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WORK BREAKDOWN STRUCTURE (WBS)

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Introduction

A work breakdown structure permits summing of subordinate costs for tasks, materials, etc., into their successively higher level "parent" tasks, materials, etc. For each element of the work breakdown structure, a description of the task to be performed is generated. This technique (sometimes called a system breakdown structure) is used to define and organize the total scope of a project.

A work-breakdown structure (WBS) in project management and systems engineering, is a deliverable-oriented breakdown of a project into smaller components. A work breakdown structure is a key project deliverable that organizes the team's work into manageable sections. The Project Management Body of Knowledge (PMBOK 5) defines the work-breakdown structure "A hierarchical decomposition of the total scope of work to be carried out by the project team to accomplish the project objectives and create the required deliverables."

A work-breakdown structure element may be a product, data, service, or any combination thereof. A WBS also provides the necessary framework for detailed cost estimating and control along with providing guidance for schedule development and control.

Example of work breakdown structure applied in a NASA reporting structure. The work breakdown structure provides a common framework for the natural development of the overall planning and control of a contract and is the basis for dividing work into definable increments from which the statement of work can be developed and technical, schedule, cost, and labor hour reporting can be established.

The development of the WBS normally occurs at the start of a project and precedes detailed project and task planning.

The WBS is organized around the primary products of the project (or planned outcomes) instead of the work needed to produce the products

(planned actions). Since the planned outcomes are the desired ends of the project, they form a relatively stable set of categories in which the costs of the planned actions needed to achieve them can be collected. A well-designed WBS makes it easy to assign each project activity to one and only one terminal element of the WBS. In addition to its function in cost accounting, the WBS also helps map requirements from one level of system specification to another, for example, a cross reference matrix mapping functional requirements to high level or low-level design documents. The WBS may be displayed horizontally in outline form, or vertically as a tree structure (like an organization chart).

WBS is a hierarchical and incremental decomposition of the project into phases, deliverables and work packages. It is a tree structure, which shows a subdivision of effort required to achieve an objective; for example, a program, project, and contract. In a project or contract, the WBS is developed by starting with the end objective and successively subdividing it into manageable components in terms of size, duration, and responsibility (e.g., systems, subsystems, components, tasks, subtasks, and work packages) which include all steps necessary to achieve the objective.

Methodology

What is Work Breakdown Structure?

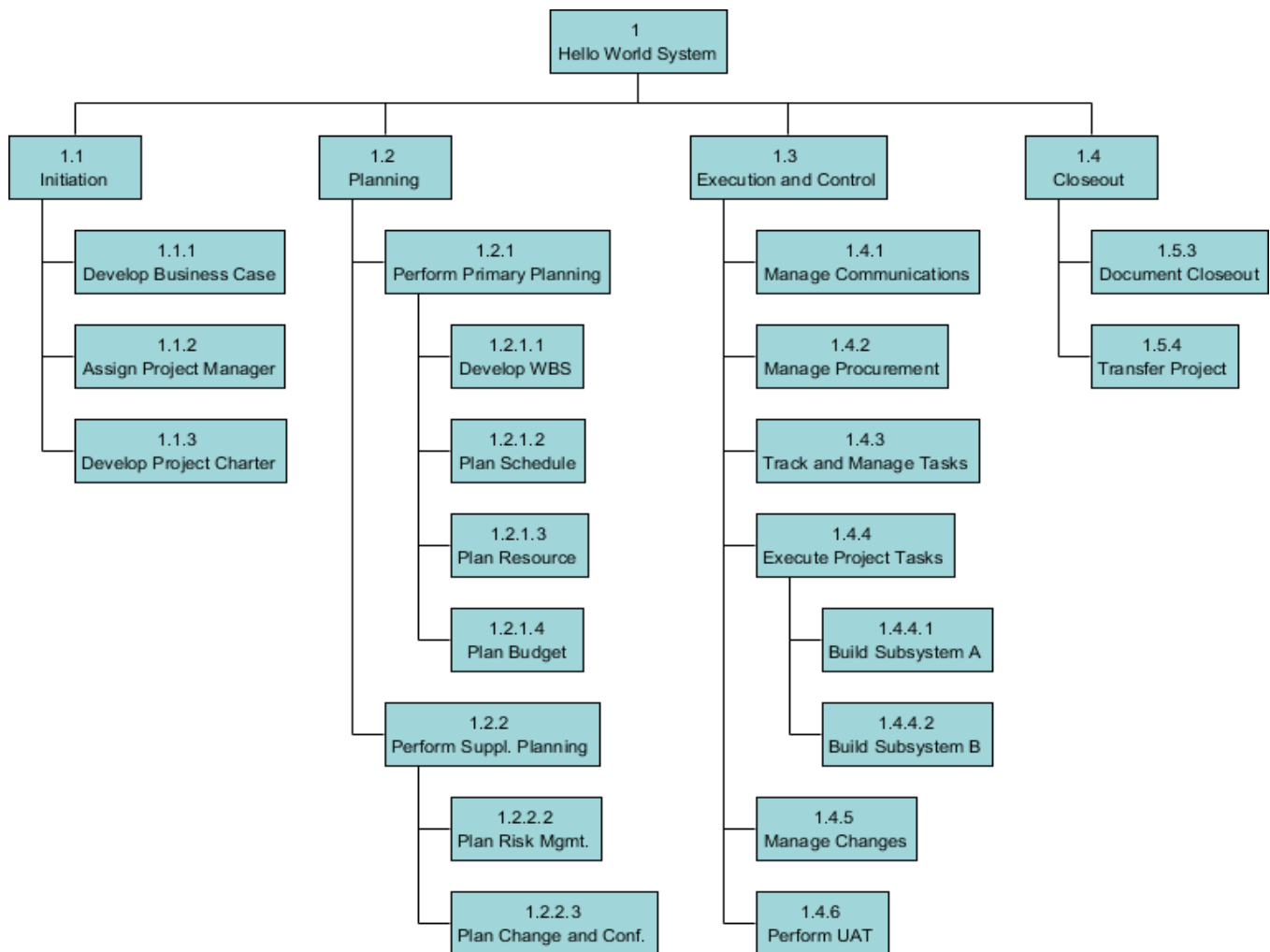
A Work Breakdown Structure (WBS) is a deliverable-oriented hierarchical decomposition of the work to be executed by the project team to accomplish the project objectives and create the required deliverables. A WBS is the cornerstone of effective project planning, execution, controlling, monitoring, and reporting. All the work contained within the WBS is to be identified, estimated, scheduled, and budgeted.

Company owners and project managers use the Work Breakdown Structure (WBS) to make complex projects more manageable. The WBS is designed to help break down a project into manageable chunks that can be effectively estimated and supervised. This article will give a few work breakdown structure examples and will give you an overview of how WBS can help in project planning.

Work Breakdown Structure Diagram

The Work Breakdown Structure (WBS) is developed to establish a common understanding of project scope. It is a hierarchical description of the work that must be done to complete the deliverables of a project. Each descending level in the WBS represents an increasingly detailed description of the project deliverables.

The first two levels of the WBS (the root node and Level 2) define a set of planned outcomes that collectively and exclusively represent 100% of the project scope. At each subsequent level, the children of a parent node collectively and exclusively represent 100% of the scope of their parent node. Here is a Work Breakdown Structure example:



Quality of a Work Breakdown Structures

A well-designed WBS describes planned outcomes instead of planned actions. Outcomes are the desired ends of the project, such as a product, result, or service, and can be predicted accurately. Actions, on the other hand, may be difficult to predict accurately. A well-designed WBS makes it easy to assign elements of the WBS to any project activity. A good WBS should exhibit the following characteristics:

- **Definable:** can be described and easily understood by project participants.
- **Manageable:** a meaningful unit of work where specific responsibility and authority can be assigned to a responsible individual.
- **Estimateable:** duration can be estimated in time required to complete, and cost can be estimated in resources required to complete.

- Independent: minimum interface with or dependence on other ongoing elements (i.e., assignable to a single control account, and clearly distinguishable from other work packages).
- Integratable: integrates with other project work elements and with higher level cost estimates and schedules to include the entire project.
- Measurable: can be used to measure progress; has start and completion dates and measurable interim milestones.
- Adaptable: sufficiently flexible so the addition/elimination of work scope can be readily accommodated in the WBS framework.

Guidelines for Developing Work Breakdown Structure

The development of Work Breakdown Structure involves subdividing the major project activities or sub-activities into smaller, more manageable activities until the activities are defined in sufficient detail to support the management and development of project works. The items at the lowest level of a branch are known as work packages. Here are some tips in developing a Work Breakdown Structure that can express works effectively:

1. Always express Work Breakdown Structure activities at the lowest levels of granularity in verb form.
2. Review the Work Breakdown Structure. Make sure all deliverables have been fully covered by the works defined in the Work Breakdown Structure.
3. Ensure that testing and training have been taken into account.
4. Ensure that non-IT work packages are also included such as, documentation and review activities are included in the structure.
5. Ensure that other supporting activities such as, product/service launch and implementation activities are planned.
6. Ensure that delivery approval cycles are taken into account.
7. Include project management deliverables on the project as well (e.g. production of Project Plan). Include any deliverables that must be met or delivered by the customer or any external parties.

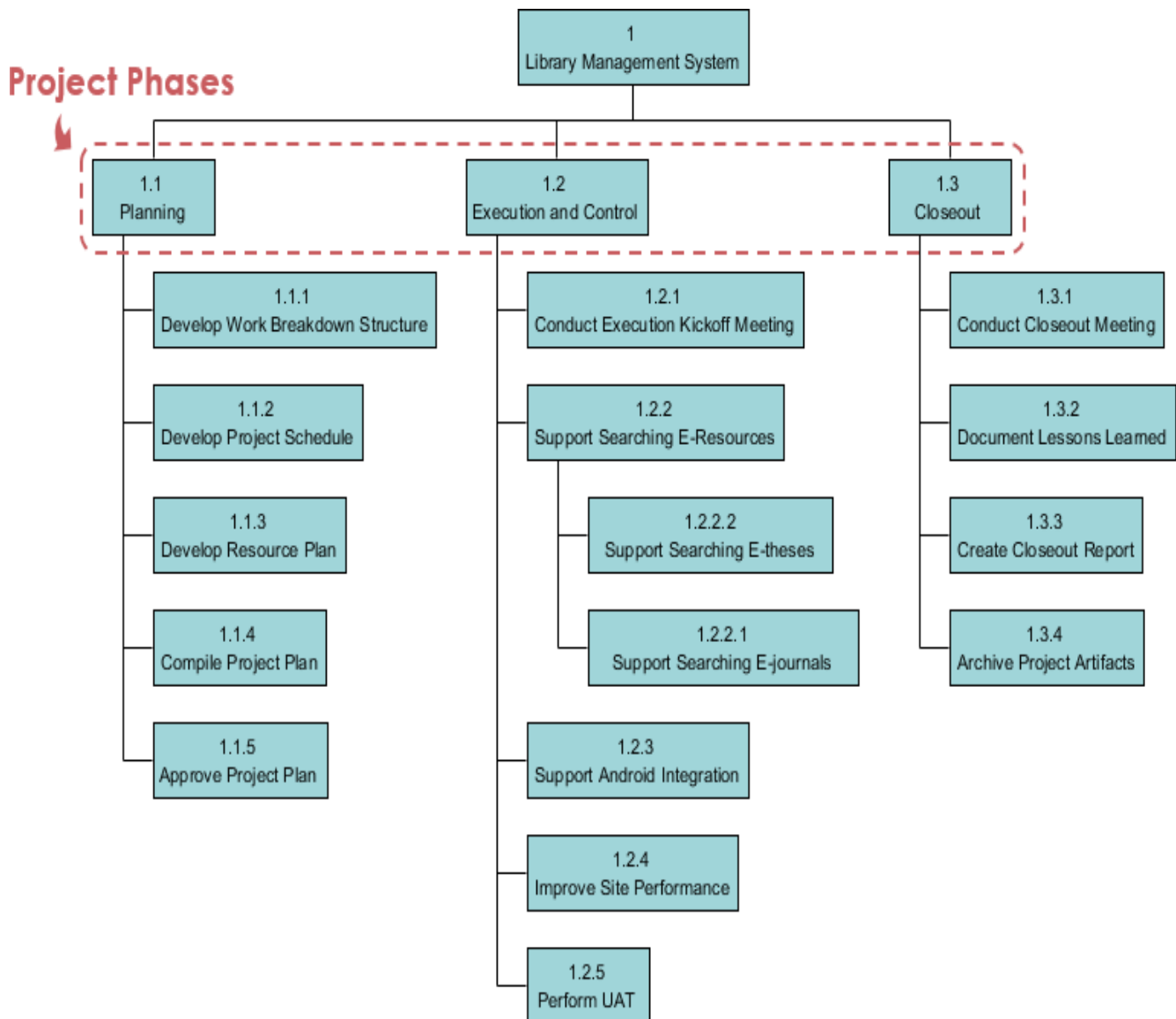
Check the Work Breakdown Structure against the project approach specified in Project Charter for any activities that needs to be included in the Work Breakdown Structure.

Different Forms of Work Breakdown Structure

Generally speaking, there are three typical ways in structuring works with a Work Breakdown Structure (WBS). They include phase-based structures, deliverable-based structures and responsibility-based structures.

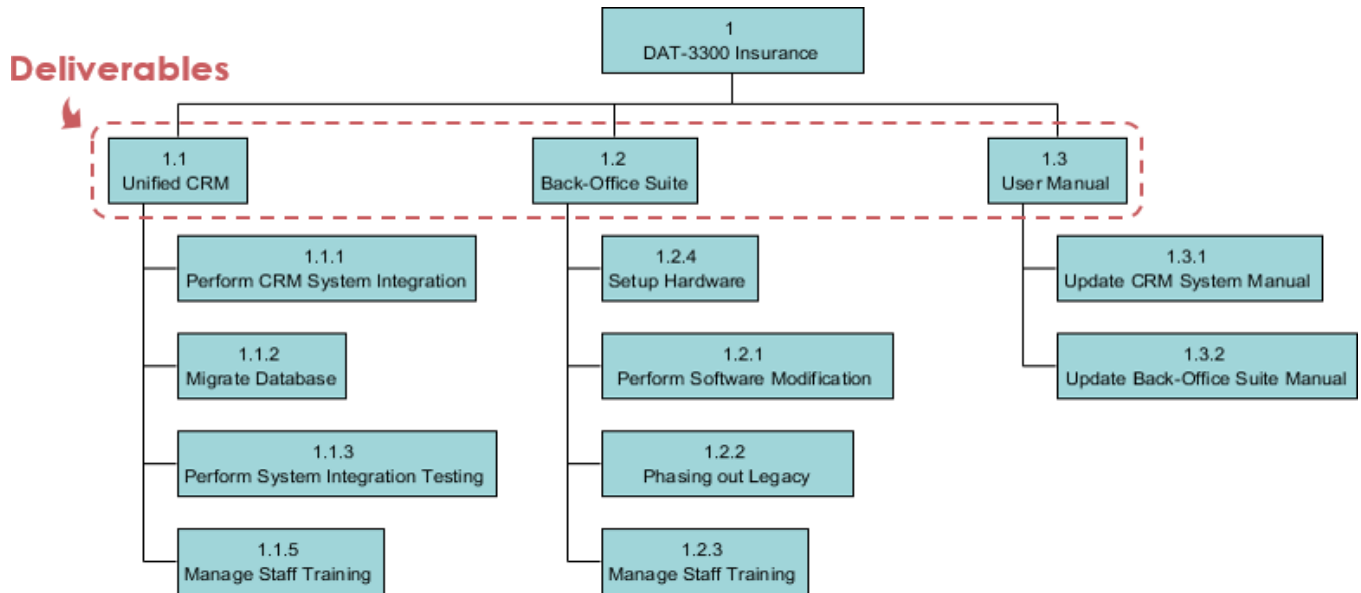
- **Phase-based structures**

Define and structure project activities based on the project phases.



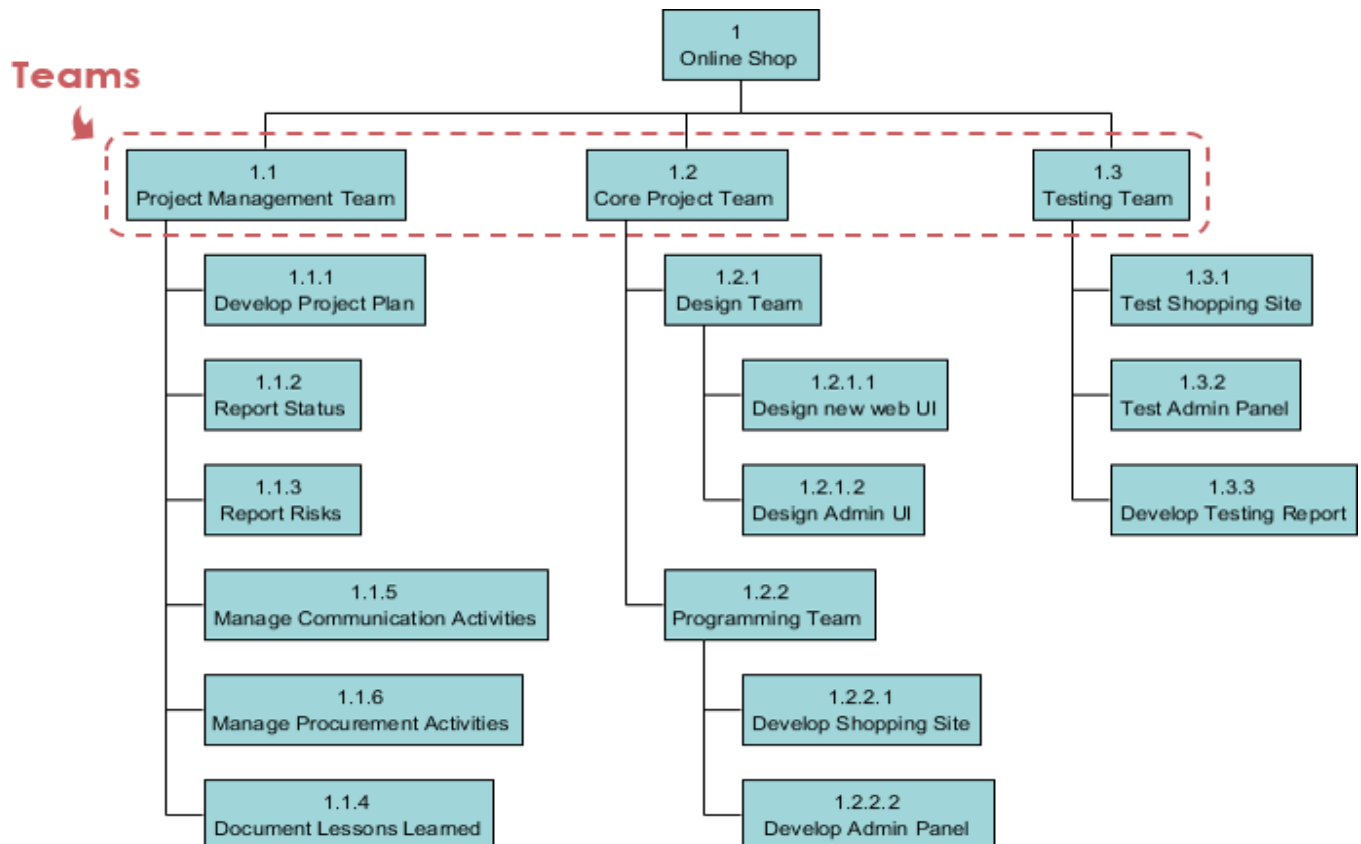
- **Deliverable-based structures**

Define and structure project activities based on the deliverables agreed to deliver.



- **Responsibility-based structure**

Define and structure project activities based on the organization units that will work on the project.



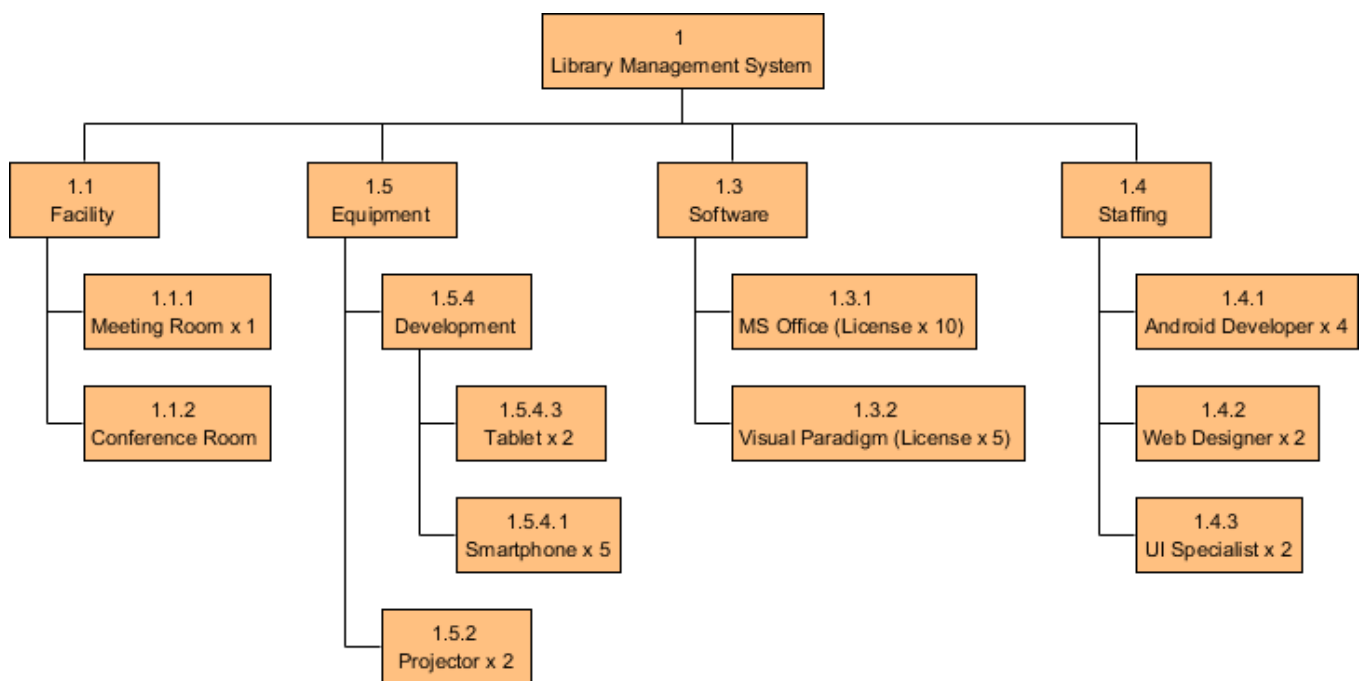
Other Use Cases of Breakdown Structure

Typical use of breakdown structure as a project management tool includes Work Breakdown Structure (WBS), Resource Breakdown Structure, Risk Breakdown Structure and Organization Breakdown Structure (OBS), or sometimes known as Organization Chart.

- **Resource Breakdown Structure**

Resource Breakdown Structure (RBS) is a project management tool that provides a hierarchical decomposition of resources, either structured by resource category, types or by IT/business function that has resource needs.

Here is a Resource Breakdown Structure example:



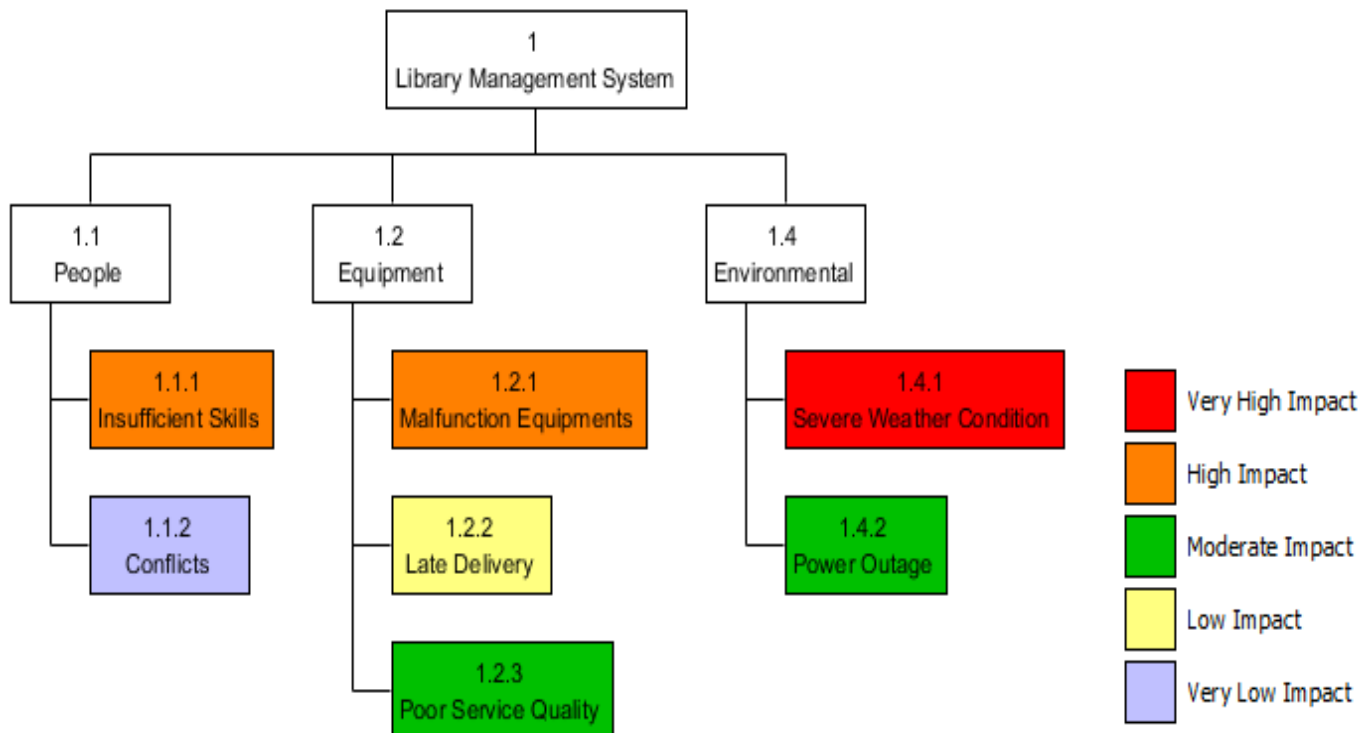
• Risk Breakdown Structure

Risks are everything in any IT project. The existence of risk causes negative impact on project schedule, costs and quality. In project management, Project Manager is responsible for managing risks and to ensure that the project will be delivered on time, within project and up to the standard user expected. One of the popular risk management tool is the Risk Breakdown Structure.

Risk breakdown Structure is the hierarchical decomposition of risks, starting from the root node element that represents the project, and going down to the various risk categories, and then finer level risks.

Besides presenting project risks in a Risk Breakdown Structure, it is possible to combine the use of Color Legend in representing the impact of risk. Take a look at the Risk Breakdown Structure example below, a legend of Impact with five items has been setup, representing the five levels of impacts that risks may have on the project with five distinct color codes.

Here is a Risk Breakdown Structure example:



Organizational Breakdown Structure

Organizational Breakdown Structure, or sometimes known as Organization Chart, is a widely used project management tool for representing project organization. It typically begins with the project sponsor, and with all key stakeholders included. In presenting the organization structure, consider the organization or group that is requesting the project and the level of their sponsorship and authority.

Here is an Organizational Breakdown Structure example:

