1 Basics

1.1 Project and Project Management Basics

1.1.1 Perception of Projects

Projects are **undertakings** characterized by the **uniqueness** of their entire features and conditions. The lack of previous experience resulting from such uniqueness manifests itself as indetermination and uncertainty.

According to their **level of determination**, projects can be categorized into a hierarchy of human rational activities:

Processes as single routine tasks	A frequently repeated, rather sequential line of activities, in which the initial situation and the desired outcome are well defined, and the necessary measures are categorized or specified. There is only a slight uncertainty connected with the achievement of the goals. Example: procurement of some parts
Projects	A unique, parallel or sequential network of activities, in which the initial situation is well defined and the desired outcome is only specified in the form of concrete deliverables. The measures applied are open to some extent, which causes significant uncertainty about the achievement of the objectives. Examples: product development, erection of a building, development of a new software
Programs	A parallel and sequential network of different projects and single tasks, in which the desired outcome is only specified in the form of goals, but the required measures and single projects are to some extent still completely open. The high uncertainty about the achievement of only vaguely defined goals is counteracted by implementing control measures, i.e. by defining new, additional projects. Examples: implementation of Total-Quality-Management (TQM) in the overall corporate culture, merging of companies

Fig. 1-1: Differentiation of processes - project- programs

Projects are temporary, complex undertakings. In other words: each project has a planned project end defined right at the outset. Therefore, projects can be regarded as **temporary companies.** This is why they are seen as an excellent management qualification step.

Projects are characterized by **a strong presence** of the **following characteristics**:

Characteristic	Description
Unique:	Not or only partly repeating tasks associated with uncertainty and high levels of risk.
Goal-oriented:	The desired technical outcome (deliverable) is specified; the required effort as to resource usage is limited.
Delineated:	A project has limitations as to time frame, budget, as well as to organizational-legal constraints.
Complex, dynamic:	The tasks are comprehensive and strongly interrelated. Therefore, there are many interdependencies between the individual tasks and the environment around them. The scope, as well as the limitations and dependencies, may permanently change. Transparency is poor.
Interdisciplinary, interdepartmental:	Tasks can only be performed through the cooperation of differently qualified individuals, who usually come from different organizational units.
Significant:	Projects have a high relevance concerning the usability, acceptance, economic success, use of resources a.s.o. for the organization involved.

Fig. 1-2: Project characteristics

Projects are independent social systems, which are integrated into a project-specific environment. Behavioral patterns, working forms, communication flows, and specific rules which differ from the culture of the parent organization are frequently established.

In this context, the integration into a project-specific environment means that projects are never isolated from environmental influences. Only considering all these factors represented by individuals, groups, interested parties, or related to factual/technical constraints enables an overall project view. The above-mentioned behavioral patterns arise from the specific interests, expectations, and fears attached to towards the project by the different stakeholders/interested people.

1.1.2 Types of Projects

Projects can be categorized in respect to different criteria.

The differentiation made depending on project type enables the use of similarities for efficient project management (see Chapter 6 “Project Portfolio Management) by applying tailor-made methods, tools and structures.

Criterion	Example
Project scope:	The following project types can be distinguished by project scope or content: • Company foundation projects, company merger and acquisition projects • Business venture projects • Marketing projects, event projects • Strategy projects • Acquisition projects, tender projects, pre-projects • Feasibility studies, planning projects • Research projects, product development projects • Organizational development projects • IT-projects • Investment projects (plant / construction business etc.) • Maintenance projects, major repairs
Position of the customer / project sponsor:	Depending on the customer's position (buyer, client) the following project types can be distinguished: • External projects: external customer (external project owner, client, buyer) • Internal projects: internal customer (internal project sponsor, user) For each project, there has to be at least an internal project sponsor, who is responsible for the execution of the project within the company.
Degree of repetition:	One can distinguish between: • Unique projects (pioneer projects) • Recurring projects (standard or routine-projects), so-called repetitive projects
Involved organizational units:	Organizational complexity increases with the increased number of involved units. Therefore, it is possible to distinguish between: • Intra-departmental projects • Inter-departmental projects • Cross-organizational projects
Degree of difficulty:	This is manifested by the project characteristics, such as scope, complexity, duration, legal framework, area of knowledge. The classification by degree of difficulty defines the amount of methods and rules provided in the project management handbook.

Fig. 1-3: Project categorization

In addition, the differentiation of project types serves for adequately applying project management methods and prioritizing project management.

In **external order execution projects**, for example, clear and very detailed contracts will typically exist between customer and seller, including tight deadlines and penalties. Structured scheduling and cost planning, as well as a well-functioning controlling (including claim management), is vital for success in this type of projects. **Internal projects**, on the contrary, are frequently assigned rather vaguely, sometimes even in oral form. A brief project definition, including goals, specified as much as possible, would already be an important basis for the successful execution of projects of this kind. A comprehensive claim management or detailed cost controlling would instead cause a considerable culture shock in such internal projects.

Pioneer projects, routine projects, and routine tasks require different methods

Another distinction is that between **pioneer projects** (unique projects), **routine projects** and single tasks. Routine projects have already been repeatedly performed in similar ways. For those projects, project management can be applied very efficiently in standardized form. Checklists, standardized forms, work breakdown structures and many more tools will be available already before project start, so that the project manager and his/her team can use them to develop project-specific plans with little effort. In contrast, **pioneer projects** are characterized by high levels of uncertainty and little previous experience. Therefore, it is particularly important in pioneer projects that the project manager develops the objectives, measures, and specific project organization together with the team, during an intensive start-up process (project start-up workshop).

Companies mainly distinguish between

- Small short projects (C)
- Standard projects (B)
- Highly complex projects (A)

The third example of a project type-specific use of project management methods is the difference between **investment projects** and **organizational development projects**. The success factor of investment projects often lies in the technical accuracy and quality of the results, whereas the success of organizational development projects mainly depends on the acceptance of the organizational changes by all parties affected and involved. Intensive communication processes through teamwork, jointly developing intermediate results, an intensive flow of information etc. are essential for the success of organizational development projects. As for investment projects, detailed budgeting and budget control, as well as compliance with deadlines are the major success criteria.

The examples mentioned above illustrate that professional project management does not mean always implementing all project management methods and approaches of the project management “toolkit” in the same level of detail, but to apply these project management methods according to the situation or depending on project type, so that the benefit will be optimized in relation to the effort made.

	Degree of innovation low → high				
Type of project:	**Standard projects**			**Pioneer projects**	
Marketing projects, strategy projects					
Acquisition projects, tender projects					
Feasibility studies					
Planning projects					
Research and product development projects					
Organizational development projects					
Investment projects (e.g. construction business etc.)					
Implementation projects (e.g. IT-implementation etc.)					
Maintenance projects, major repairs					

Fig. 1-4: Questionnaire for project categorization

1.1.3 Project Management Tasks

Project management can be structured according to general management functions.

We are using the structure presented in the following chart, where the different project management sub-tasks are grouped according to the corresponding general management functions.

The basic structure of management in general shows the following four main functions:

Planning: determining the outcome

Organizing: making it work, staffing resources

Leading: instructing and motivating others in a goal-oriented manner

Controlling: monitoring, by aiming at successful work execution

Management tasks	Project management tasks
Planning	• Project strategy • Project definition • Planning stakeholder relations, environmental impacts • Identification of project risks • Work planning • Development of work packages • Quality planning • Scheduling • Resource planning • Cost planning • Financial planning
Organization, communication, coordination	• Role definition, staffing • Assignment of tasks and competencies • Establishment of the flow of information (project information system: reporting system, meeting management, documentation ...) • Communication management within the project team and with the project environment (stakeholders) • Project marketing • Interface management • Establishment of values, norms, rules (project culture)
Leading	• Selection of team members • Promotion of goal clarity and acceptance • Promotion of team member development • Support of team member cooperation (motivation, coaching, conflict management) • Initiating change • Promotion of appropriate working conditions • Decision-making • Discharge of team members
Controlling	• Collection and evaluation of progress data • Integrated control of quality, time, resources, costs, financial means • Selection of control measures • Monitoring of the development of critical success factors/risks • Implementation of corrective measures

Fig. 1-5: Project management tasks

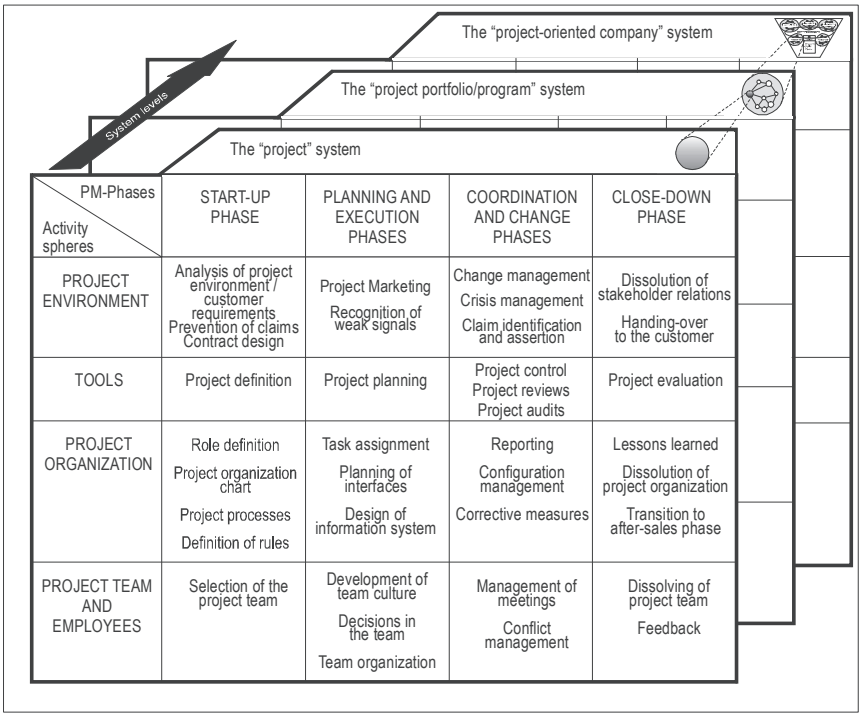
1.1.4 Systems Approach to Project Management - The Big Picture

In order to create an overall project management view that is as complete as possible, the following structuring criteria are applied:

(1) Project management **system levels**

(2) Project management **phases** and **processes**

(3) Project management **fields of activity/components**



PM-Phases / Activity spheres	START-UP PHASE	PLANNING AND EXECUTION PHASES	COORDINATION AND CHANGE PHASES	CLOSE-DOWN PHASE
PROJECT ENVIRONMENT	Analysis of project environment / customer requirements Prevention of claims Contract design	Project Marketing Recognition of weak signals	Change management Crisis management Claim identification and assertion	Dissolution of stakeholder relations Handing-over to the customer
TOOLS	Project definition	Project planning	Project control Project reviews Project audits	Project evaluation
PROJECT ORGANIZATION	Role definition Project organization chart Project processes Definition of rules	Task assignment Planning of interfaces Design of information system	Reporting Configuration management Corrective measures	Lessons learned Dissolution of project organization Transition to after-sales phase
PROJECT TEAM AND EMPLOYEES	Selection of the project team	Development of team culture Decisions in the team Team organization	Management of meetings Conflict management	Dissolving of project team Feedback

Fig. 1-6: Project management-overview

The **system levels** of project management describe the specific system that shall be controlled. This automatically yields the corresponding relevant environment systems.

Project management is concerned with managing the following systems:

- Project management of single projects
- Project portfolio/program: management of a group of interdependent projects and tasks
- Project-oriented company: management of a company that implements projects as its major form of work

It is the task of the system-oriented view of project management to identify analogies between the different system levels, thus introducing project management as the management concept for companies.

Project management phases as typical system states are sections of the whole life cycle:

Project management consists of typical management phases. Project phase models can either be structured in a content-oriented or process-oriented way. Chapter 3.2.2 “Task Planning” presents specific phase models structured according to content-related criteria.

A process-oriented project management phase model which can be valid for any project contains the following phases:

A. Project start-up phase
B. Planning and execution phases
C. Coordination and change phases
D. Project close-down phase

Process-oriented phases are often called project management processes

These process-oriented phases are also often called project management processes.

The following figure illustrates the relations between the described project management phases in a project:

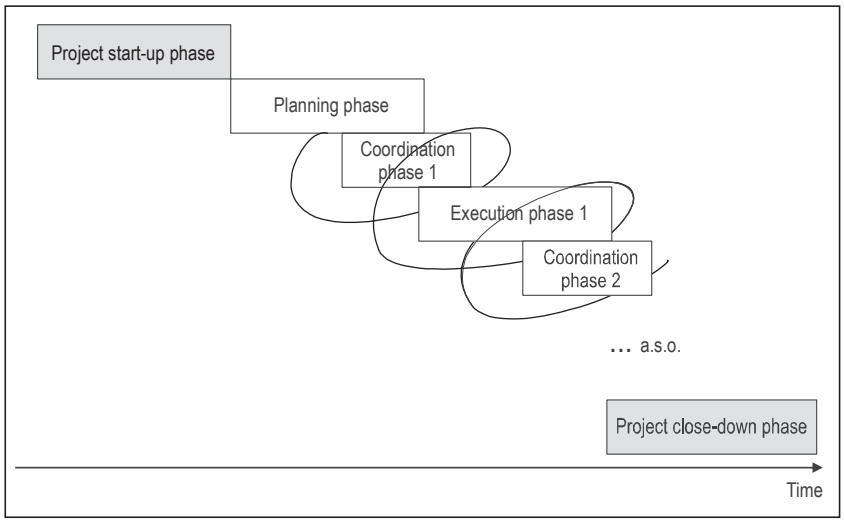


Fig. 1-7: Process-oriented project phase model

A. Project start-up phase

Providing the necessary structures

The **project start-up phase** is the first process section that starts with the assignment of the project charter and finishes with the beginning of the first **planning and execution phase**.
In this phase, the necessary structures and preconditions concerning the involved organizational systems are established. This phase emphasizes the initiation and the establishment of all relevant preconditions.

B. Project management planning and execution phases

Preparing all project management documents

The planning phase mainly includes the preparation of all project management documents (project handbook). The execution phases manage the technical performances of project tasks as the realization of the different project planning steps of project management.
The required project planning and execution tasks are performed by management. A project often has **several execution phases**, which are either bound to coordination/control phases, or to the project start-up and project close-down phase. The focus of this phase is differentiation (breakdown of work and distribution).

C. Project management coordination phases

Coordination phases are frequently associated with the beginning or with the end of a corresponding technical execution phase. Therefore, special attention has to be paid to transitions phases, from the project management perspective.

Technical phase is completed

A technical phase (execution phase 1) is ended by a coordination phase, and the resulting outcome is transferred as framework conditions into the following technical phase. Then, this phase (execution 2) can start.

Integration of intermediate results, start of the next phase

Coordination phases include putting together **intermediate results**, as well as the management of deviations and changes. The emphasis in this phase lies on integration (consolidation, revision, and correction).
The following chart illustrates the relationship between execution and coordination phases:

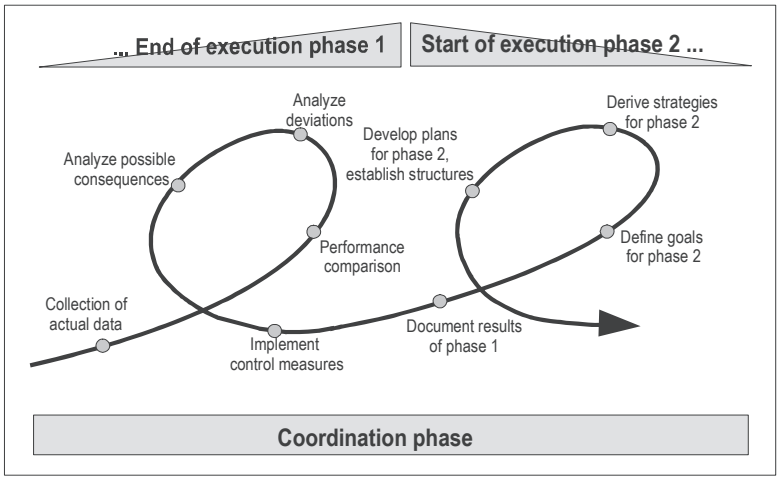


Fig. 1-8: Tasks in the coordination phases

Project management execution and **coordination and change phases** are connected by feedback control loops. A project may repeat these phases several times.

D. Project close-down phase

This phase finishes the project, and discharges the responsible people. This phase emphasizes on finishing and transferring lessons learned.

Milestones are externally determined events or events defined by the team

Project phases are started and ended by events (milestones). **Milestones** are either externally determined events associated with a specified performance progress, or events defined by the team for control purposes.
Penalized finishing deadlines in the construction industry, or the deadline of the tendering process of a specific service are examples for external milestones.
Internal projects are generally less determined and standardized. Therefore, milestones defined by the project team are appropriate tools for ensuring efficient project work, especially in projects of this kind. At the same time, milestones are suitable for starting a new project phase, as well as for placing milestone workshops for coordination and agreeing on strategies, objectives, and values for the following phase.

Difference between technical phases and project management phases

Project management phases must not be mixed up with those of the project itself, the so-called technical project phases: technical project phases are, as already discussed, sections of the object life cycle (conception, planning, realization, putting into operation).

Here are the project **spheres of management activity**:

Areas of activity are those system components which increase project value or success when actively controlled.

- The „**project environment**“ consists of all relevant influence factors which lie outside the project and interact with the project. They can be structured into different environmental segments, including their corresponding interactions (see Chapter 2.1.5 “Project Environment and Stakeholder Analysis”).
- „**Methods/tools**“ include all instruments for dealing with the core parameters work, time, costs, and project risks.
- „**Project organization**“ is the total of all those structures and rules securing the efficient cooperation of people involved in the project. This comprises the definition of roles, including the corresponding competencies and responsibilities as well as information management .
- The „**project team**“ comprises all individuals, including their competencies, values, and attitudes, who consequently aim at achieving goals through **teamwork**. The objective is the development and maintenance of effective teamwork culture.

This comprehensive project management approach is ultimately characterized by the following orientations:

Customer-oriented:	Project management emphasizes on customer demands, rather than being product-oriented.
Process-oriented:	Project management focuses on project process structures, not on hierarchical structures and positions.
System-oriented:	Project management is defined as a complex system showing its components and their interrelations, instead of dealing with a more or less random gathering of individuals, tasks, methods, and tools.

Fig. 1-9: Characteristics of system-oriented project management

The proposed general model distinguishes itself from other concepts thanks to its systems-oriented approach.

It can generally be noted that such a comprehensive project management approach largely integrates other concepts, such as Total-Quality-Management (TQM), Business Process Management, Knowledge Management etc., through its customer orientation and business process orientation.

As opposed to these management models, more and more approaches which emphasize the quick and simple achievement of goals are growing in importance. These approaches also encourage using as little documentation as possible (project management light).

Agile project management enhances direct coordination in the team

The latest philosophy to be established is called **Agile Project Management**. This approach emphasizes the self-controlled, group-autonomous management of performing people, as opposed to planned task coordination. The project manager assigns clear tasks, and receives notifications of completion within a short period of time (mostly in a few days). There is only little documentation, roles are of minor importance, a project manager is not required.

Agile project management involves the following values:

- The focus is on communication, and therefore on the human aspect, rather than on processes, tools, and organizational structures.
- Keep it simple and stupid (KISS)
- Cooperation instead of contracts with the customer/project sponsor
- Quick informal reaction to changes
- Plans are considered rather as orientation

Agile project management actually represents a back-swing in the pendulum of project management from a comprehensive, exaggerated planning obsession to a very simple form of cooperation and documentation.