a Project (DP₂)

Fundamental Principles: No project should commit to significant expenditure unless the following points are considered.
- Project has acceptable business cases
- No conflict with any relevant company strategy
- Evaluation and acceptance of the risk involved
- An estimated of time and cost is done
- Appropriately control system will be set up in the project

Objectives: To decide whether authorizing a project this is based on approval or rejection of the Project Initiation Document. The project board check the existing and reasonable of the key element of the PID (The Project objectives, project quality plan, business case, risk log, project plan, project organization, and controls).

Input: Draft Project Initiation Document, First Stage Plan

Output: Approved Project initiation Document, Approved First Stage Plan

3. *Authorizing a Stage or Exception plan (DP₃)*

Fundamental Principles: Project need to be divided into several stages in order to be easier for project board to manage and direct project. Moreover, it is important to spot problems early and re-act to them.

Objectives: To decide whether to proceed to next stage based on current status of project, reassessment result of likely project end date, risk situation and business case.

Input: next stage plan, updated stage plan, updated project plan, updated project budget, updated risk log, Project Highlight Report

Output: Approved Next Stage Plan.

4. *Giving ad hoc direction (DP₄)*

Fundamental Principles: Even when a stage is proceeding according to plan and within tolerance, project manager may need to consult with project board. This process also serve project board when they want to pass information to the project manager during the stage. Such occasions might be:

- for advice on direction when options need clarifying
- when the effect of external event needs to be considered

Objectives:

- to ensure that changes in corporate or external event which may affect to the project are notified to project manager and appropriate actions are taken
- to make decision on response to project issues beyond the project manager's authority
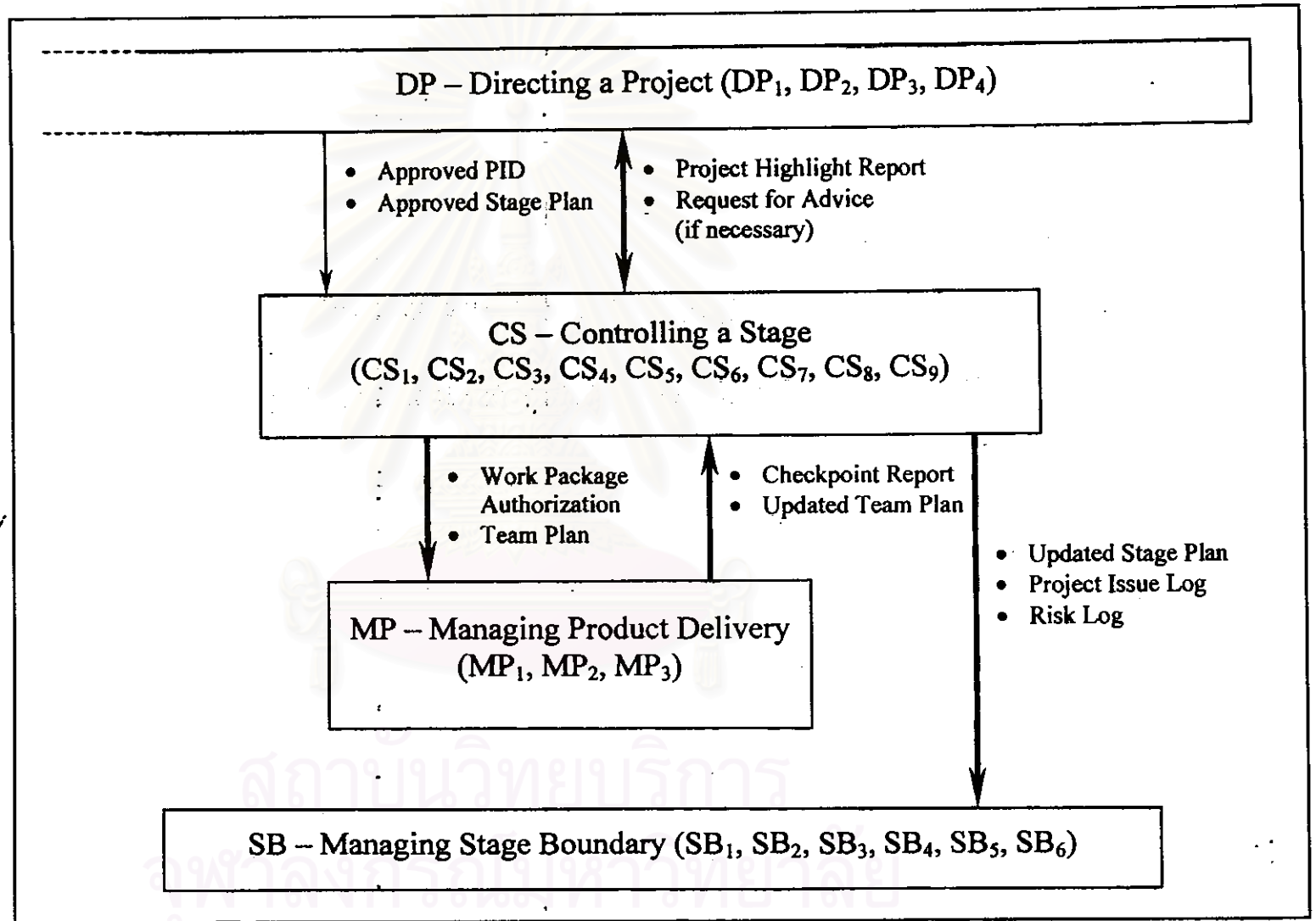
Input: Project Highlight report, Exception Report
Output: Feedback from the project board

IV. *Controlling a Stage (CS)*

Fundamental Principles: After Project Manager has gained authority to proceed and resource has been committed, project management team must emphasize on delivery of the products, to their stated quality criteria, within the approved time scales and budget, within the stated tolerances.

Figure 3.7: Controlling a Stage (CS) process

DP – Directing a Project (DP_1, DP_2, DP_3, DP_4)

- Approved PID
- Approved Stage Plan

- Project Highlight Report
- Request for Advice
  (if necessary)

CS – Controlling a Stage
(CS_1, CS_2, CS_3, CS_4, CS_5, CS_6, CS_7, CS_8, CS_9)

- Work Package
  Authorization
- Team Plan

- Checkpoint Report
- Updated Team Plan

- Updated Stage Plan
- Project Issue Log
- Risk Log

MP – Managing Product Delivery
(MP_1, MP_2, MP_3)

SB – Managing Stage Boundary (SB_1, SB_2, SB_3, SB_4, SB_5, SB_6)

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The objectives of Controlling a Stage (CS) are to:

- deliver the right products, at the quality criteria, on time and to cost with agreed tolerance
- suitably direct and utilize resource
- properly direct and conduct work on product
- update plan with actual and compare progress against plan
- correctly manage deviation from plan
- regularly inform project progress to all involved parties

Responsibility: Project Manager

1. Authorizing Work Package (CS₁)

Fundamental Principles: Project would become disorder, if the people who are working on the project starting activities whenever they think fit. Certainly, there must be a level of autonomy within the project team, but there will be broader issues of which they can not aware. Therefore, it is important that work only commences and continues when receiving authorization from project manager.

Objectives:

- Brief the team manages and hand out them with all necessary document, and information such as planned effort for the work, timescale for completion, and progress reporting.
- Identify risk relating to the project to staff.
- Ensure the team manager is committed to completion of the work within the constraint laid down.

Input: Stage plan

Output: Work Package Authorization, Team plan

2. Assessing Progress (CS₂)

Fundamental Principles: In order to make decision correctly and exercise control rationally, it is necessary to know exactly what has happened, to be compared with what it was expected. Thus it is vital that there is a steady flow of information about work progress prepared for Project Manager in timely manner.

Objectives: keep update an accurate and current picture of progress on the work being carried out

> *Input:* Checkpoint Reports, Updated Team plan
>
> *Output:* Updated Stage Plan

3. Capturing Project Issue (CS₃)

Fundamental Principles: During project is proceeding, various problems, queries, and change may arise randomly. They need to be captured in a consistent and reliable way, so that they can be examined and managed properly.

Objectives: to capture all project issues arising in the project and record them in issue log for systematic handling. A Project Issue is anything which could has impact on the project. It can be a change in requirement, a problem occurring, or even idea and suggestion.

> *Input:* New Project Issues, Project Issue Log
>
> *Output:* Project Issue Log

4. Examining Project Issue (CS₄)

Fundamental Principles: Before making a decision on a responsive action to any project issues, each of them should be assessed for its effect.

Objectives: Regularly review all open project issue and examine the new project issues about their impact on costs, time scale, benefit achievement and risk. Then establish alternative action for each project issue.

> *Input:* Project Issue Log
>
> *Output:* Project Issue Log

5. Reviewing Stage Status (CS₅)

Fundamental Principles: Mostly, during the course of managing the project, a Project Manager can easily become dominated by 'fire fighting' and day-to-day problem solving. It is quite risky that project will get out of control, if it is not checked on a timely basis. There needs to be a balance between planning ahead and reacting to events.

Objectives: to check periodically that the current stage is kept within tolerance and also whether or not it will go outside the tolerances. This is done by reviewing progress against plan, reviewing the impact of project issues and reviewing the risk log.

Input: Issue Log, Risk Log, Project Plan, Stage Plan

Output: Plan deviation, Stage Status Information

6. *Reporting Highlight (CS₆)*

Fundamental Principles: Senior Project Manager owns accountability for success or fail of the project, so Project Manager has to keep inform him about the project status and try to get him involve with project.

Objectives: summarize information about status of stage and project and prepare a summary report for the Senior Project Manager

Input: Stage Plan, Plan revision, Checkpoint Reports, Risk Log, Issue Log, and Communication Plan

Output: Project Highlight Report

7. *Taking Corrective Action (CS₇)*

Fundamental Principles: For all project even well-managed project, deviation from the plan will occur and corrective action must taken to bring project back in line with plan. However, change or adjustment to the project must be considered reasonably prior to taking action.

Objectives: Select and implement most suitable action to resolve deviation from the plan. This can be done by first, identify cause and effect of deviation, then, identify the potential ways to deal with deviation, and finally select the most appropriate solution.

Input: Plan deviation, Issue Log, Risk Log, Stage Plan

Output: Request for advice

8. *Escalating Project Issues (CS₈)*

Fundamental Principles: To limit authority allocated to Project Manager, at the beginning of each stage, Senior Project Manager sets tolerances for each stage. The Project Manager only has authority to carry on a stage while it is forecast to stay within the tolerance. If the stage is forecast to go outside the tolerance the Project Manager must notify Senior Project Manager at once.

Objectives: to bring the situation to the attention of the Senior Project Manager when Project Manager forecasts that stage will exceed the tolerance. This is an advance warning to the Senior Project Manager of a deviation.

Input: Project Issue Log

Output: Project Highlight Report

9. Receiving Completed Work Package (CS₉)

Fundamental Principles: Where work has been assigned to project staff, there should be a confirmation that work has been completed and accepted.

Objectives: To check the completed work package to ensure that it conforms to the Product Description and specification.

Input: Approved work package

Output: Work Package Status

V. Managing Product Delivery (MP)

Fundamental Principles: This process is designed for supporting product creation work especially when the third party does not used PRINCE2. There should be interface between product creation and management work in order to monitor that assigned work is actually progressing in accordance with customer's expectation, agreed time scale, and contract price or internally approved budget, and meet the approved criteria.

The objectives of Managing Product Delivery are to :

- ensure that work on products assigned to the team is authorized and agreed
- make certain that team plan for the work is available for monitoring
- ensure that work is actually done and work progress and forecasts are regularly reviewed
- make sure that completed product is approved and meet quality criteria

Responsibility: Supervisor/Third Party

1. Accepting a Work Package (MP₁)

Fundamental Principles: Before accepting the allocated work package, there should be agreement between project manager and team manager on the work package authorized by project manager.

Objectives: This process encourage team managers to check the allocated work package and discuss with project manager until they really accept and agree with the assigned works.

Input: Work package, team plan

Output: Accepted work package

2. Executing a Work Package (MP₂)

Fundamental Principles: For any project, the actual task of producing product need to be managed, moreover, tracking of the work must be delegated to team manager as same as the production work.

Objectives: To feed the progress, status information and found problems to the project manager in 'Checkpoint Report', in the manner and frequency identified by project manager.

Input: Authorized work package, team plan

Output: Checkpoint Report, Updated team plan

3. Delivering a Work Package (MP₃)

Fundamental Principles: Since the project manager authorized the work package, its completion needs to be feed back to project manager.

Objectives:

- To gain approval from the quality audit team for the products develops.

- To hand over the completed products and notify project manager of completion of the work package.

Input: Completed Work Package

Output: Approved Work Package

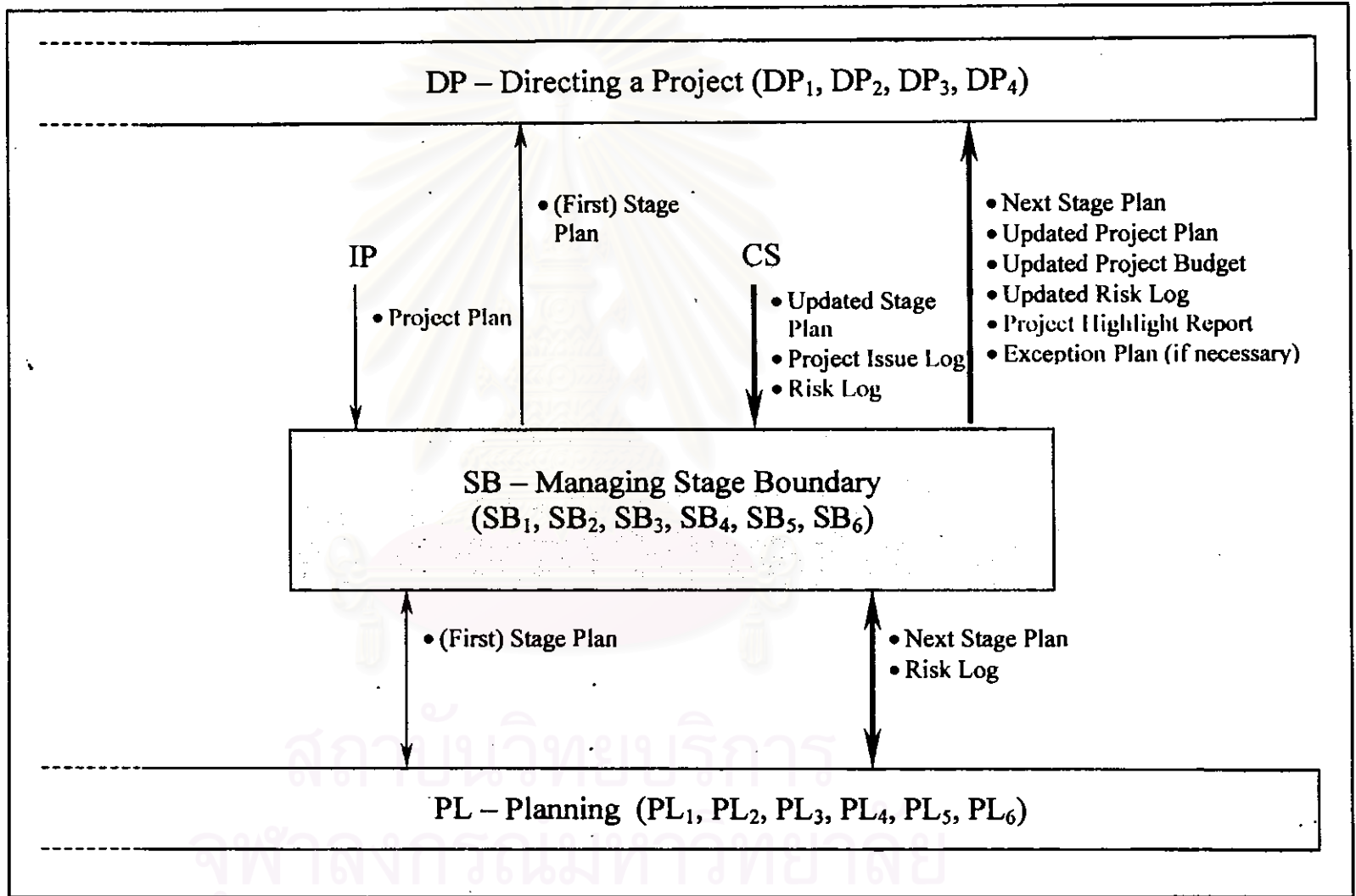## VI. *Managing Stage Boundary (SB)*

Fundamental Principle: To achieve successful project, it is necessary to break it into shorter duration in order to limit authority delegate to Project Manager. In PRINCE2, Project Manager gains authority to manage project only stage-by-stage. This allows Senior Project Manager to check project status at the end of each stage before authorizing Project Manager to carry on to next stage.

In addition, project plan cannot identify all detailed activities, so it is not useful for control progress of project. When project is broken down into shorter stages, Project Manager can create stage plan consisting of detailed activities. Each stage plan must be approved by Senior Project Manager at the end of each stage before using as reference for next stage.

Figure 3.8: Managing Stage Boundary (SB)

DP – Directing a Project (DP_1, DP_2, DP_3, DP_4)

IP

CS

- (First) Stage Plan

- Project Plan

- Updated Stage Plan
- Project Issue Log
- Risk Log

- Next Stage Plan
- Updated Project Plan
- Updated Project Budget
- Updated Risk Log
- Project Highlight Report
- Exception Plan (if necessary)

SB – Managing Stage Boundary
(SB_1, SB_2, SB_3, SB_4, SB_5, SB_6)

- (First) Stage Plan

- Next Stage Plan
- Risk Log

PL – Planning (PL_1, PL_2, PL_3, PL_4, PL_5, PL_6)

The objectives of managing stage boundary are to:

- assure the Senior Project Manager that all products planned for the current stage is created completely and meet their quality criteria
- provide the information needed for the Senior Project Manager to make decision for continuing of the project
- obtain authorization for managing next stage, together with tolerance margin

Responsibility: Project Manager

1. Planning a Stage (SB₁)

Fundamental Principles: Project should not proceed to next stage unless there is enough detail for daily control to be exercised against the plan. The commitment of the Project Board and Project Manager is a key to success for each stage.

Objectives: To prepare plan for the next stage of project. The stage plan must contain sufficient detail for the project manager to control project progress on a day-today basis.

Input: Issue log, current stage plan, project plan, risk log

Output: Next stage plan

2. Updating a Project Plan (SB₂)

Fundamental Principles: Project Board uses project plan throughout the project to evaluate project performance. After stages are completed and the next stage plan is created the project plan need to be updated to reflect the latest understanding of the project and allow project board to adjust their anticipation.

Objectives: To update project plan based on actual status of the previous stage and plan for the next stage.

Input: Updated stage plan, next stage plan, project plan

Output: Updated project plan

3. *Updating a Project Business Case (SB₃)*

Fundamental Principles: Projects are in a dynamic environment. Changes in project more or less have impact to project business case, so it must be regularly updated at least at the end of each stage.

Objectives: To update the business cases according to change which occurs during the project.

Input: Project plan, next stages plan, budget plan.
Output: Updated budget plan

4. *Updating the Risk Log (SB₄)*

Fundamental Principles: Risks occur and change their status throughout the project. Project manager should review risk regularly.

Objectives: To re-assess project risks to see whether project risk has increased, decreases, disappeared, occurred or remained.

Input: Project plan, next stage plan, issue log, risk log.
Output: Updated risk log.

5. *Reporting Stage End (SB₅)*

Fundamental Principles: After completion of a stage, a summary report should be feed back to project board who provide resources and approve plan for each stage.

Objectives: To prepare report which summarize actual results of the completed stage in terms of costs, dates achieved and product produced. The report should relatively present the stage status compare with the original stage plan and tolerance defined for the stage.

Input: Current stage plan, issue log, risk log, next stage plan
Output: Project Highlight Report

6. *Producing an Exception Plan (SB₆)*

Fundamental Principles: Project manager gain authority from senior project manager in managing project as long as project's status remain within agreed tolerance. But he will loss his authority at once if project is forecasted to deviate beyond tolerance. Then a new plan must be presented to take the place of the current plan.

Objectives: To produce an exception plan to replace the current stage plan

Input: Current stage plan, issue log, exception report

Output: Exception plan

VII.Planning (PL)

Fundamental Principles: Effective project management relies mainly on two factors, effective planning and control. Even small projects require planning. Understanding of tasks required and the pitfalls will emerge from planning the project and stages. In addition, control process can only be exercised in as much detail as the plan is created.

Planning is an on-going activity throughout the project. Planning process itself is used by each process of PRINCE2 as shown in Figure 3.9
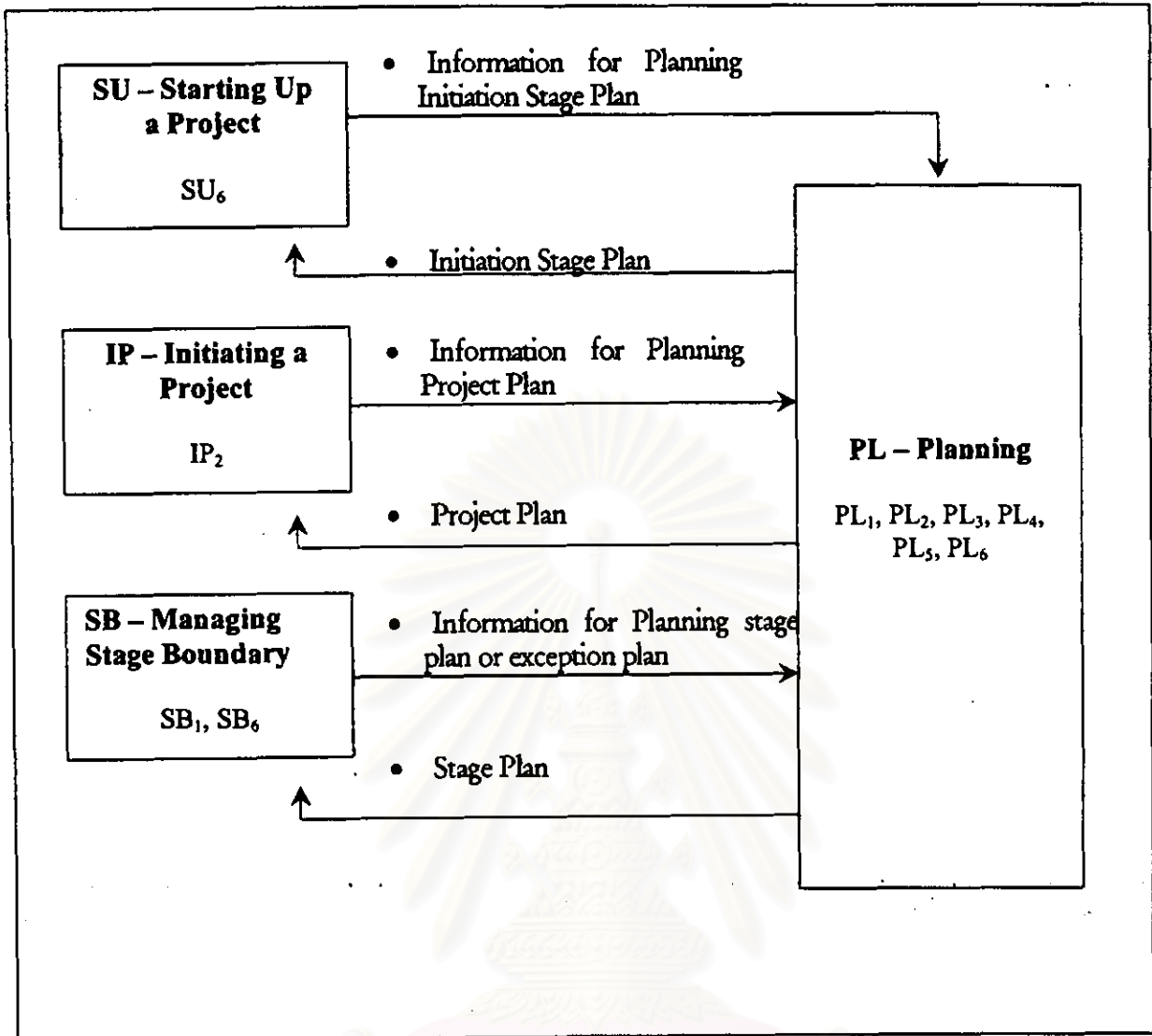
Figure 3.9: Planning (PL)

1.   Designing a Plan (PL₁)

Fundamental Principles: Good plans cover all aspects of the project, giving everyone involved a common understanding of the work in advance. Designing a plan ensure that fundamental issues about planning are defined before any real planning can commence and they can be easily assimilated by all involved.

Objectives: To identify fundamental issue about planning such as planning tools, plan level, estimating and communication channel.

Input: Project quality plan

Output: Plan design

2.   *Defining and analyzing products (PL$_2$)*

Fundamental Principles: By creating plan based on the products to be delivered, the creation, quality and specification of those products can be managed and controlled more easily.   In addition, since all key products are defined, everyone involved can visualize and understand the required outcome.

Objectives: To apply the concept of 'Product Based Planning' in creating plan.   It consists of three steps; identify the products to be produced, describe each of them and sequence them in their logical order of creation.

Input: Official Contract, project quality plan

Output: Product breakdown structure, product description

3.   *Identify Activities and Dependencies (PL$_3$)*

Fundamental Principles: Product flow diagram visualizes components of products and dependency among them, but it's not enough for scheduling and control purpose.   The activity required to transform one product to another is important for giving planner the clear picture of the plan's workload.

Objectives: To identify all necessary activities in transforming products.

Input: Product description, Product Breakdown Structure

Output: Product Flow Diagram

4.   *Estimating (PL$_4$)*

Fundamental Principles: Estimating is like prediction, however it is better than not estimating at all

Objectives: To identify resource types and effort required for each activity.

Input: All planning information so far

Output: Activity estimates

5.   *Scheduling (PL$_5$)*

Fundamental Principles: So far a plan can only show the possibility of achieving its objective, however to identify when each activity is carried out they need to be put together in a schedule.

Objectives: -   To schedule work according to the defined sequence and dependencies.

- To match available resources to the activities
- To calculate cost required for each resource and total cost of project.

Input: Activities estimates, activity dependencies, resource availability.
Output: Schedule

6. Analyzing Risks (PL₆)

Fundamental Principles: Resource and budget allocation to a project without consideration of the risk inherent in that project is courting disaster. Before work commence, risks should be considered and take responsive action to remove or lessen the impact of those risks.

Objectives: - To assess project risk and create plan to prevent and mitigate impact of those risks.

Input: All previous planning information.
Output: Updated risk log

3.2.5 PRINCE2 Components

In this case study project, five of eight components are applied as follow:

I.   Plans
II. Controls
III. Stages
IV. Management of Risk
V.   Change Control

I. Plans

The PRINCE2 planning structure requires plan to be broken down into lower level plan containing more detail. Planning for an entire project in details at the start is really difficult and rarely correct in accordance with the future actual situation because of uncertain environments, doubtful element of work and risk factors.

Basically, PRINCE2 breaks down plan into three levels which are project plan, stage plan, and team plan.

1) *Project Plan:* This is a mandatory plan describing how and when project's objectives are to be achieved, by showing major products, resources and activities required on project.

2) *Stage Plan:* Project plan is divided to several stages and the end of each stage is referred as control point for project board. Stage plan's pattern is similar to project's. It consists of diagrams showing identified resources, activities, start and end dates Product-based planning is also apply to planning a stage-plan. The Approved stage plan is used by project manager in day-to-day control.

3) *Team Plan:* Team plans are optional and usually required when there are more than one products are produced during stage or different skill groups working in the same stage. Normally, team plan is created by team manager within "Managing Product Delivery" process, in consultation with team member and agreed with project manager.
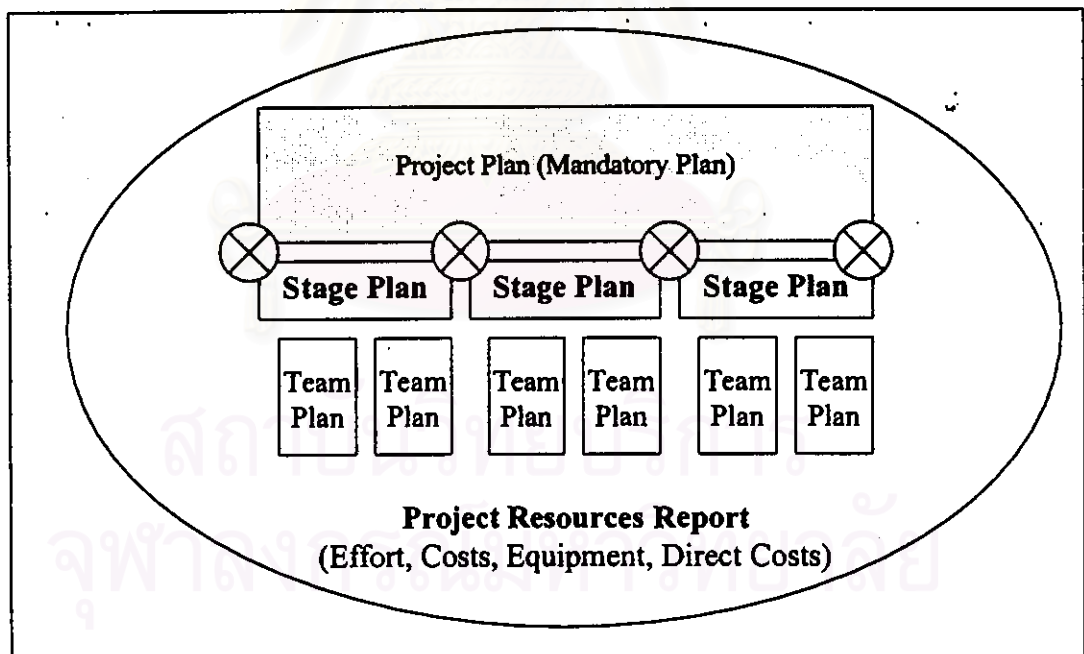
Figure 3.10: Level of Plan in PRINCE2 *(Bradley, 1997)*

II. Control

During Project operation, no matter how good it was planned, the obstacle is always occurs, and this causes project unable to carry out according to plan, for example, user's requirement changes or subcontractor fails to meet its planned commitment. The important duty of project management is to have the project control according to the plan or purpose.

The objective of control is to ensure that project:
- producing the required products which meet the defined acceptance criteria
- being carried out to schedule and in accordance with its resources and cost plans
- Remaining viable against its business case

Control is separated into two classes which are control at project level in charged by project board and control on day-to-day basis within stage responsible by project manager. In PRINCE, concept of "Management by Exception" is introduced to control project. After approving stage plan, project board is kept informed by reporting regularly, therefor it's no need for progress meeting during stage. Project board can rely that project manager will inform them immediately if any exception situation is forecasted, meanwhile, project manager has full authority to adjust the plan as long as the stage and project stays within the tolerances defined by the project board.

Control is applied throughout project life. For PRINCE2- compliant project, control is divided into two phases; controlled start and controlled progress.

Controlled start

After project organization is set up, project manager has to create plan for initiation stage and submit to project board for getting approval. This is to ensure that project board is able to monitor and control project even in planning stage.

Project initiation document which is important product of Project Initiation Process (IP) is canvassed and approved by project board in Authorizing a Project Process (DP$_2$). Project board must make sure that before significant resource is spent on

the project, everything involved in the project is agreed on. The approval of Project Initiation Document (PID) identifies official project start up.

Controlled Progress

During project implementation, several tools and techniques are used to monitor and control project in order to ensure that the project stay in line with the expectation defined in PID and the current stage plan.

1) Tolerance

Tolerance is a significant factor in supporting concept of "Management by Exception" It is the permissible deviation from a stage or project plan without bringing deviation to the attention of project board. Normally it is defined as percentage of time and cost. Project board has responsibility to identify tolerance in managing project for the Project Manager. The defined tolerance for each project is depend on size, complexity and risk of the project.

2) Project Issues

Project Issues is used for record possible deviation from specification and questions or concerns from project team. This is to ensure that all raised issued won't be overlooked and will get appropriate response.

3) Risk Log

Risk should be assessed through out project life, at least at the end of each stage, The identified risk must be analyzed, set up counter measure, regularly reviewed and logged as Risk Log.

4) Checkpoint Report

Checkpoint is a stage-level control tool which project manager use to monitor progress of work authorized to project team against plan. Checkpoint can be arranged as either meeting or reporting. The format of report and frequency of reporting depend on project manager's desire. Normally it's set as weekly report.

5) Plan and Re-plan

No project ever goes one hundred per cent to plan. Even with an excellent plan, something will go a little slower than planned or cost a little more, other things will go more quickly, cost a little less. That arouses project manager sometimes to re-plan in order to achieve the original objectives. In PRINCE 2, re-planning is needed at stage boundaries and when exception arises.

6) *Project Highlight Report*

PRINCE 2 requires "Project Highlight Report" in supporting the concept of "Management by Exception". Project board is kept informed regularly about project status from the Project Highlight Report submitted by project manager. The report should tell project board about achievement in this period, expected achievement in next period, potential problem and suggestion. From the report, project board concerns about actual progress to date against committed stage plan and marginal tolerance agreed with project manager.

7) *Exception Report*

Exception report is produced and used as warning message from project manager to project board when approved stage plan is forecasted to exceed the pre-defined tolerance. The exception report should describe cause and effect of deviation, available options, effect of each option and project manager's recommendation.

8) *Mid Stage Assessment*

After exception report has been proposed to project board then board will assign project manager to create exception plan for the working stage to ensure that the project result will be least changed from the original goal.

After that, the exception plan will be proposed to the project board for approval. Project Board should examine the effect of the exception plan on project plan and business case. The approved exception plan will be used up to the next End Stage Assessment.

9) *End Stage Assessment*

One benefit of breaking the project into stages is that the project board can delegate authority to project manager only one stage at a time. At the end of each stage,

the project board can evaluate project status and make a decision whether they should allow project manager to proceed to the next stage.

End Stage Assessment is the mandatory control point at the end of each stage. Each stage will be counted as completely finished when it is agreed and accepted by the project board. During the end stage assessment project board has to evaluate actual result of the finished stage against plan, quality of the product, the existing risk, and the overall project status against plan. All that mention issues should be included in the End Stage Report prepared by the project manager. In addition the project manager should also propose plan for the next stage to project board for an approval, because the project manager cannot proceed to the next stage until getting approval from project board.

III. Stage

Stages are partitions of the project with control points. Project board uses stage in control and limit authority delegated to project manager. So the number of stages and range between stages depend on size, risk and complexity of project.

In PRINCE 2, there are two different types of stage.

1) *Management Stage*
The whole project plan is divided into a series of management stages. This enable project board to control the commitment at resources and make a decision of continuation of the project.

At the end of each management stage, End Stage Assessment is established by project board in order to assess the progress of last stage and also make approval for next stage plan. This allows project board to use their authority in control and direct the project.

2) *Technical Stages*
Technical stages are work packages in charge by a particular set of specialist skills. They are drawn on the same scheme of management stages. The difference between technical stages and management stages is that technical stages are planned to

run in parallel in order to best utilize the available resource and they are planned and managed by project manager. While management stages are created in series manner and planned by project board.
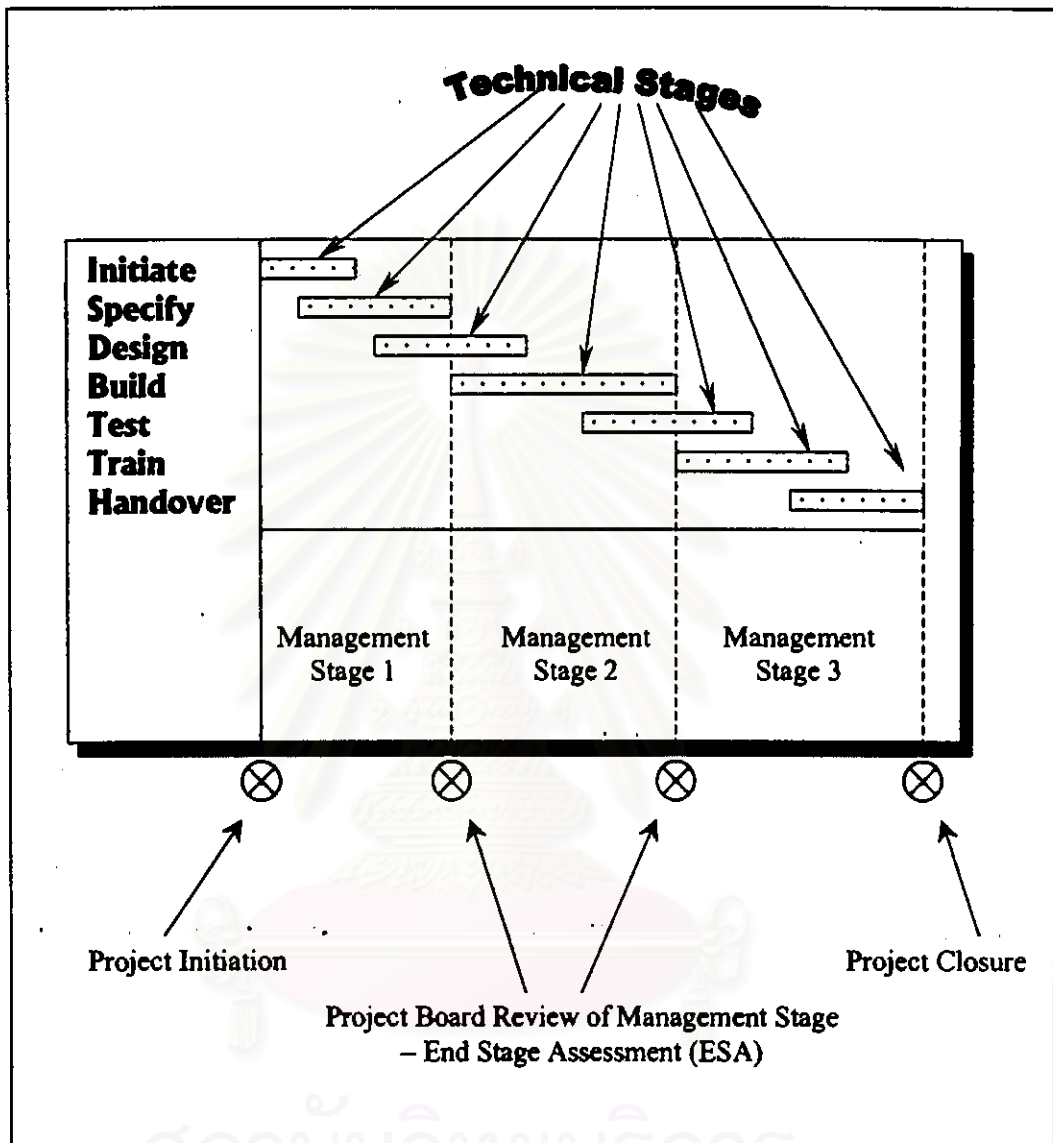

Figure 3.11: Management and technical stage (Bradley, 1997)

From figure 3.11, the sample plan consists of seven technical stages which are initiate, specify, design, build, test, train and hand over stage. The technical stages can run in parallel like design stage and build stage. In addition, the sample plan is divided into two stages and End Stage Assessment, which is milestone of project board, is set up at the end of each management stage.

IV. Risk Management Component

Risk is one of the critical factors which can lead to success or fail of project. Most of successful projects apply risk management in handling risk which occur during the project life.

Normally, projects are established to bring about change, or deal with novel or unusual factor. They are unique and usually project's objectives have to be achieved within certain constraints such as limit resources, within schedule and under budget. That causes project work is less predictable than non-project work.

Risk Management of risk is one of the most important parts of the works performed by project manager and project board. The project manager is responsible for identifying, recording and regular reviewing risk. The project board is in charge for notifying project manager of external risk and making decision on project manager's recommendation reaction to risk.

PRINCE introduces two iterating processes to handle with risk.

1. Risk Analysis

Risk Analysis consists of three activities

i) *Risk Identification* where all potential risks that could be faced by the project are identified and defined

ii) *Risk Estimation* which each risk is estimated for its probability and impact to the project.

iii) *Risk Evaluation* which groups all listed risks in two group, acceptable risk and unacceptable risk, and then develop action plan to mitigate the unacceptable risks. Generally, there are five types of action to response to risk which are prevention, reduction, transference, contingency, and accepting.

2. Risk management

After risks are identified, estimated, and evaluated, attention needs to focus on managing them. Risk management covers the activities to plan, monitor, and control actions to cope with identified risks so that project can achieve its objective.

Risk should be regularly reviewed through out the project life at least at the end of each management stage and especially when change occurs or plan is either created or adjusted.

V. Change Control

Changes to specification or scope more or less affect to project so they need to be carefully controlled. The change control means analyzing the impact of potential changes and make judgmental decision on whether to include them or not. Change Control considers two elements:

i) Authority Level

During project initiation, there should be consideration about level of authorizing change allocated to each work function

ii) Integrity of change

In performing impact analysis, project issue should be view in various aspects such as time, cost, risk, and benefit

3.2.6 PRINCE2 Technique

In this case study project, three of four techniques are applied as follow:

I. Product-Based Planning Technique

II. Change Control Technique

III. Project Filing Technique

I.   Product-Based Planning Technique

The most significant technique of PRINCE in planning is "Product-Based Planning". The strength of this method is that it can be applied for every planning level, for example Project Plan, Stage Plan, Team Plan or even Individual Plan. Applying this technique assures that all planned activities within the project is geared towards required deliverables that will all contribute toward the final outcome.

There are three steps to the product-based planning technique:
- Producing a Product Breakdown Structure
- Writing Product Descriptions
- Producing a Product Flow Diagram

1) Product Breakdown Structure

To create Product Breakdown Structure (PBS), the project final product is continually breakdown into sub-product in hierarchical manner until all meaningful products have been identified and each product can be individually planned, scheduled, budgeted, monitored and controlled. Figure 3.12 identifies the example of hierarchy structure of a product. The higher level of products must completely consists of all lower level products to which they are linked.
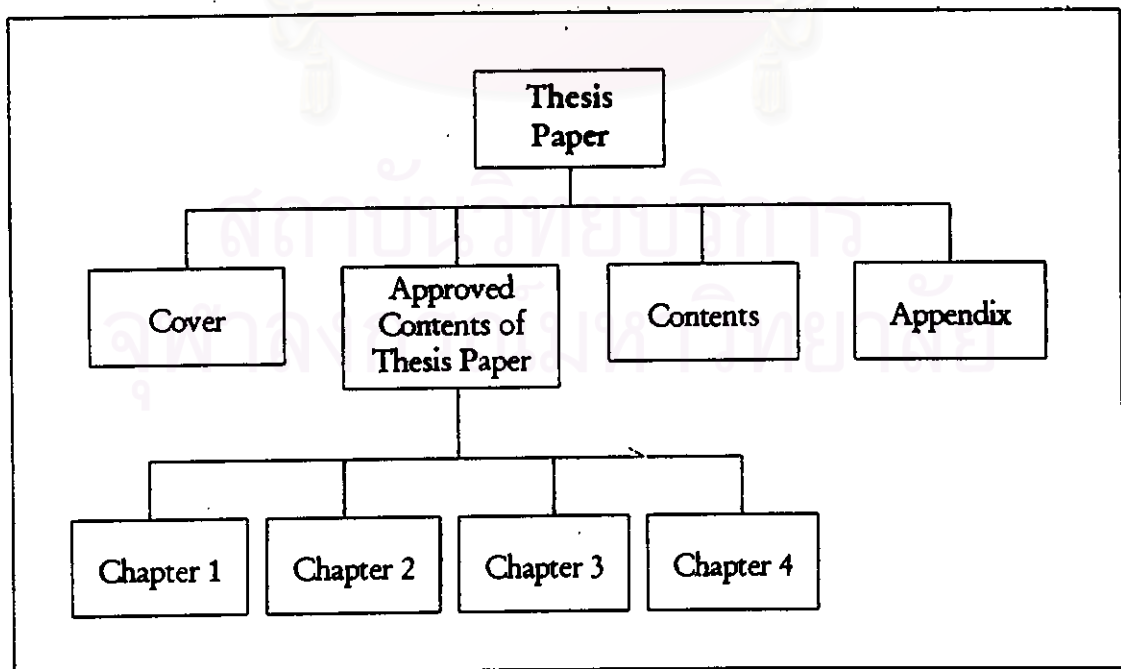

Figure 3.12: Product Breakdown Structure (PBS) of thesis-paper preparation project

Figure 3.12 shows Product Breakdown Structure (PBS) of thesis-paper preparation project. In creating this PBS, first, the final product which is thesis paper is thesis paper is drawn at top of tree diagram. Then it is divided into its key components which are cover, approved contents of thesis paper, contents and appendix. Next, the approved contents of thesis paper can be broken down into another lower level consisting of chapter 1, chapter 2, and chapter 3. As a result, the bottom most of each branch of the PBS identify all components of the thesis paper which can be individually planned and controlled.

2) Product Descriptions

A clear and complete product descriptions are critical to their successful creation. Since the person who is in charge with the product understands and agrees with the identified product specification therefore it would rarely occur that staff produce things different from the specification. Moreover, what were written in the product description will be set as a focal area for quality review. Generally, the product description should consists of the following topics: product's purpose, composition, derivation and quality criteria.

3) Product Flow Diagram

The objective of product flow diagram is to present the sequence of product development process, including dependency and relationship between products. All of the product list generated in product breakdown structure should be included in the product flow diagram. Normally, product flow diagram is organized in either left-to-right or top-to-bottom manner, the left-most or top-most product in the diagram is products which are available before the start of project.

Product flow diagram helps planner to visualize the product flow of project so he/she can perform planning correctly and effectively that lead to better project plan.
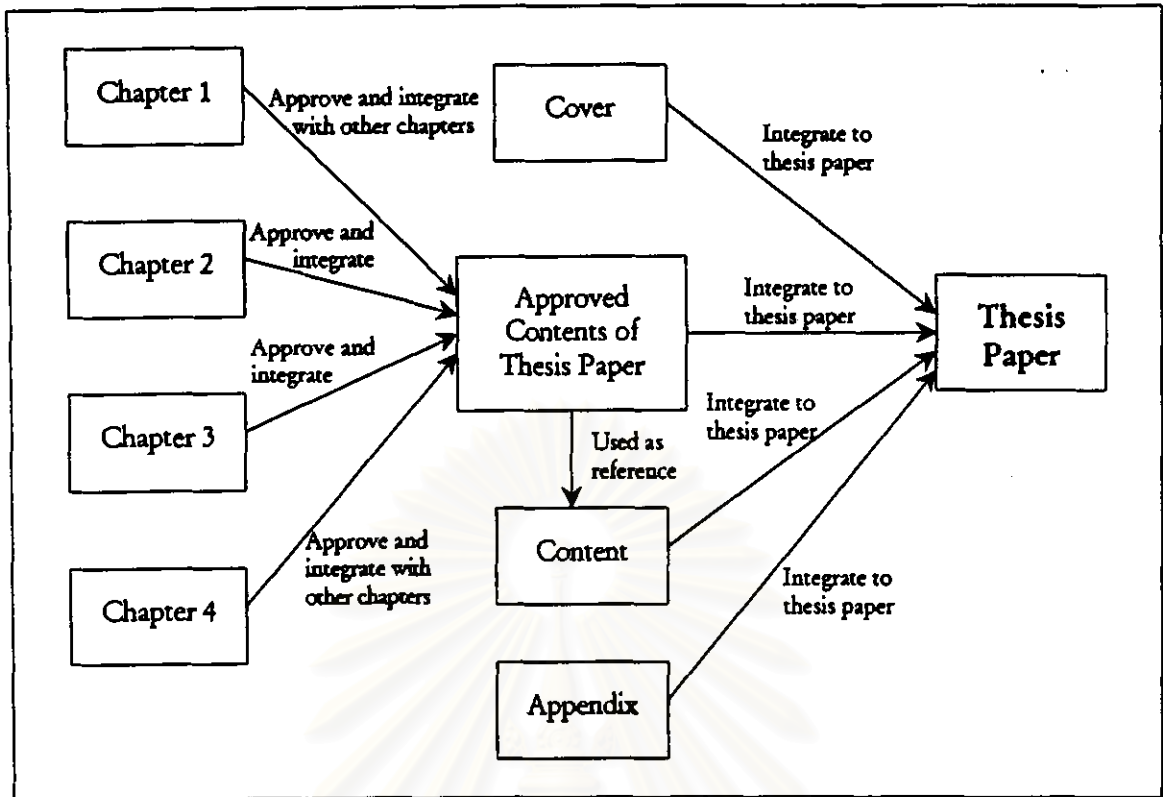
Figure 3.13: Product flow diagram of thesis-paper preparation project

The product flow diagram as shown in figure 3.13 is converted from the PBS of figure 3.12. Each arrow presented flow of product while the text attached with the arrow identify activity to transform one product to another product. For example, from figure 3.13, each chapter is sent to approved from advisor and then integrate with other chapters to gain the approved contents of thesis paper.

II. Change Control Technique

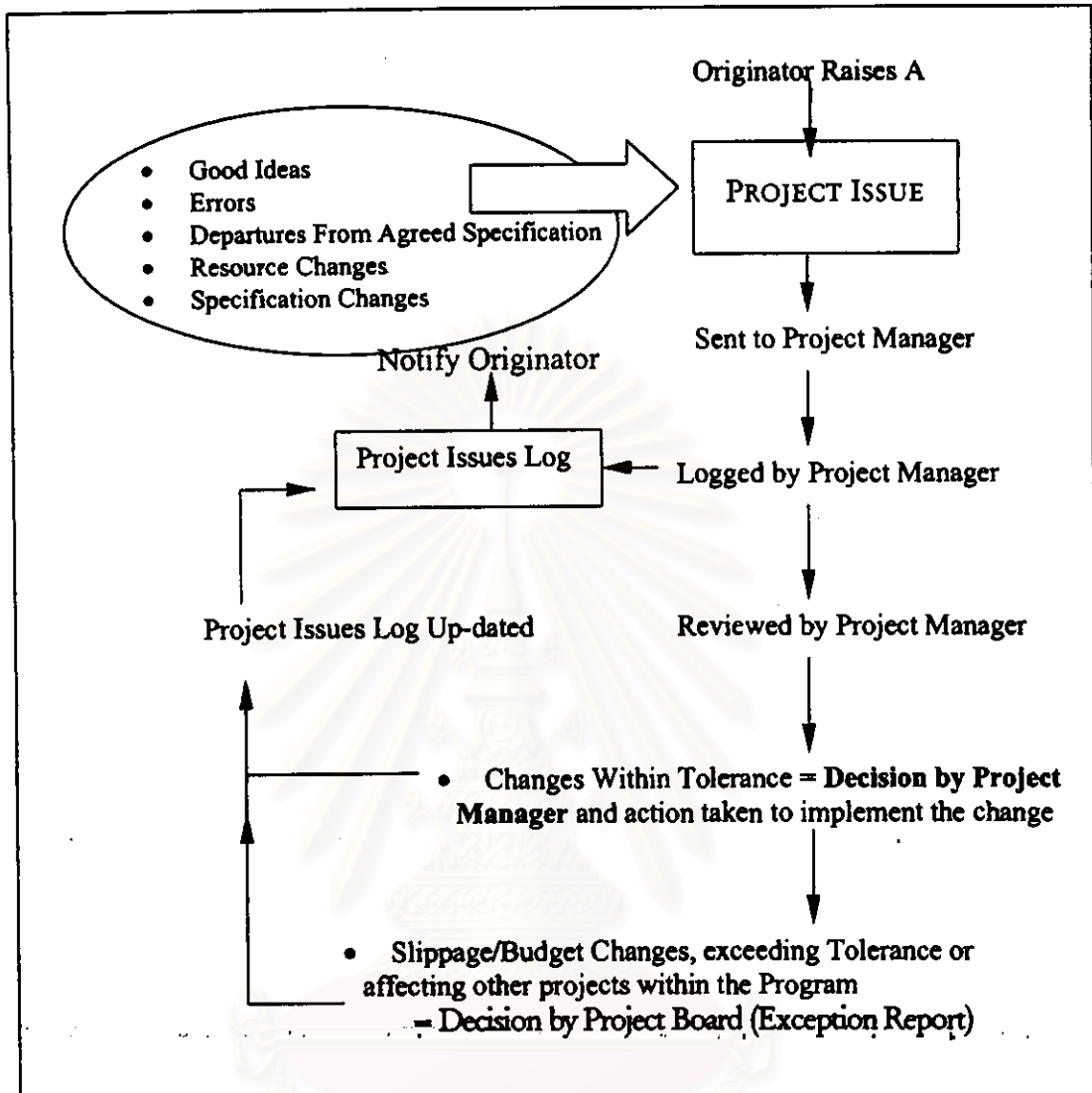Change control procedure is simply shown in the following diagram.

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Figure 3.14: Procedure for Controlling Changes (Bradley, 1997)

From figure 3.14, Project issues can be good ideas, errors, departures from agreed specification, resource changes and specification changes, moreover, it can be raised by anyone in the project. In applying controlling change technique, all project issues are routed to project manager. Then project issues are recorded to project issues Log and acknowledgement is sent back to originator. Project issues is initially prioritized and reviewed by the project manager. If change caused by project issue does not exceed tolerance and has no affect to other projects within the program then he can make decision and takes action to implement change. If not, decision is passed through project board and resolution is updated to project issued log before implementing change. Finally, change resolution either from project manager or project board is notified to the originator.

III. Project Filing Technique

During project is running, there are several documents and reports, which are produced through out the project especially, control report and updated plan which regularly increase over the time. Therefore, in successful project-related document so that all documents can be tracked and retrieved rapidly.

PRINCE2 divides project product into three categories which are management product, specialist product and quality product, so it is recommended to simplify the filing structure based on three different types of product:

- The management file
- The specialist file
- The quality file