1.   INTRODUCTION

1.1   CHARACTERISTICS OF A PROJECT

In general, a <u>project</u> is considered to be one having the following characteristics :-

(a)   it has to produce a set of <u>products</u> to meet the <u>business needs</u>;
(b)   it requires a corresponding set of <u>activities</u> to construct the required products;
(c)   it needs certain amount of <u>resources</u> to carry out the activities;
(d)   it has a <u>finite life-span</u>;
(e)   it runs under an <u>organisation structure</u> with properly defined responsibilities;
(f)   it is a <u>temporary structure</u>, created to achieve a specified business benefit or objective. When the work has been completed, the project is closed.

1.2   ITEMS TO BE MANAGED

Items needed to be managed in a project, in general, include :-

   (a)   Function;
   (b)   Time;
   (c)   Resource;
   (d)   Quality; and
   (e)   Risk.

These five items are usually inter-related and mutually affecting each other. For example, adding a new <u>function</u> to a project may cause it to take more <u>time</u> and <u>resource</u> to complete. It may also introduce additional <u>risk</u>, and affect the overall <u>quality</u>.

These factors have to be suitably balanced and optimised under a properly management project environment.

2. PRINCIPLES AND TECHNIQUES

2.1 ORGANIZATION

The PRINCE Organisation model for projects is based upon two main principles :-

(a)   that a project is a joint responsibility of **users** (the parties who actually use the products of the project), **supplier** (the product providers) and the **customer** (the organisation benefiting from the product); and

(b)   that the distinct nature of a "project", as opposite to normal line management activities, demands a special structure to manage throughout its whole life cycle.

Based on these principles, the model proposes five roles in the project organisation :-

(a)   overall project management and major decision making (by the Project Steering Committee (PSC));

(b)   day to day management (by the Project Manager (PM));

(c)   production of end-products (by the Team Manager (TM));

(d)   quality assurance of end-products (by the PSC or the Project Assurance personnel delegated by the PSC); and

(e)   support on the project (by some administrative or technical roles)

According to the requirements of each project, a role can be shared by more than one person, or two or more roles can be combined. The PRINCE project organisation can be used for projects of all sizes without building up a large management team.

The PRINCE project organisation is shown below[1]:

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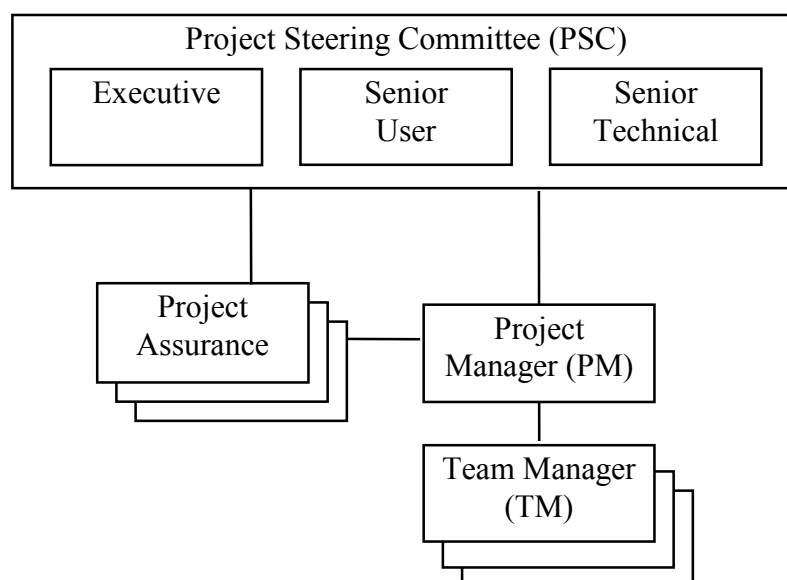
[1] Optionally, project support roles may be provided to support the project variously (by some administrative or technical roles).

2.1.1 Project Steering Committee (PSC)

It is usually for the head of an organisation to establish a PSC to control a project. PSC so appointed has the ultimate responsibility for the project and its members have the responsibilities such as to authorise the start and closure of the project; to assign roles of the PAT to individuals; and to meet at key decision points.

The PSC is not involved in the day-to-day management of the project as this responsibility is delegated to the PM. PSC authorises the project to proceed stage by stage. It meets at stage end to assess whether the project continues to satisfy the business case. If there is change in business case or there is overspending on time or resource that affect the continual viability of the business case, the PSC can decide re-direction or termination of the project.

PSC usually consists of three members each taking the following senior management responsibilities respectively :-

Executive   who represents the interest of the overall business of the customer; and provides overall departmental guidance and assessment throughout the project development cycle;

Senior User   who represents the users of the system (product); and

Senior Technical   who represents developer(s) or procurers, the resources which will deliver the technical products of the project.

A project is usually said to be carried out :-

* by the "Supplier";
* for the "User"; and
* for the ultimate benefits of the "Customer".

The 3 members of PSC, namely "Senior Technical", "Senior User", and "Executive", represents the interests of the above 3 parties respectively.

2.1.2 Project Manager (PM) and Team Manager (TM)

The PM, to whom all other team members report, is responsible for the timely production of all end-products to the agreed quality standards within the tolerances of time and cost set by the PSC.

The TM is not mandatory. The PM may find that it is beneficial to delegate the authority and responsibility to the TM (who may possess specialised skills and knowledge) for planning the creation of some (or all) products and managing the team(s) to produce those products. The TM agrees with the PM what work is to be done by the team, manages its performance, report and finally returns the completed products to the PM. For example, a contractor responsible for producing certain products can be assigned the role of TM.

2.1.3 Project Assurance

It is the PSC   responsibility to monitor all aspects of the project   performance and products independent of PM. This is the Project Assurance Function.

Areas to be assured depends on where the project risks rest, e.g.:-

- viability of the Business Case
- effectiveness and usability of the solution
- feasibility of technical solution
- compliance to organisational and business strategy
- security

Each PSC member is responsible for the areas of assurance that are related to his/her interest being represented. PSC can delegate the Project Assurance work to others who are independent of PM and the rest of the project team, according to the needs and desires of the PSC. While the PSC has the ultimate responsibility to assure the integrity of the project, the delegate has no executive authority. Each assurance responsibility may be shared by more than one individual covering part of or the entire the project. The delegation shall be planned at Project Initiation Stage to facilitate resources control. The delegate reports to the PSC member that delegates.

ITSD project team may suggest an organisational structure on project assurance for PSC to approve. The common structure consists of three roles: Business Assurance Coordinator (BAC), User Assurance Coordinator (UAC) and Technical Assurance Coordinator (TAC). The three roles represent the business, user and technical interest respectively.

2.2   PLANNING

2.2.1 Product Based Planning

Product Based Planning is a planning approach of PRINCE. It approaches the planning of projects from the viewpoint of the products required to be produced. It focuses the attention on the goal, thereby ensuring that any activities to be undertaken in the project are the necessary ones required for the production of the ultimate products.

By focusing on the goal rather than the means of getting there, all products required by the project can be identified and described before development of the products commences, ensuring that a common understanding exists between all interested parties.

There are four planning techniques associated with this Product Based Planning approach, namely :-

(a)   Product Breakdown Structures (PBS) to identify all products which are required to be produced by the project;
(b)   Product Flow Diagrams (PFD) to show the logical sequence for producing the products;
(c)   Product Descriptions to describe the purpose, components, derivation, quality criteria and quality checking method of the products; and
(d)   Product Transformations to identify the activities needed for the production of the required products and to show the dependencies of the activities.

A PM will use these techniques to prepare plans, which are to be monitored and controlled by PSC. More details about plans are provided in Section 6.2.3.

2.2.2 Staging

Breaking down a project into stages enables more effective management and control of project. The division to stages is based on the checkpoints on commitment to resources rather than technical activities. Some major benefits attributed to staging are quoted below :-

(a)   It provides senior management with the opportunity to make objective assessments of the progress to date by providing discrete packages of work which may be reviewed at the stage boundaries.

(b)   It facilitates control against the tendency for projects to have their own momentum and to proceed regardless of cost by enabling and encouraging a reappraisal of the business case at each of the stage boundaries.

(c)   Final detailed estimates produced immediately prior to the commencement of each stage enable more realistic estimating and monitoring.

(d)   Unless the project is broken into stages it is very difficult to monitor and control. Using a staged approach, monitoring can be carried out within, and at the end of, each stage.

A project must be broken down into stages which must be distinct, with minimal overlap, so that PSC can decide at the end of each stage whether or not the project should proceed. The management requirements of each stage are clear definitions of :-

(a)   the start and finish dates;
(b)   the end-products to be produced; and
(c)   all of the resources needed to produce the end-products.

The number of stages for a project is a PSC decision reflecting the level of management time to be spent to maintain control. The decision of setting stage breaks should be made in consideration of the following factors :-

(a)   Upon the completion of major end-products (any stage boundary should not divide a major end-product);

(b)   Where decisions have to be made about the ongoing viability of the project; and

(c)   At parts of the project which are the most critical, where visible tight control is necessary.

2.2.3 Plans

Plans provide information that is a basis for decision making and controlling. PRINCE provides a structured set of technical and resource plans to achieve effective technical and managerial control of a project. There are two levels of plan that are of interest to PSC, namely the Project level and Stage level.

There are, in turn, two types of plans, namely the Technical Plans and Resource Plans.

Project Level

Plans at project level provide necessary information for the PSC to oversee the project and are used by them to progressively monitor the continuing viability of the project.

The Project Plans will identify the major activities and end-products, the major resource requirements, and the total costs. They should also identify the major control points within the project such as the stage boundaries. At end of each stage, Project Plans should be updated with actual figures and be assessed by the PSC with respect to the continual viability of the business case.

Stage Level

Plan at stage level should detail work to be carried out during that stage by the involved parties. Stage Plans will identify, for a particular stage, the activities, end-products, the resource required and the costs. Since Stage Plans are prepared just before the start of a stage, they can show the stage activities in more details and can provide more realistic estimates.

Technical Plans

Technical Plans (typically in the form of a bar chart) are used to identify the sequence of events, to define timescales and to assign responsibilities for producing end-products.

A Project Technical Plan is mandatory for all project and should identify the major control points within the project such as the stage boundaries.

A Stage Technical Plan is prepared for each stage of the project and shows all products and technical activities within the stage in greater details than the Project Technical Plan.

Resource Plan

Resource Plan is used to identify the type, amount and period of use of the various resources required during the life of the project. A Project Resource Plan is mandatory for all projects. Stage Resource Plan is not required as its information has been included in the Project Resource Plan.

2.3   CONTROL

2.3.1 Management By Exception

A major Control Principle advocated in PRINCE is "Management by Exception". The PSC exercises control on project by Exception. During a project stage, the PSC delegates the day-to-day project management responsibilities to the PM. At the same time, it allocates to the PM time and resources tolerances for running the project.

If the project has exceeded or is anticipated to exceed the tolerances, the PM should report the problem and recommend recovery action to the PSC. However, if the planned time/resource has been exceeded but the excess is within tolerance, the PSC needs not be involved.

By means of this control mechanism, time and effort required for PSC members can be kept to the minimum, yet they can maintain the overall control of the project.

Setting Tolerance

To support the Management by Exception Principle, the technique of " Tolerance Setting" is employed in PRINCE. The amount of Tolerance allotted on any one stage should be assessed by the PSC in the light of the plans for that stage, the degree of risk associated with those plans, the criticality of that stage to the successful completion of the project, and the experience of the PM. The PSC should not be tempted to set a zero tolerance or an infinite tolerance.

2.3.2 Quality Control

Another major Control Principle advocated in PRINCE is concerning the Control on Quality. It is considered in the PRINCE methodology, that control on the production of product to be on time and within budget is not enough, and that the quality of the product should also be controlled. Quality issues must be addressed as part of the planning process in order to ensure that end-products are of the desired quality.

Quality Plan is expected to be included in the Project Initiation Document for outlining the overall Quality Expectation and Control of the project at the outset. Quality Criteria and Quality Checking Method are expected to be contained in the Product Description of major products for setting the quality standards and quality control method at the detail level.

Quality Review

Quality review is a quality control technique applied to support the Quality Control Principles. The Product Description containing the Quality Criteria and Quality Checking Method is input together with the product to the review process. In the review, the Quality Checking Method will be applied to the product, and the Quality Criteria will be the base for reference. The review can be regarded as looking for positive evidence that the product meets its specification and quality criteria. It provides evidence of a firm basis for the users to accept the product.

2.3.3 Control Meetings

Project control in PRINCE is carried out at two levels:

(a)   by the PSC at formal assessment meetings; and
(b)   by the PM at Checkpoint meetings/reviews.

In order to make optimum use of management time, these meetings should be carefully planned, well structured and only held when there is good reason for doing so.

<u>PSC Meetings</u>

These are not time driven progress meetings, but event driven ones. The information necessary for decision taking is circulated well in advance and the chairman ensures that discussion is confined to the real management issues. The key meeting types are

- Project Initiation Meeting;
- End-Stage Assessment; and
- Project Closure Meeting.

The Project Initiation Meeting will formally initiate the project and give guidance and direction on the overall management of the project.

The End-Stage Assessment (ESA) is a PSC meeting/review held at end of each project stage. In an ESA, the PSC will consider the acceptance of products produced in the current stage, confirm the completion of the stage. It will also review the next stage plan and the overall status of the project and of the business case to decide whether further investment is justified. If the project is to continue, the PSC will then approve the next stage plan and set the tolerance for the next stage.

The Project Closure Meeting is the final meeting of the PSC at which they review the Project Closure Report, confirm the acceptance of the delivered system, formally announce the completion of the project, and schedule the Post-Implementation Review.

<u>Checkpoint Review</u>

These are regular time driven reviews held by the PM, TM and team members to identify any problems and react as necessary. The review is a periodic technical and management control point.

2.3.4 Management of Risk

Every aspect of a project exposes to risks. The management of risk is one of the most important parts of the PSC's and Project Manager's jobs. Although the cost of managing risk may appear significant, the cost of not managing risk effectively can be many times greater. The Project Manager has the responsibility to ensure that risks are identified, recorded and regularly reviewed. The PSC has two responsibilities:

- To notify the Project Manager of any external risk exposure to the project
- To make decisions on the Project Manager's recommended reactions to risk.

The obvious times for risk assessment and management are the Project initiation and every end stage assessment. In PRINCE, a Risk Log is used by the PM to record and keep track of identified risks.

2.3.5 Software Configuration Management

The objective of Software Configuration Management (SCM) is to achieve a controlled and traceable product evolution. SCM involves identifying the configuration on the software at given points in time, systematically controlling changes to the configuration, and maintaining the integrity and traceability of the configuration throughout the software life cycle.

The PSC is responsible for overseeing all SCM activities. It endorses the SCM Plan prepared at the beginning of the development or maintenance phase. It also grants the PM the authority to handle Change Requests that can be accommodated within the tolerance given to the PM. If the impact of the changes exceeds the tolerance, the PSC should make the decision whether to authorise the changes.

3.   PROJECT ACTIVITIES

This section describes major project management activities that would take place in a project. The activities are described in the following sequence :-

- Project Initiation;
- Project Stage(s); and
- Project Closure.

3.1   PROJECT INITIATION

The senior management of the user department is responsible to initiate the project and to appoint the appropriate personnel to participate in the PSC.

3.1.1 Project Initiation Meeting

The first meeting of the PSC is the Project Initiation Meeting where the project is formally initiated according to the Terms of Reference set by the senior management. At this meeting, the PSC will review and agree the Terms of Reference, establish the project organisation, commission the production of Project Initiation Document.

3.1.2 Project Initiation Document (PID)

The end-product of the Initiation Stage should be a Project Initiation Document containing:-

- a definition of the project (addressing "WHAT" the project is to cover);
- the business case for the project (describing "WHY" the project is needed);
- a project organisation with defined responsibility for the members of the PSC, any Project Assurance personnel delegated by the PSC, and the PM (telling "WHO" will be involved in the management of the project);
- a Project Plan, with proper staging, and a Stage Plan for the next stage (stating "WHEN" the respective project activities are to be done); and
- control mechanism of the project (addressing "HOW" the project is to be monitored and controlled).

The PSC is expected to approve the content of the Project Initiation Document before any further work on the project is undertaken.

3.2   PROJECT STAGES

During project stage, the day-to-day project management responsibility is delegated by the PSC to the PM. The PM makes use of "Checkpoint Reviews" to monitor and control the project progress, and "Highlight Reports" to report the project progress to the PSC. Normally, the PSC will only be involved at end of a project stage, when the "End-Stage Assessment" will be held to assess the continual viability of the project. These management control activities are described in further details in the following sections :-

3.2.1 Checkpoint Review

The PM requires each TM to feed back progress details via Checkpoint Reviews, where the progress of product delivery and resources (i.e. manpower and money) usage will be reviewed. Based on the progress information, the PM will assess whether the tolerance will be exceeded and adjust the plan if necessary. The frequency of the review is decided by the PM, and is usually tied to the need to provide the PSC with Highlight Reports. During the review, the TM will also discuss with the PM concerns, problems and what is to be achieved in the next period.

The review usually takes the form of a meeting. If considered appropriate (e.g. having close contact between the TM and the PM, etc.), it may take other forms, e.g. email, letter, telephone conversation, etc.

3.2.2 Highlight Reports

At frequent intervals (usually monthly), the PM prepares a Highlight Report for the PSC identifying work achieved, problems encountered, and outlook for the next reporting period. This report is for the information of PSC only. It is not meant to be used to call for action or decision from the PSC. Should a major exception occur and the decision from PSC is needed, the PM is expected to call for a PSC meeting.

3.2.3 End-Stage Assessments (ESA)

The ESA is a mandatory management control which occurs at the end of each stage. At ESA, the PSC assesses the products produced in the stage and considers whether the stage is satisfactorily complete. If the PSC agrees that the stage is acceptably complete, it then reviews the next stage plans, the overall status of the project as well as the business case to decide whether further investment is justified. If the project is to continue, it then approves the plans for the next stage and sets the tolerances for the next stage.

The meeting is expected to focus on management issues and should not involve long discussions about technical or minor issues.

3.3 PROJECT CLOSURE

The Project Closure Meeting is the final meeting of the PSC at which they review the Project Evaluation Report and agree the completion and closure of the project. The meeting addresses what needs to be handed over from the project to those who will be using, running and maintaining the system in the future; receives the project evaluation report which reviews the conduct of the project and highlights the lessons learnt; arranges for the post implementation review to be held at appropriate time; and formally closes the project. This meeting may well form part of the ESA for the last stage.

- End -