

Project and Scope Planning

Topics of the Lecture

- Knowledge areas in PMBOK
- Project planning preconditions
- Project managers activities before project planning
- Project planning processes in PMBOK
- Overview of project success definition and factors

Knowledge Areas in PMBOK

PMBOK knowledge areas and their management processes in process groups are presented in the next table:

Table 1. PMBOK Knowledge Areas and Their Management Processes

Process Groups Knowledge Area	Initiating	Planning	Executing	Monitoring and Controlling	Closing
4. Project Integration Management	4.1 Develop Project Charter	4.2 Develop Project Management Plan	4.3 Direct and Manage Project Execution	4.4 Monitor and Control Project Work 4.5 Perform Integrated Change Control	4.6 Close Project or Phase
5. Project Scope Management		5.1 Collect Requirements 5.2 Define Scope 5.3 Create WBS		5.4 Verify Scope 5.5 Control Scope	
6. Project Time Management		6.1 Define Activities 6.2 Sequence Activities 6.3 Estimate Activity Resources 6.4 Estimate Activity Durations 6.5 Develop Schedule		6.6 Control Schedule	
7. Project Cost Management		7.1 Estimate Costs 7.2 Determine Budget		7.3 Control Costs	
8. Project Quality Management		8.1 Plan Quality	8.2 Perform Quality Assurance	8.3 Perform Quality Control	
9. Project Human Resource Management		9.1 Develop Human Resource Plan	9.2 Acquire Project Team 9.3 Develop Project Team 9.4 Manage Project Team		
10. Project Communications Management	10.1 Identify Stakeholders	10.2 Plan Communications	10.3 Distribute Information 10.4 Manage Stakeholder Expectations	10.5 Report Performance	
11. Project Risk Management		11.1 Plan Risk Management 11.2 Identify Risks 11.3 Perform Qualitative Risk Analysis 11.4 Perform Quantitative Risk Analysis 11.5 Plan Risk Responses		11.6 Monitor and Control Risks	
12. Project Procurement Management		12.1 Plan Procurements	12.2 Conduct Procurements	12.3 Administer Procurements	12.4 Close Procurements

Notes

Click on steps to see PMBOK v4 to Agile Mapping Notes

Project Planning Preconditions

To start with project planning following preconditions should be met:

- Project sponsor is determined and to the project and its manager available;
- Project manager is assigned to its role;
- Business needs, current understanding of the customer's needs and the new product, service, or result that is intended to satisfy are documented in project charter or in some other corresponding document;
- Project charter is signed – project is formally authorized;
- Project management team (or steering committee) may be assigned. The members of the project team who are directly involved in project management activities.

Preparation of Project Planning

Preparation of project planning consists of choosing and assigning of project (management) team and holding of project kick-off meeting. Objectives of this meeting are as follows:

- to allow project manager to introduce team members,
- to discuss the project overview,
- to discuss project roles and responsibilities,
- to review any documentation created or collected to date
- to identify any training needs

Project Planning Nature and Context

Project planning is in its nature definition of project work and its arrangement (performance/business). In the context of information system change is project planning organizing of change processes and their control. Project planning location in project life cycle illustrates the following figure:



Figure 1. Project Planning Context

Project planning is not one-time action, done in the in the beginning of the project, but it is periodically performed through the entire project. Assuming that project timeline is

divided by milestones and phases between them, then in any time when remained project work must be planned 3 things must be done:

- refine validity of commitments agreed in project charter or corresponding document (this activity belongs to project initiation process preceding planning process);
- refine general framework (or roadmap) of remaining project work (major milestones to product owner and how to reach them);
- arrange work of following time period (phase, iteration, spring) taking into consideration the nearest major milestone to product owner).

Project Planning Processes in PMBOK

Are divided in 2 parts:

- developing the project management plan
- planning processes of concrete aspects (objects, areas) of the project

These processes are required to:

- establish the total scope of the effort,
- define and refine the objectives, and
- develop the course of action required to attain the objectives that the project was undertaken to achieve

The planning processes develop the project management plan and the project documents that will be used to carry out the project. The multi-dimensional nature of project management creates repeated feedback loops for additional analysis – so called „rolling wave planning” indicating that planning and documentation are iterative and ongoing processes.

Planning processes inputs and outputs are presented on the next figure:

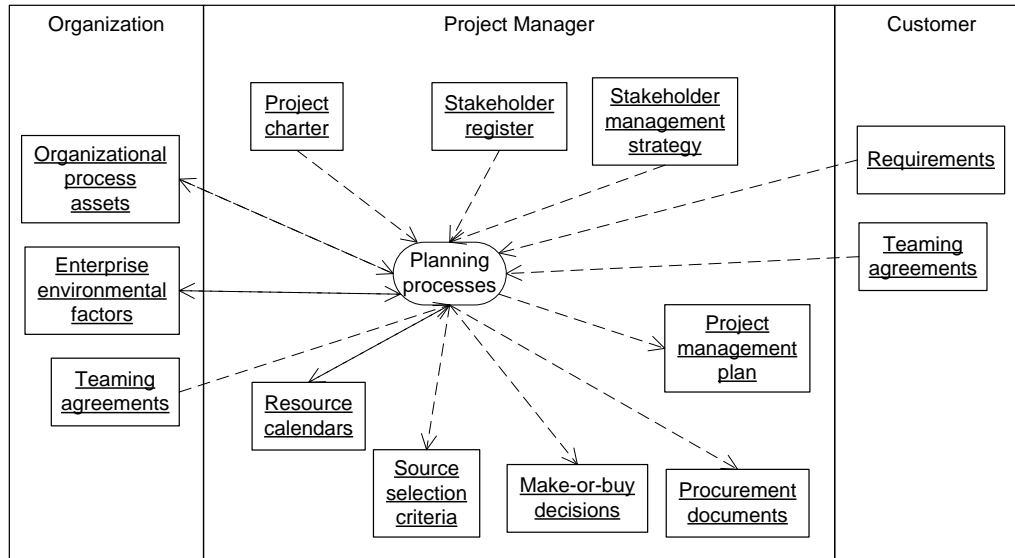


Figure 2. Planning Processes Inputs and Outputs

Planning processes consist of aspect planning processes and their outputs integration process named “develop project management plan”. The output from latter process is the project management plan consisting of different project aspects management plans integrating all aspect management plans into one whole. These plans are presented on the next figure:

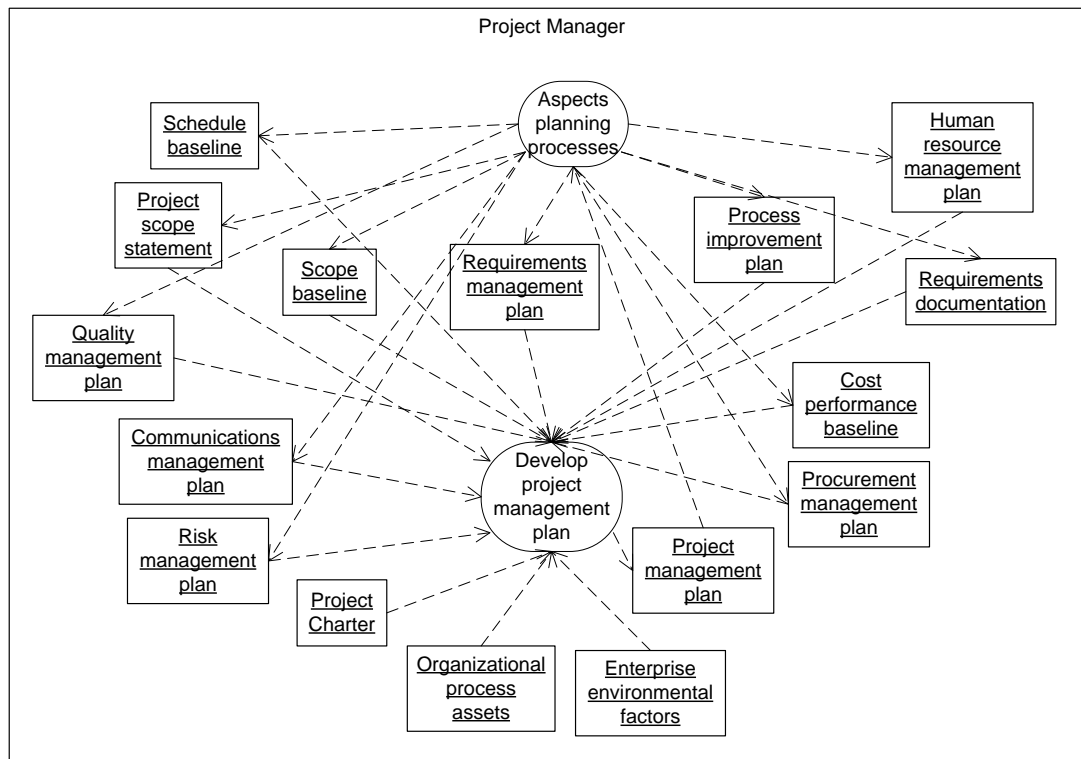


Figure 3. Project Aspects Management Plans

Aspects planning processes and their relationships are presented on the following figure representing logical sequence:

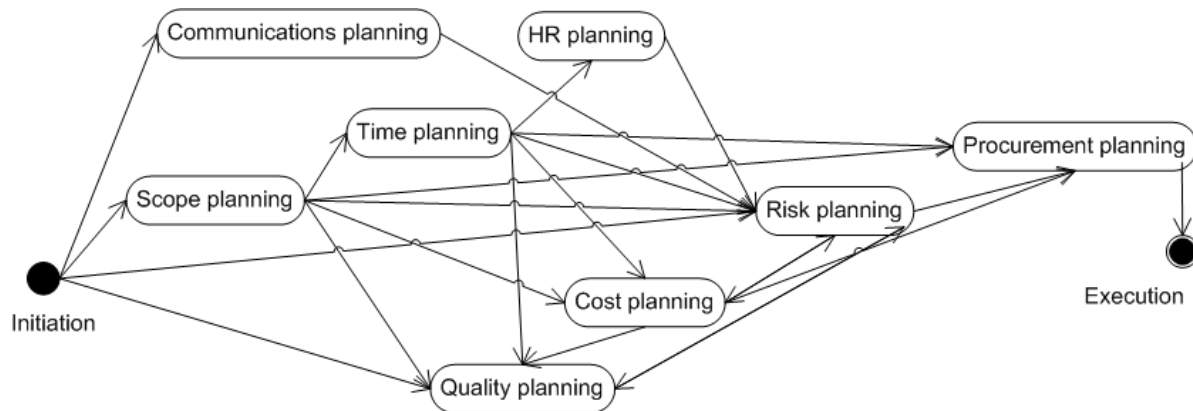


Figure 4. Planning Processes and Their Relationships

Develop Project Management Plan

It is the process of documenting the actions necessary to define, prepare, integrate, and coordinate all subsidiary plans. The project management plan becomes the primary source of information for how the project will be planned, executed, monitored and controlled, and closed. Inputs for project management plan developing process are:

- project charter
- outputs from planning processes
- enterprise environmental factors
- organizational process assets

Corresponding enterprise environmental factors are:

- Configuration management system; information collection and distribution system
- Organizational structure and culture
- Existing facilities
- Personnel administration (hiring and firing guidelines etc)

Corresponding organizational process assets are:

- Standardized guidelines, work instructions, proposal evaluation criteria, and performance measurement criteria,
- Project management plan template — elements of the project management plan that may be updated include, but are not limited to:
 - guidelines and criteria for tailoring the organization's set of standard processes to satisfy the specific needs of the project, and

- project closure guidelines or requirements like the product validation and acceptance criteria,
- Change control procedures including the steps
 - by which official company standards, policies, plans, and procedures, or any project documents will be modified and
 - how any changes will be approved and validated,
- Project files from past projects
 - (e.g., scope, cost, schedule and performance measurement baselines, project calendars, project schedule network diagrams, risk registers, planned response actions, and defined risk impact),
- Historical information and lessons learned knowledge base
- Configuration management knowledge base containing
 - the versions and baselines of all official company standards, policies, procedures, and any project documents.

Project Management Plan

Project management plan integrates and consolidates all of the subsidiary management plans and baselines from the planning processes and includes but is not limited to:

- The life cycle selected for the project and the processes that will be applied to each phase
- Results of the tailoring by the project management team
- How work will be executed to accomplish the project objectives
- A change management plan that documents how changes will be monitored and controlled,
- A configuration management plan that documents how configuration management will be performed,
- How integrity of the performance measurement baselines will be maintained,
- Need and techniques for communication among stakeholders,
- Key management reviews for content, extent, and timing to facilitate addressing open issues and pending decisions

Results of the tailoring by the project management team are as follows:

- Project management processes selected by the project management team
- Level of implementation of each selected process
- Descriptions of the tools and techniques to be used for accomplishing those processes
- How the selected processes will be used to manage the specific project, including the dependencies and interactions among those processes and the essential inputs and outputs

Project baselines include, but are not limited to:

- Schedule baseline
- Cost performance baseline
- Scope baseline

Often the scope, schedule, and cost baseline will be combined into a performance measurement baseline that is used as an overall project baseline against which integrated performance can be measured. The performance measurement baseline is used for earned value measurements.

Project subsidiary plans and documents are presented in the next table:

Table 2. Project Subsidiary Plans and Documents

Project Management Plan	Project Documents	
Change management plan	Activity attributes	Quality metrics
Communications management plan	Activity cost estimates	Responsibility assignment matrix
Configuration management plan	Activity list	Requirements traceability matrix
Cost management plan	Assumption log	Resource breakdown structure
Cost performance baseline	Basis of estimates	Resource calendars
Human resources plan	Change log	Resource requirements
Process improvement plan	Charter	Risk register
Procurement management plan	Contracts	Roles and responsibilities
Quality management plan	Duration estimates	Sellers list
Requirements management plan	Forecasts	Source selection criteria
Risk management plan	Issue log	Stakeholder analysis
Schedule baseline	Milestone list	Stakeholder management strategy
Schedule management plan	Performance reports	Stakeholder register
Scope baseline: • WBS dictionary • WBS • Scope statement	Project funding requirements	Stakeholder requirements
	Proposals	Statement of work
	Procurement documents	Teaming agreements
	Project organizational structure	Team performance assessments
Scope management plan	Quality control measurements	Work performance information
	Quality checklists	Work performance measurements

Remark! In the table presented plans and documents are not related. These are only presented in sorted way.

Scope Planning Background

Project success is determined by its usefulness or profitability:

- in increase of revenue
- in savings of costs

The main reason to change existent information system is to get more benefits to organization, to help more to achieve its strategic goals obtainable benefits must be expressed in information system (new, changed) goals. After the project completion developed information system must meet these requirements what implement information system goals.

Here raises a question: "what are these requirements to what developed information system must meet?" More precisely:

- What are the projects deliverables?
 - What kind of must be the constitution of changed (future) information system to achieve goals expressing information system value?
- What customer really wants?
- What are formalities to take into account?

In the context of project management with expected outcome and its requirements deals scope management. In the context of information system we can take scope as all requirements what developed information system can meet. This concept is illustrated on the next figure:

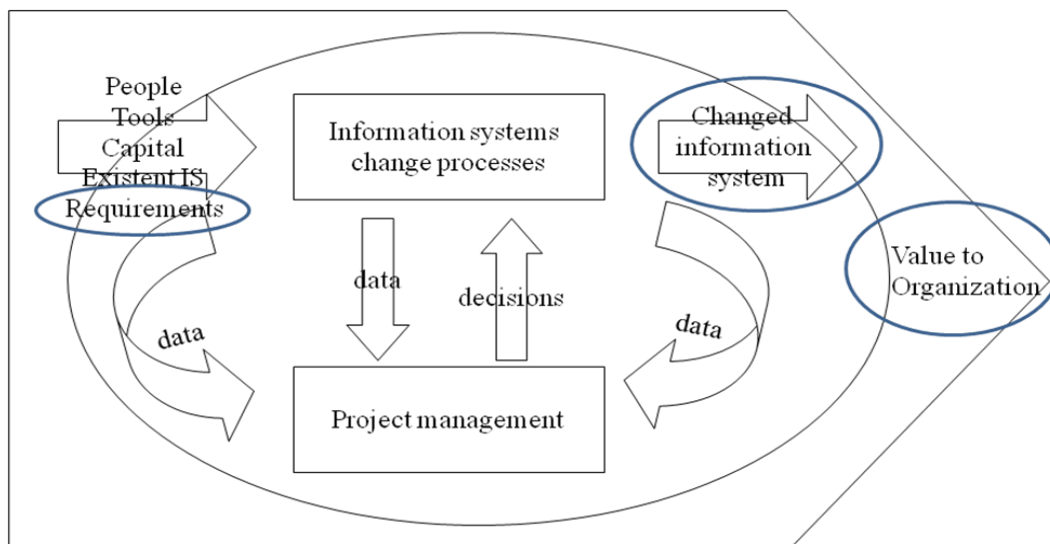


Figure 5. Scope Context in the Information System Development

Scope Definition

Scope is the sum of the products, services, and results to be provided as a project (PMBOK). In the context of project management we must define, write down and get products owner agreement for 2 things:

- to “breadth” of expected deliverables – product (hereby system) scope
- to “depth” of expected deliverables – project scope

Product scope - the features and functions that characterize a product, service, or result

Project scope - the work that needs to be accomplished to deliver a product, service, or result with the specified features and functions. Project scope is handled in the following lecture,

Product Scope

In defining scope of project deliverables we must agree with project stakeholders (customer and performer) and write down unambiguously following aspects:

- what product, service, or result will do
- how the product, service, or result will be used
- how the product, service, or result will function
- what the product will look like, what the service is, or what the result will be
- what impact the product, service, or result will have on the organization, customer, stakeholders, and business processes
- any constraints, restrictions, standards, regulations, and other requirements related to the product

Scope of changeable information system– amount of aspects or range of IS architecture (what will be in and out of borders) affected with change including:

- quantity of IS goals
- quantity of IS processes
- quantity of actors in IS
- quantity of functional/non-functional requirements
- quantity of data entities
- quantity of locations

Scope Planning

Scope planning processes, inputs and outputs are presented on the next figure:

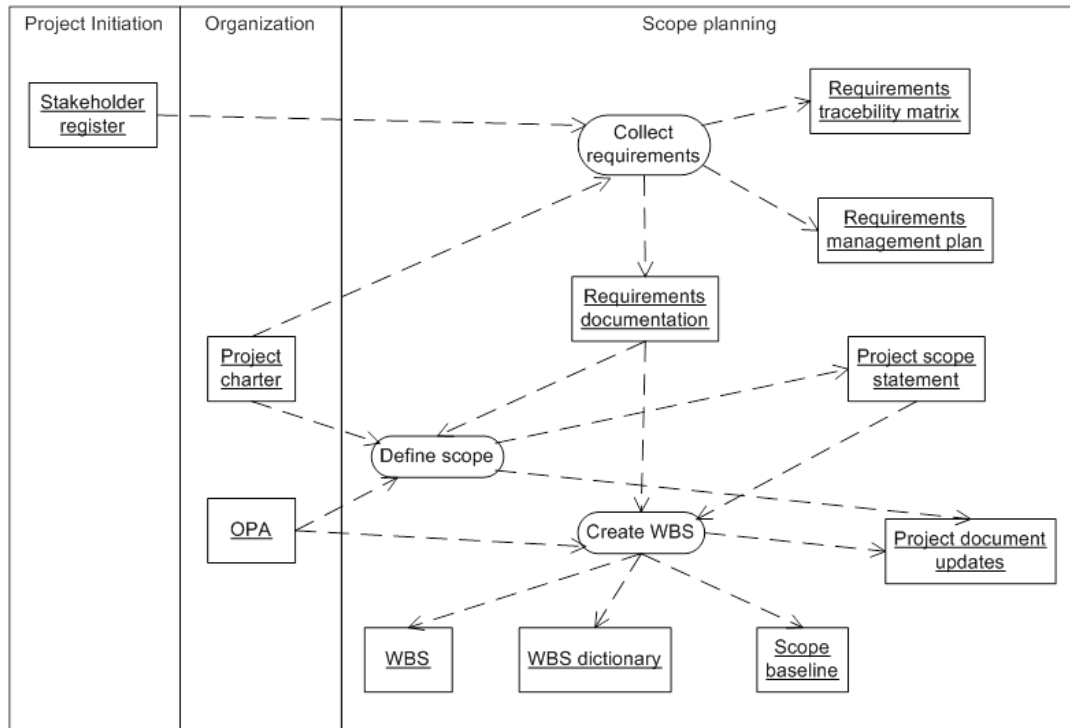


Figure 6. Scope Planning Processes, Inputs and Outputs

Scope planning processes are:

- collecting requirements
- defining scope
- creating work breakdown structure – WBS

In current lecture I describe the first process – collecting requirements. Other processes are subject for following lecture.

Collecting Requirements

Collecting requirements is the process of defining and documenting stakeholders' needs to meet the project objectives. The project's success is directly influenced by the care taken in capturing and managing project and product requirements. Requirements include the quantified and documented needs and expectations of the sponsor, customer, and other stakeholders. Collecting requirements is defining and managing customer expectations. Requirements become the foundation of the WBS, cost, schedule, and quality planning.

Inputs for this process are project charter and stakeholder register and outputs are requirements documentation; requirements management plan and requirements traceability matrix. Tools and techniques for collecting requirements are system analysis methods and techniques. Remark: system development methodology used in the

project must give guidelines for requirements collecting, documenting and tracing their life cycle.

Requirements Documentation

Requirements documentation describes how individual requirements meet the business need for the project. Requirements may start out at a high level and become progressively more detailed as more is known. Before being baselined, requirements must be unambiguous (measurable and testable), traceable, complete, consistent, and acceptable to key stakeholders – SMART. The format of a requirements document may range from a simple document listing all the requirements categorized by stakeholder and priority, to more elaborate forms containing executive summary, detailed descriptions, and attachments

Components of Requirements Documentation may be as follows:

- Business need or opportunity to be seized, describing the limitations of the current situation and why the project has been undertaken;
- Business and project objectives for traceability;
- Functional requirements, describing business processes, information, and interaction with the product, as appropriate which can be documented textually in a requirements list, in models, or both;
- Non-functional requirements, such as level of service, performance, safety, security, compliance, supportability, retention/purge, etc.;
- Quality requirements;
- Acceptance criteria;
- Business rules stating the guiding principles of the organization;
- Impacts to other organizational areas, such as the call center, sales force, technology groups;
- Impacts to other entities inside or outside the performing organization;
- Support and training requirements;
- Requirements assumptions and constraints

Requirements Management Plan

Documents how requirements will be analyzed, documented, and managed throughout the project. Components of the requirements management plan can include, but are not limited to:

- How requirements activities will be planned, tracked, and reported;
- Configuration management activities;
- Requirements prioritization process;

- Product metrics that will be used and the rationale for using them;
- Traceability structure - which requirements attributes will be captured on the traceability matrix and to which other project documents requirements will be traced

Requirements Traceability Matrix

A table that links requirements to their origin and traces them throughout the project life cycle. The implementation of that matrix helps ensure that each requirement adds business value by linking it to the business and project objectives. It provides a means to track requirements throughout the project life cycle, helping to ensure that requirements approved in the requirements documentation are delivered at the end of the project. It provides a structure for managing changes to the product scope

This process includes, but is not limited **to tracing**:

- Requirements to business needs, opportunities, goals, and objectives;
- Requirements to project objectives;
- Requirements to project scope/WBS deliverables;
- Requirements to product design;
- Requirements to product development;
- Requirements to test strategy and test scenarios; and
- High-level requirements to more detailed requirements

Requirements Attributes

Attributes associated with each requirement can be recorded in the requirements traceability matrix. These attributes help to define key information about the requirement. Typical attributes used in the requirements traceability matrix may include: a unique identifier, a textual description of the requirement, the rationale for inclusion, owner, source, priority, version, current status (such as active, cancelled, deferred, added, approved) and date completed. Additional attributes to ensure that the requirement has met stakeholders' satisfaction may include stability, complexity, and acceptance criteria.

[Additional Material for Scope Planning](#)

From Nick Jenkins "Project Management Primer":

Scope planning 1. step – requirements gathering

Many projects start up with vague or ill-defined ideas of what they want to achieve. If to hope to deliver a successful project in a finite amount of time, we must 1. set to project a concrete goal and 2. determine the final state our project must achieve. If we have an infinite amount of time we can simply try one solution after another until we hit upon the best solution for our problem. Most of us operate in an environment where we need to

deliver a concrete solution in a very finite period of time. Additionally we must select the best solution from a range of possible approaches. The first and most important step in this process is defining what will actually constitute a success. Then we can evaluate all of the possibilities against our definition of success and find the best fit. The more accurate we can be about defining our objectives; the more likely we will be to succeed.

Scope is a general term to describe everything that our project encompasses – everything that must be achieved for the project to be complete. This would encompass projects vision, goals and requirements. These would be embodied in documents such as a “project proposal” and at a lower level “commercial specifications” and “technical specifications”. Pictorially expressing:

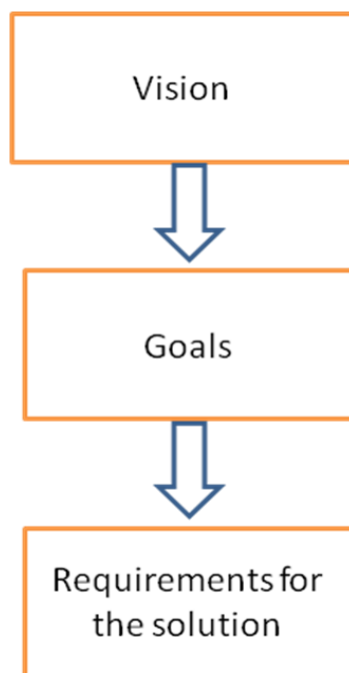


Figure 1. Vision, goals and requirements related to each other

Project vision is bases for defining project goals. These in turn are as “filters” to determination of requirements characterizing expected result (solution).

Project Vision

A single encapsulated idea which defines the aim of our project. It should be stated in a single sentence; it should be inspiring, “visionary”. In additionally it don’t have to be formalized. The only important thing is that every interested party of project know exactly what the vision is and agree on it. Examples of project visions:

- “deliver the cheapest system, in the shortest time, that just about gets the job done”
or
- “deliver the best sales and marketing system on the market”

Which of these vision statements is inspiring, which of these motivates project team to do their job?

Project Goals

Project goals are slightly lower-level and more specific than the vision. They should directly support the overall vision of the project but refine its definition. Typically goals are set out by customers or by a business and define how the success of the project will be achieved.

Project proposal states the highest level goals in a project; it outlines the overall business goals and vision to the project as decided by the customer or client. It is what gets signed off when a commercial deal is agreed. It may define what we are legally committed to delivering.

While the vision encompasses the whole project, goals may refer only to the objectives of a particular segment of the project.

Examples: “the project should deliver the best Customer, Sales and Marketing system on the market, it should:

- reduce time taken to process sales orders by 50% (of manual process times)
- provide detailed management reports on a quarterly basis
- provide detailed market and customer analysis at request
- link sales directly to marketing initiatives to measure marketing ROI
- provide detailed client and prospect information to account managers
- completely automate license renewals via a website
- provide a zero-footprint client, accessible via the Internet
- provide an upgrade path for users of other sales order systems”

Some goals are more specific than others. More detail is the purpose of requirements specification. The goal is to spend enough time to make sure project goals are accurate and succinct; it will be the yardstick against which senior management will judge the success of our project.

Requirements to Expected Solution

One of the primary purposes of goals is to act as a filter for subsequent requirements. If a particular requirement cannot be traced back through higher-level goals to the overall project vision then it should be dropped since it will be outside the scope of the project

Requirements specification is the process of refining the goals of a project to decide what must be achieved to satisfy the “customers”. Generally requirements divide into 2 types: functional and non-functional requirements.

Functional requirement typically states as “the system X must perform function Y”. It asserts or affirms a necessary or desirable behavior for the system or product in the eyes of an end user.

Non-functional requirement specifies requirement associated with usability, security, performance, reliability etc.

Requirement definition must meet SMART requirements; they must be specific, measurable, achievable, relevant and testable

Risks Associated with Deliverable Uncertainty

At first sight seems that definition of deliverables is simple. Customer wants amount of models, technological architecture or application system, which consists of code and documentation. Creating these things may be difficult, defining these things seems easy. Unfortunately in projects world simplicity leads to abyss. Problems rise from seemingly safe requirements. For example: “new warehouse system will simplify financial data processing for accounting system”. This can mean, that ...

- “new system will output reports where are shown summary data, what must be enter manually to account system” or
- “new system will in the end of every month generate data file, which will transported to account system” or
- “account systems database will be updated from warehouse system online”

Work what must be carried out corresponding these interpretations is different. When project manager plans as solution reports in the month end, but customer wants online updating, then trouble is in house.

Conclusion: before beginning development work we must understand not only what all these requirements mean, but also, what customer thinks, what these requirements mean

Defining Project Success and Success Factors

Projects differ in the technology used, the size, complexity, risk and other characteristics. In particular the distinction is made between technological uncertainty and complexity of projects. The complexity of the project management is proportionate to the complexity of technology. To different types of projects are essential different success categories. These categories have different importance degree to different project stakeholders.

Projects main types are:

- Low-tech (Established Technology) - rely on existing and well-established base technologies to which all industry players have equal access

- Medium-tech (Mostly Established Technology) - these are similar to Low-tech, but involve some new technology or feature - new feature provides market advantage but also a higher degree of uncertainty
- High-tech (Advanced Technology) - projects which contain technologies that have been developed prior to project initiation, but which are used together for the first time
- Super high-tech (Highly Advanced Technology) - technologies which are not entirely existing, are emerging or even require unknown solutions at the time of project initiation

Project success is seen as a strategic management concept where project efforts must be aligned with the strategic long-term goals of the organization

The intent is to establish appropriate expectations of both top management and the project team prior to project initiation

These expectations then provide a baseline for both the decision to launch project execution and the inevitable trade-off decisions that will be required of the project's management during this period.

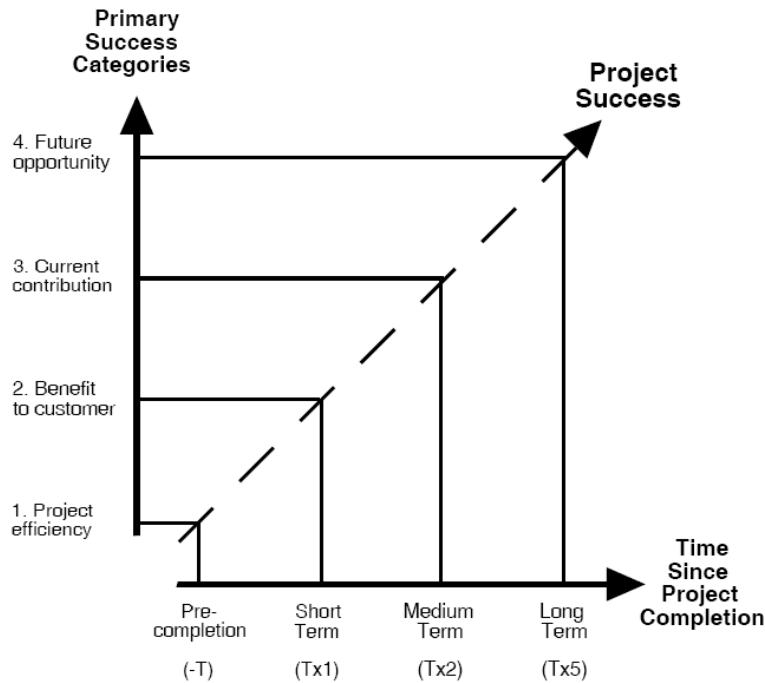
There are primary success categories and measurable success criteria (Key Success Indicators). Success Categories differ in terms of gaining project outcome "fruits" and project objectives filling time - immediately or after some time in near or distant future

Primary success categories and measureable success indicators are illustrated in the next table:

Table 3. Primary Success Categories and Measureable Success

Primary Success Category	Measurable Key Success Indicators (KSIs)
Internal Project Efficiency (Pre-completion)	<ul style="list-style-type: none"> - Meeting schedule - Completing within budget - Other resource constraints met
Impact of the Customer (Short term)	<ul style="list-style-type: none"> - Meeting functional performance - Meeting technical specifications & standards - Favorable impact on customer, customer's gain - Fulfilling customer's needs - Solving customer's problem - Customer is using product - Customer expresses satisfaction
Business and Direct Success (Medium term)	<ul style="list-style-type: none"> - Immediate business/commercial recognition - Immediate revenue & profits enhanced - Larger market share generated
Preparing for the Future (Long term)	<ul style="list-style-type: none"> - Will create new opportunities for the future - Will position customer competitively - Will create new market - Will assist in developing new technology - Will add/has added capabilities & competencies

Project success categories vary with time. This is illustrated on the next figure:



Note: Time 'T' is a suggested yardstick based on the time taken in the execution phases of the project. Actual intervals would depend on the industry involved.

Figure 7. Project Success Categories vary with Time

Success categories and characteristics of various project types are illustrated in the next table:

Project Type \ Success Category	A Low-tech (Established Technology)	B Medium-Tech (Mostly Established)	C High-tech (Advanced)	D Super Hi-Tech (Highly Advanced or Exploratory)
Project Efficiency (Pre-completion)	Critical	Important	Overruns acceptable	Overruns most likely
Impact on Customer (Short term)	Standard product	Functional product with added value	Significantly improved capabilities	Quantum leap in effectiveness
Direct Contribution (Medium term)	Reasonable profit	Profit. Return on investment	High profits. Market share	High, but may come much later. Market leader
Future Opportunity (Long term)	Almost none	Gain additional capabilities	New product line. New markets	Leadership in core and future technologies

Table 2: Success Categories and Characteristics of Various Project Types

Relationship between project management complexity and project type is illustrated on the next figure:

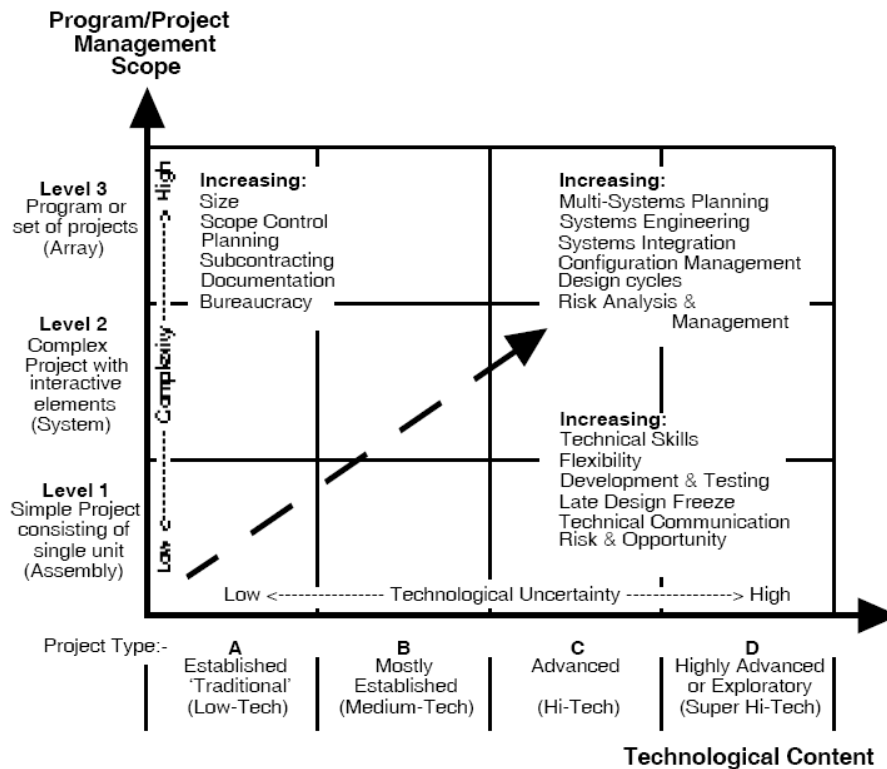


Figure 2 Relationship between Project Management Complexity and Project Type

Used Literature

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