

## MAJOR UNIT: SOFTWARE PROJECT ORGANIZATION AND COMMUNICATION

From a dynamic point of view, a project can be in any of several phases shown in figure.

**Project Definition Phase:** During the project definition phase, the project manager, a possible client, and a key project member, the software architect, are involved.

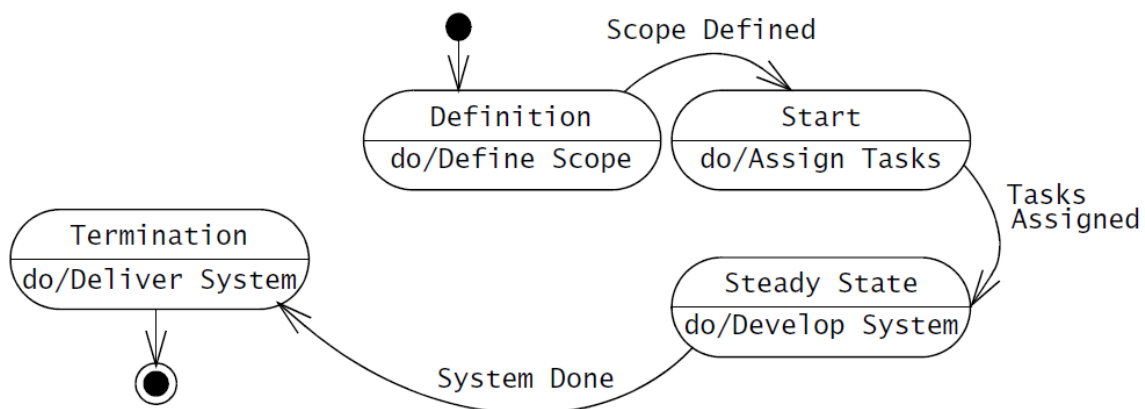
- The two areas of focus during this phase are:
  - an initial understanding of the software architecture, in particular the subsystem decomposition, and
  - the project, in particular the schedule, the work to be performed, and the resources required to do it.
- This is documented in three documents:
  - the problem statement.
  - the initial software architecture document, and
  - the initial software project management plan.

**Project Start Phase:** During the project start phase:

- the project manager sets up the project infrastructure
- hires participants
- organizes them in teams
- defines major milestones, and kicks off the project. During the project definition and project start phases, most decisions are made by the project manager.

**Project Steady State Phase:** During the project steady state phase, the participants develop the system and report progress in this manner: participants → team leader → project manager. They report to their team leader, who is responsible for tracking the status of the developers and identifying problems. The team leaders report the status of their team to the project manager, who then evaluates the status of the complete project. Team leaders respond to deviations from the plan by reallocating tasks to developers or obtaining additional resources from the project manager. The project manager is responsible for the interaction with the client, obtaining formal agreement and renegotiating resources and deadlines.

**Project Termination Phase:** During the project termination phase, the project outcome is delivered to the client and the project history is collected. Most of the developers' involvement with the project ends before this phase. A handful of key developers, the technical writers, and the team leaders are involved with wrapping up the system for installation and acceptance and collecting the project history for future use.



## Importance of Project Communication

- Software engineering is a collaborative activity.
- The development of software brings together participants from different backgrounds, such as domain experts, analysts, designers, programmers, managers, technical writers, graphic designers, and users.
- No single participant can understand or control all aspects of the system under development, and thus, all participants depend on others to accomplish their work. Moreover, any change in the system or the application domain requires participants to update their understanding of the system.
- These dependencies make it critical to share information in an accurate and timely manner.
- Communication can take many forms depending on the type of activity it is supporting.
  - Participants communicate their status during regular meetings and record it into meeting minutes.
  - Participants communicate project status to the client during client reviews.
  - The communication of requirements and design alternatives is supported by models and their corresponding documents.
- Crises and misunderstandings are handled through spontaneous information exchanges such as telephone calls, messages, hallway conversations, and ad hoc meetings.
- As software engineering projects become large, the time each participant must spend in communication increases, thus decreasing the time spent on technical activities. To address these issues, the organization of projects into teams and the sharing of information through formal and informal channels is essential.

## Planned vs. Unplanned Communication

Communication is pervasive throughout a software development project. Communication failure is costly and can have a high, and sometimes fatal, impact on the project and the quality of the delivered system.

Communication within a project occurs through planned and unplanned events. Planned communication includes:

- Problem inspection, during which developers gather information from the problem statement, the client, and the user about their needs and the application domain
- Status meetings, during which teams review their progress
- Peer reviews, during which team members identify defects and find solutions in preliminary work products
- Client and project reviews, during which the client or project members review the quality of a work product, in particular deliverables
- Releases, during which project participants make available to the client and end users versions of the system and its documentation.
- Planned communication helps disseminate information that targeted participants are expected to use.

Unplanned communication includes:

- Requests for clarification, during which participants request specific information from others about the system, the application domain, or the project
- Requests for change, during which participants describe problems encountered in the system or new features that the system should support
- Issue resolution, during which a conflict between different stakeholders is identified, solutions explored and negotiated, and a resolution agreed upon.
- Unplanned communication helps deal with crises and with unexpected information needs.

When a developer joins a project during the start phase much has already been done such as a problem statement already exists; project management has already written an initial plan to attack the problem, set up a project organization, defined planned communication events, and provided an infrastructure for planned and unplanned communication. Most of the developer's effort when joining a project is to understand these documents and join the existing organizational and communication structures. This is addressed by the following activities:

- Attend the kick-off meeting. During this activity, the project participants hear from the client about the problem to be solved and the scope of the system to be developed. This helps them to get a high-level understanding of the problem, which serves as a basis for all other activities.
- Join a team. The project manager has decomposed the project into work for individual teams. Participants are assigned to a team based on their skills and interests.
- Attend training sessions. Participants who do not have skills for required tasks receive additional training.
- Join communication infrastructure. Participants join the project communication infrastructure that supports both planned and unplanned communication events. The infrastructure includes a collection of mechanisms such as groupware, address books, phone books, E-mail services, and video conferencing equipment.
- Extend communication infrastructure. Additional bulletin boards and team portals are established specifically for the project.
- Attend first team status meeting. During this activity, project participants are taught to conduct status meetings, record status information, and disseminate it to other members of the project.
- Understand the review schedule. The review schedule contains:
  - A set of high-level milestones to communicate project results in the form of reviews to the project manager and to the client.
  - The objective of project reviews is to inform the project participants of the other teams' status and to identify open issues. The objective of client reviews is to inform the client about the status of the project and to obtain feedback.

## Communication Mechanisms

A communication mechanism refers to a tool or procedure that can be used to transmit and receive information and support a communication event. Communication mechanisms are synchronous if they require both sender and receivers to be available at the same time. Otherwise, communication mechanisms are called asynchronous.

Examples of synchronous mechanisms of communication.

Mechanism	Supported communication events
Hallway conversations	Request for clarification Request for change
Questionnaires and structured interviews	Problem definition Postmortem review
Meetings (face-to-face, telephone, video)	Problem definition Client review Project review Peer review Status review Postmortem review Brainstorming Issue resolution
Synchronous groupware	Client review Project review Peer review Brainstorming Issue resolution

Examples of asynchronous mechanisms of communication.

Mechanism	Supported communication events
Electronic mail	Change request Brainstorming
Newsgroups	Change request Brainstorming
World Wide Web	Release Asynchronous peer reviews Change request Brainstorming
Lotus Notes	Release Asynchronous peer reviews Change request Brainstorming