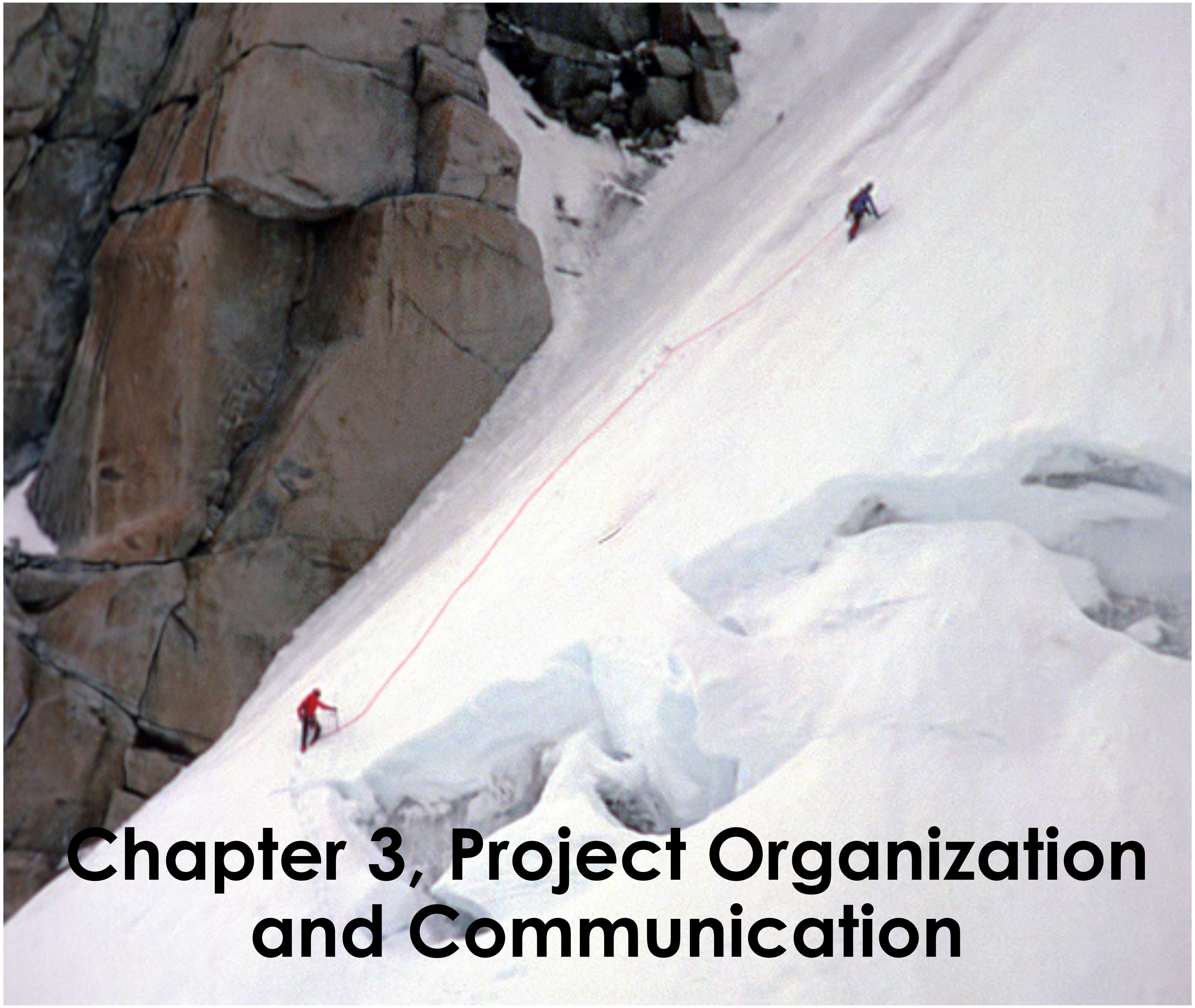
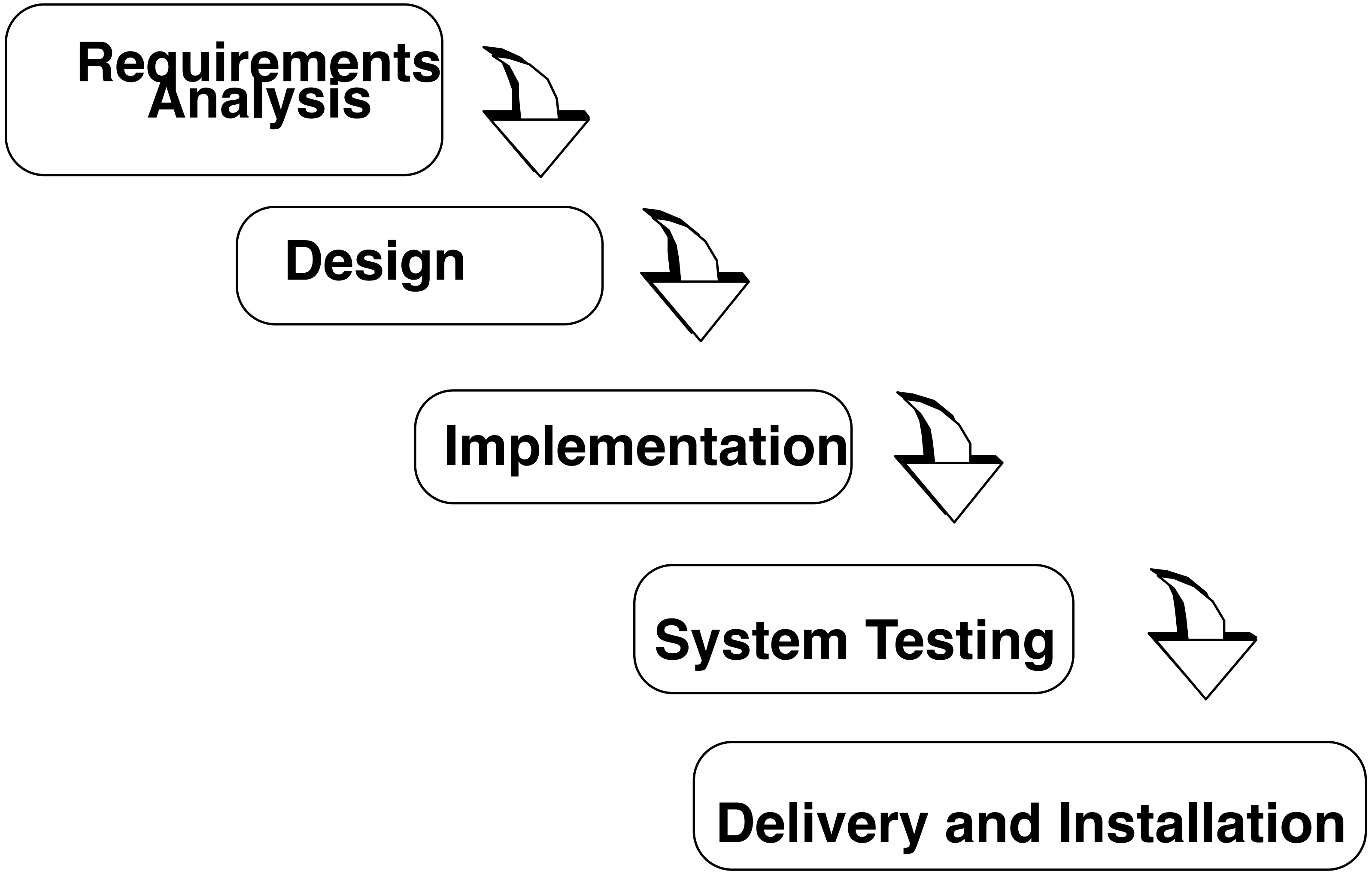
Object-Oriented Software Engineering
Using UML, Patterns, and Java

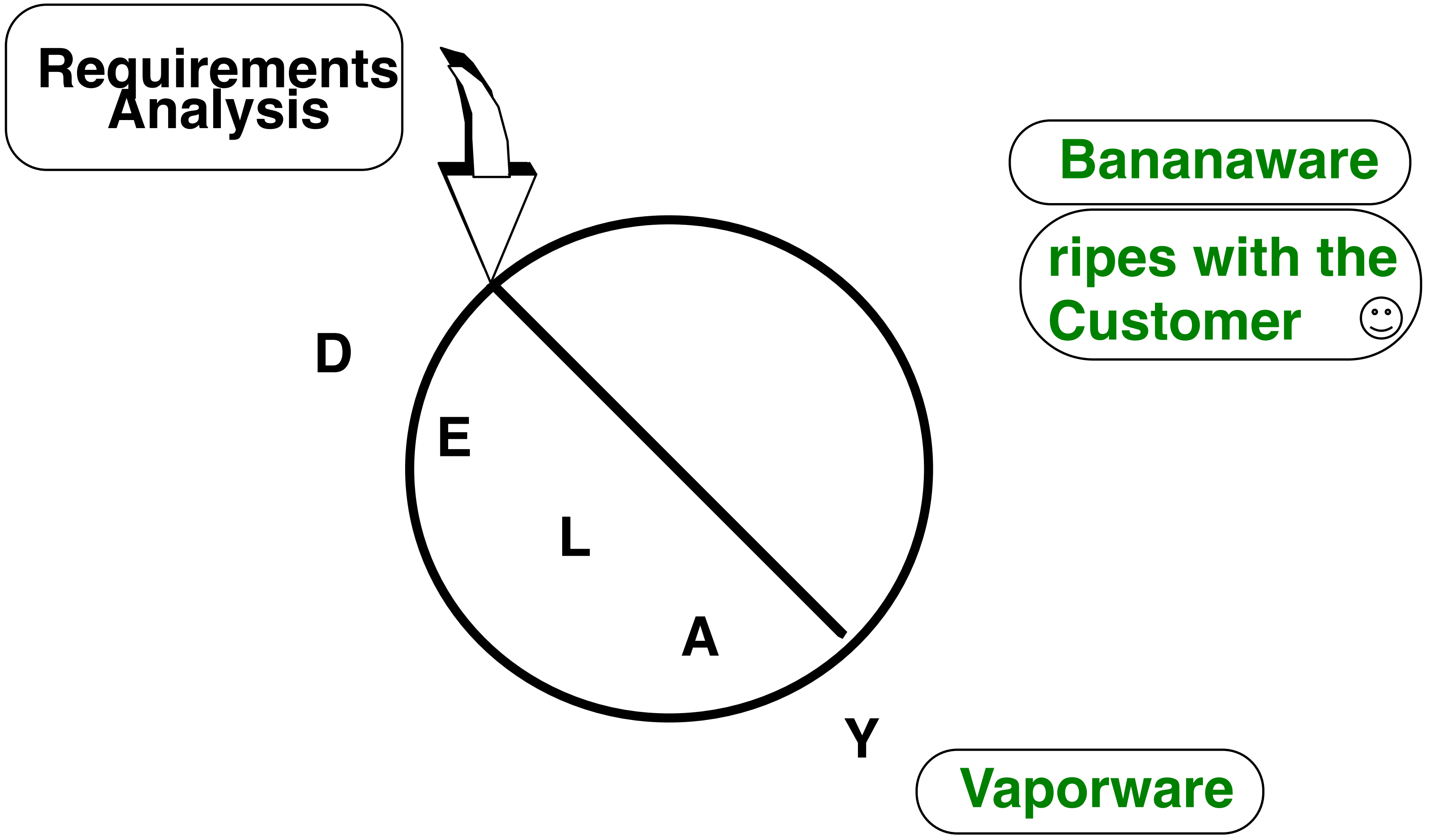


Chapter 3, Project Organization and Communication

How it should go



How it often goes



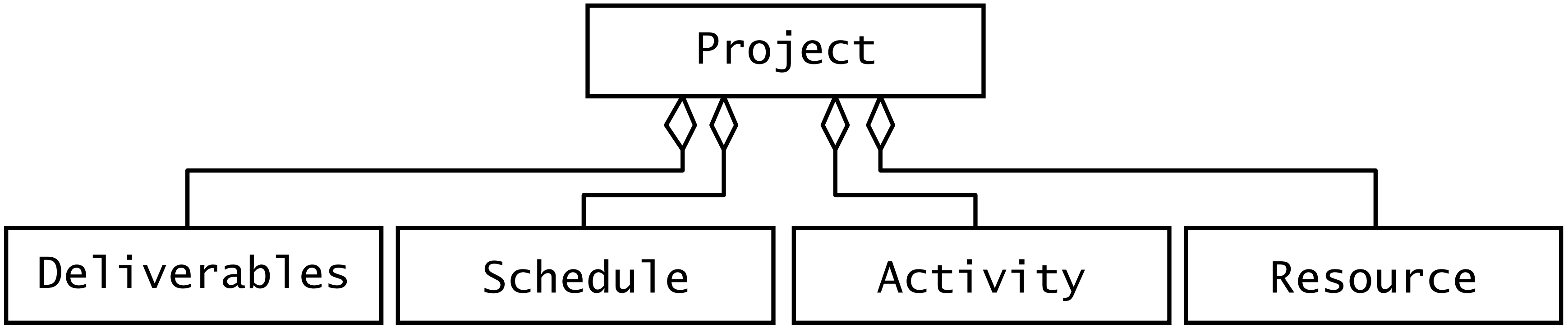
Laws of Project Management

- Projects progress quickly until they are 90% complete
  - Then they remain at 90% complete forever
- If project content is allowed to change freely, the rate of change will exceed the rate of progress
- Project teams detest progress reporting because it manifests their lack of progress
- Murphy’s law:
  - “When things are going well, something will go wrong”
  - “When things just can’t get worse, they will”
  - “When things appear to be going better, you have overlooked something.”

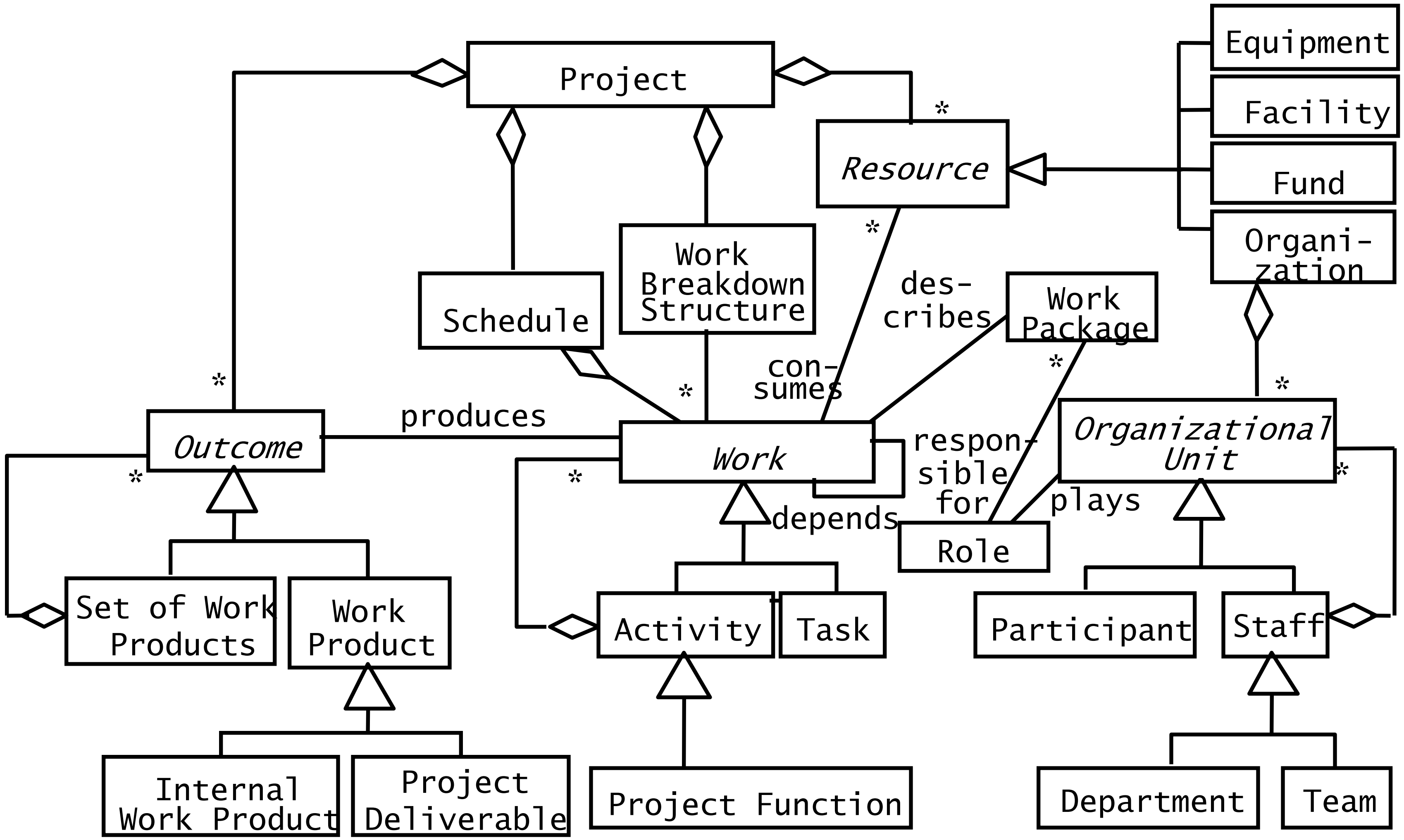
Project Definition

- A project is an undertaking, limited in time, to achieve a set of goals that require a concerted effort
- A project includes
  - A set of deliverables to a client
  - A schedule
  - Technical and managerial activities required to produce and deliver the deliverables
  - Resources consumed by the activities (people, budget)
- Focus of project management
  - Administer the resources
  - Maintain accountability
  - React to change
  - Make sure, the goals are met.

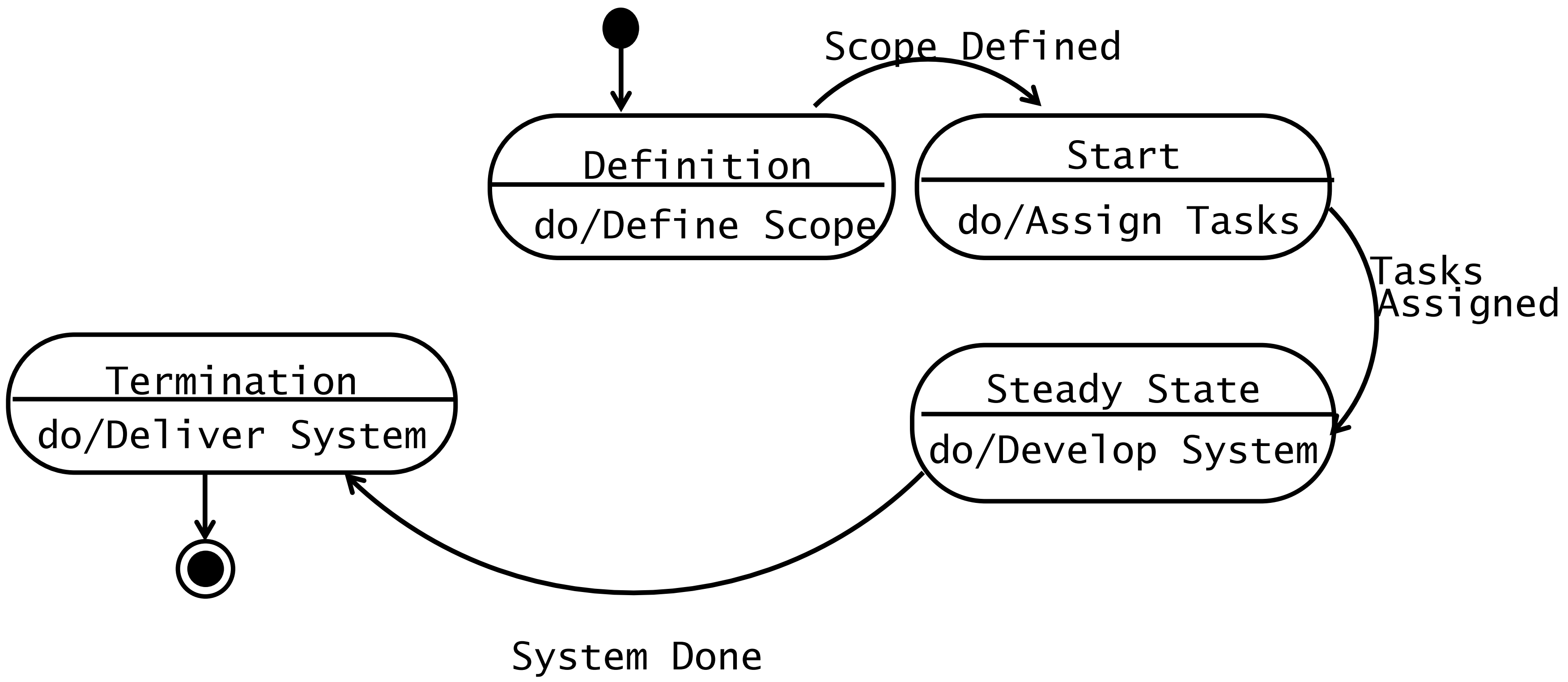
Simple Object Model of a Project



Refinement of the Model



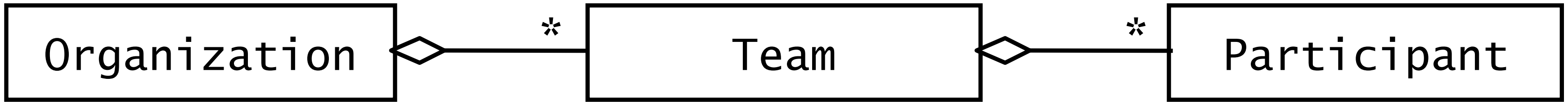
Dynamic Model of a Project



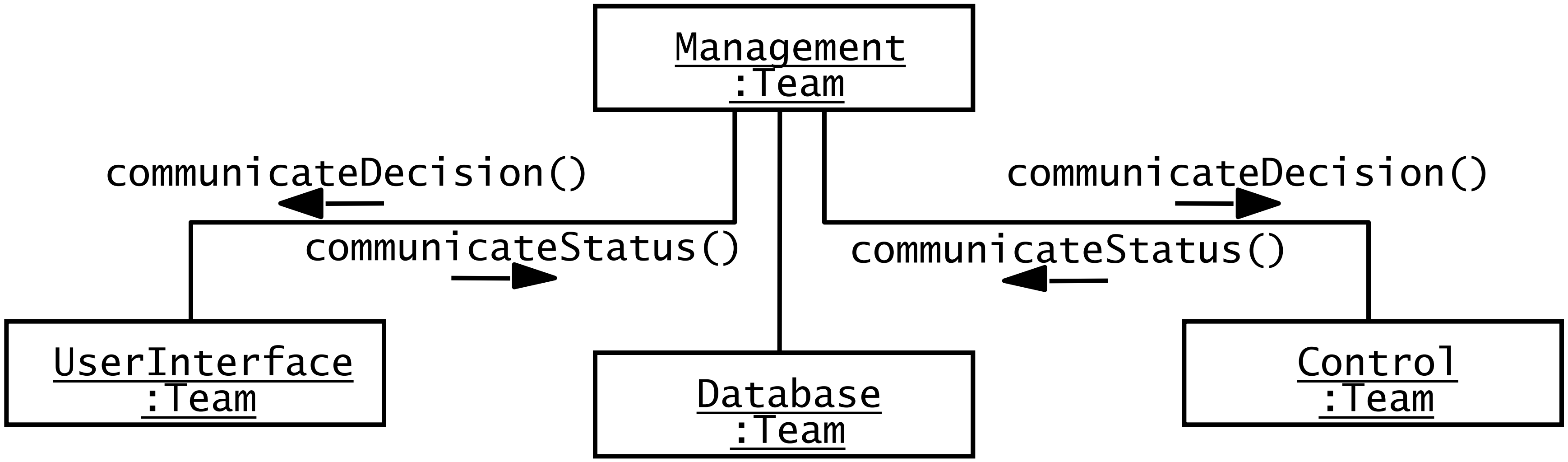
Project Organization

- A project organization defines the relationships among resources, in particular the participants, in a project

- A project organization should define
  - Who decides (decision structure)
  - Who reports their status to whom (reporting structure)
  - Who communicates with whom (communication structure)



Example of a Communication Structure

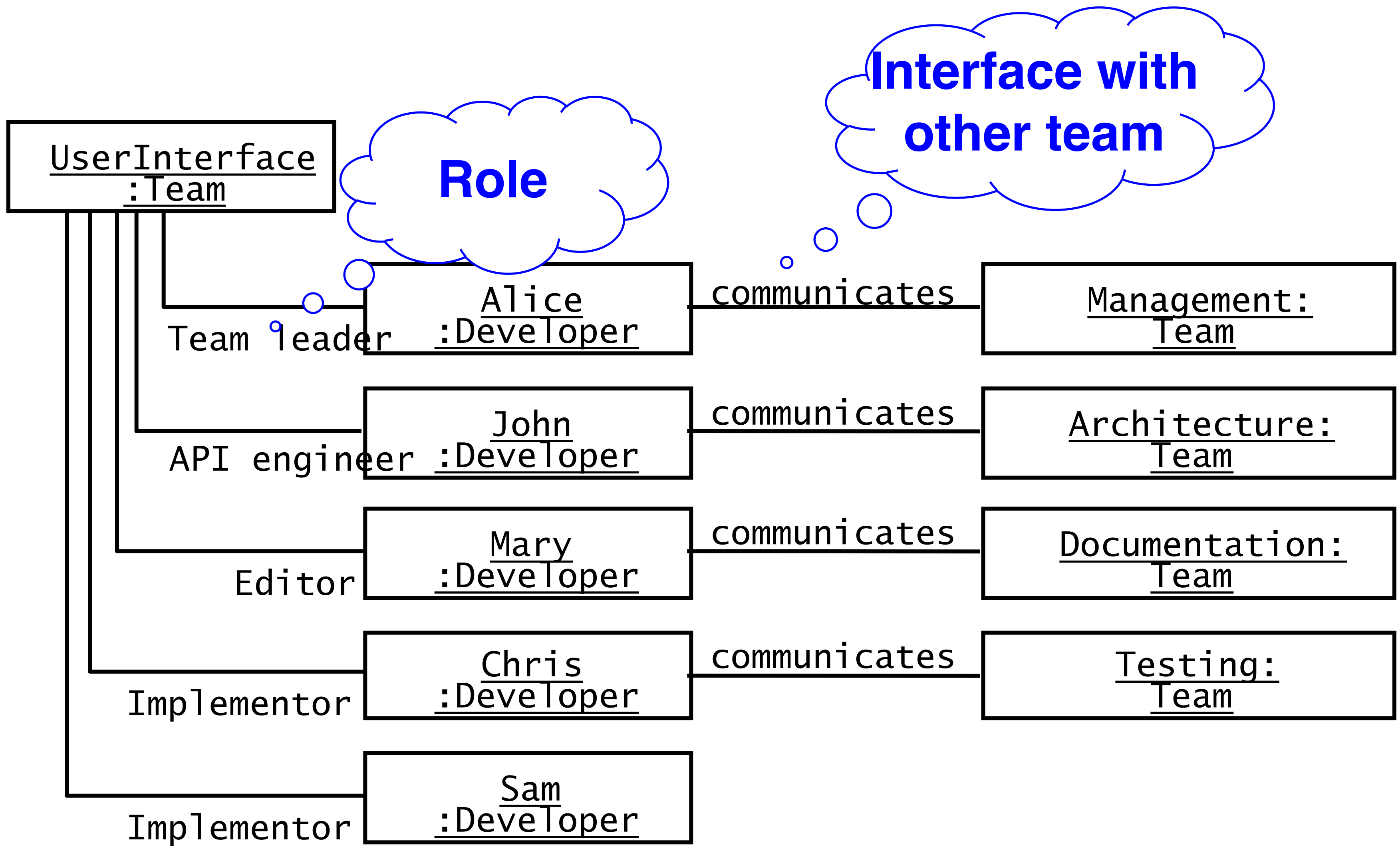


Reporting vs. Communication

- Reporting supports project management in tracking project status
  - What work has been completed?
  - What work is behind schedule?
  - What issues threaten project progress?

- Reporting along the hierarchy is not sufficient when two teams need to communicate
  - A communication structure is needed
  - A participant from each team is responsible for facilitating communication between both teams
  - Such participants are called **liaison**

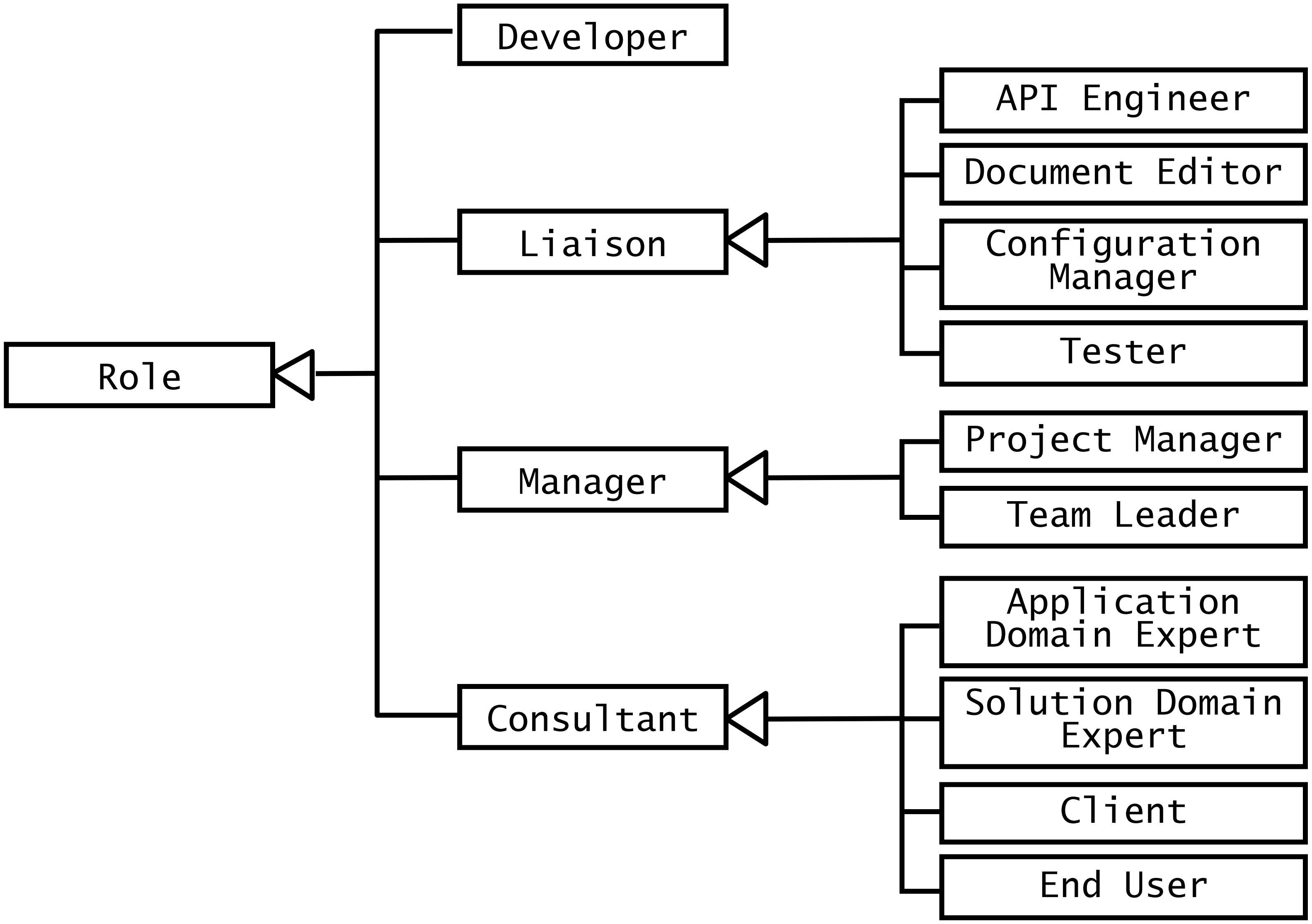
Example of a Communication Structure



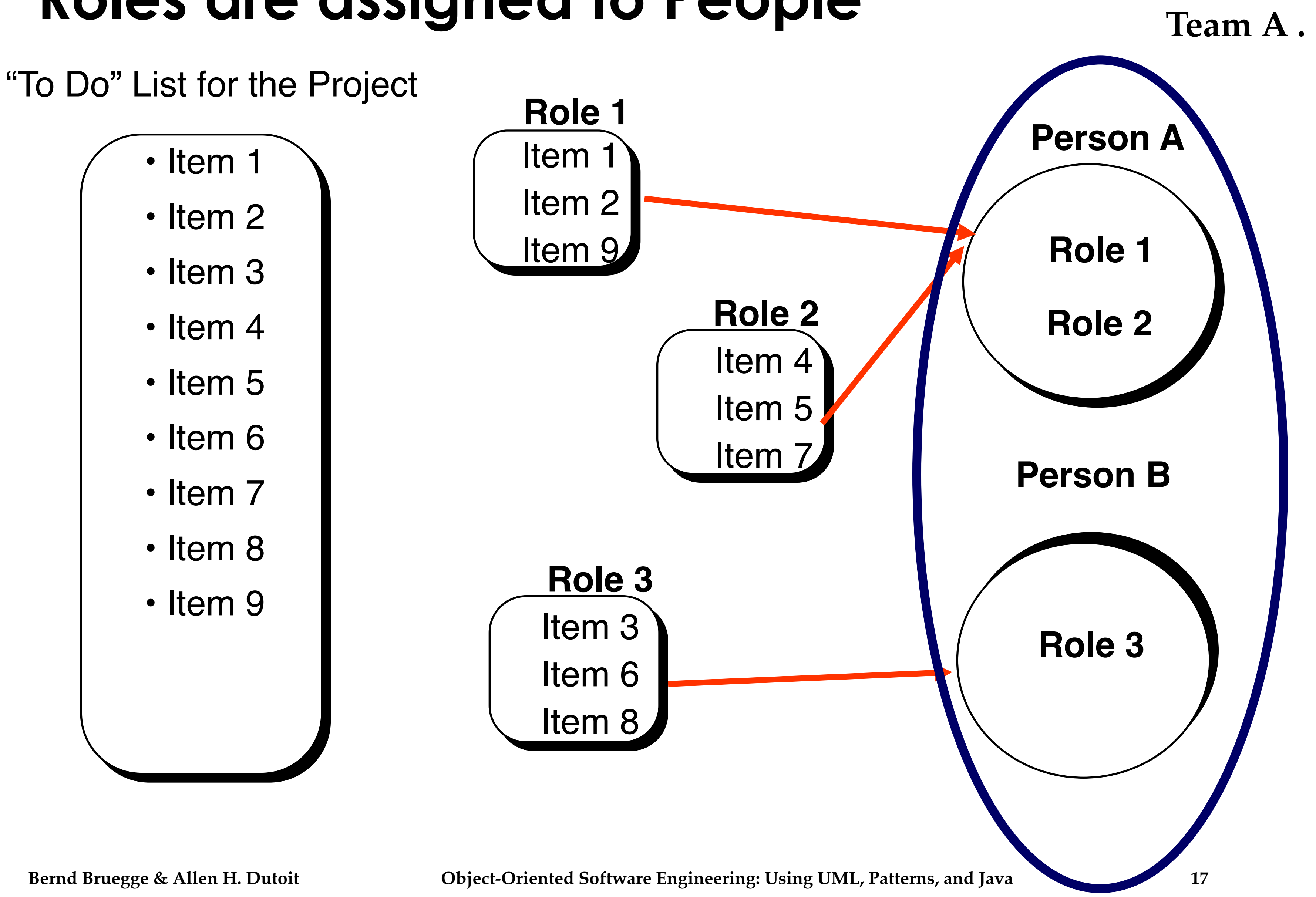
Role

- A role defines a set of responsibilities ("to-dos")
- Examples
- Role: Tester
  - Write tests
  - Report failures
  - Check if bug fixes address a specific failure
- Role: System architect
  - Ensure consistency in design decisions and define subsystem interfaces
  - Formulate system integration strategy
- Role: Liaison
  - Facilitate communication between two teams.

Types of Roles in Software Organizations



Responsibilities are assigned to Roles, Roles are assigned to People



Possible Mappings of Roles to Participants

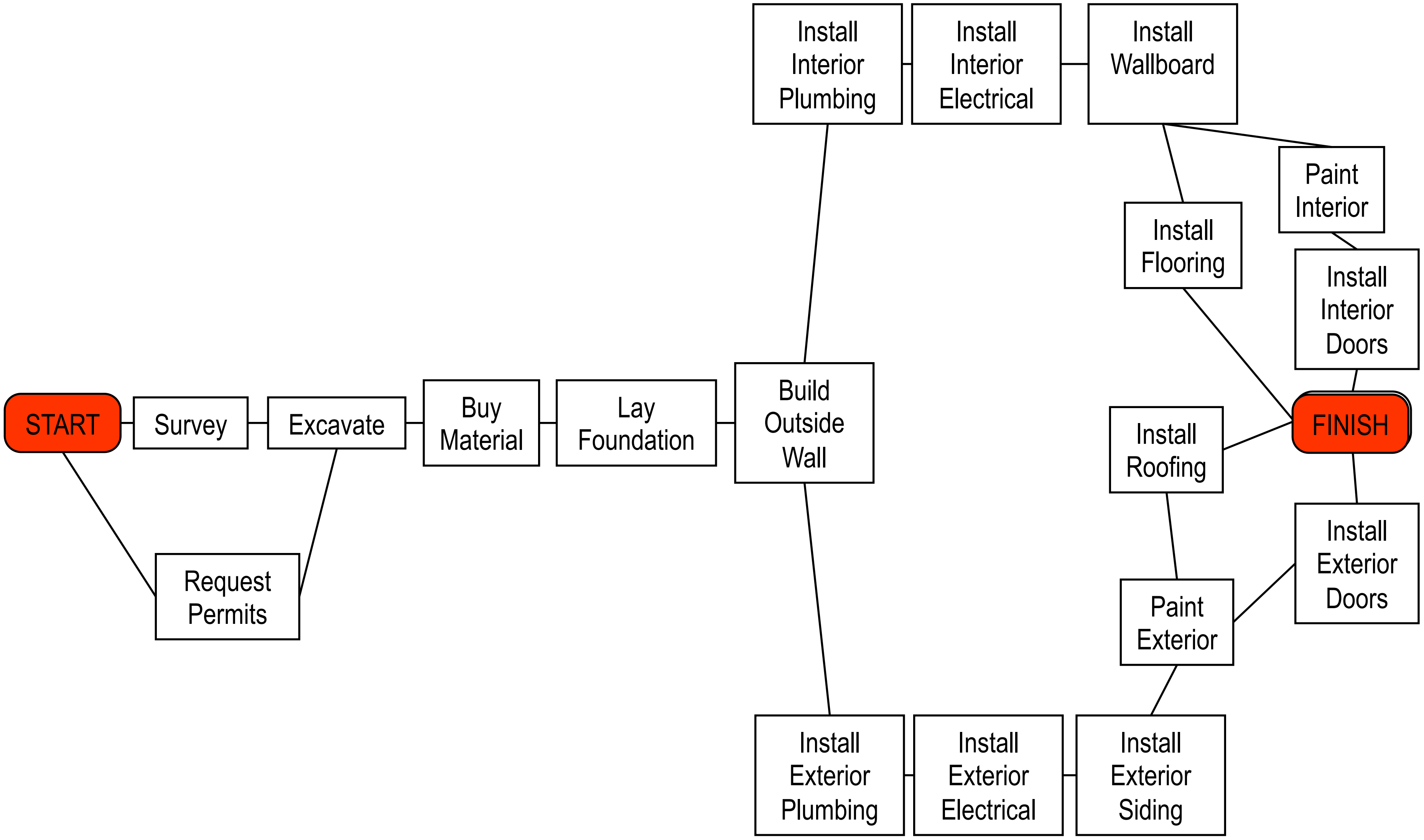
- One-to-One
  - Ideal but rare
- Many-to-Few
  - Each project member assumes several "hats"
  - Danger of over-commitment
  - Need for load balancing
- Many-to-"Too-Many"
  - Some people don't have significant roles
  - Lack of accountability
  - Loosing touch with project

Task

- A task describes the smallest amount of work tracked by management
- Typically 3-10 working days effort

- Tasks descriptions
  - Role
  - Work product
  - Start date
  - Planned duration
  - Required resources.

Example: Tasks for building a house



Tasks and Work Packages

- A task is specified by a work package
  - Description of work to be done
  - Preconditions for starting, duration, required resources
  - Work products to be produced, acceptance criteria for it
  - Risks involved
- A task must have completion criteria
  - Includes the acceptance criteria for the work products (deliverables) produced by the task.

Work Products

- A work product is a visible outcome of a task
- Examples
  - A document
  - A review of a document
  - A presentation
  - A piece of code
  - A test report
- Work products delivered to the customer are called **deliverables**

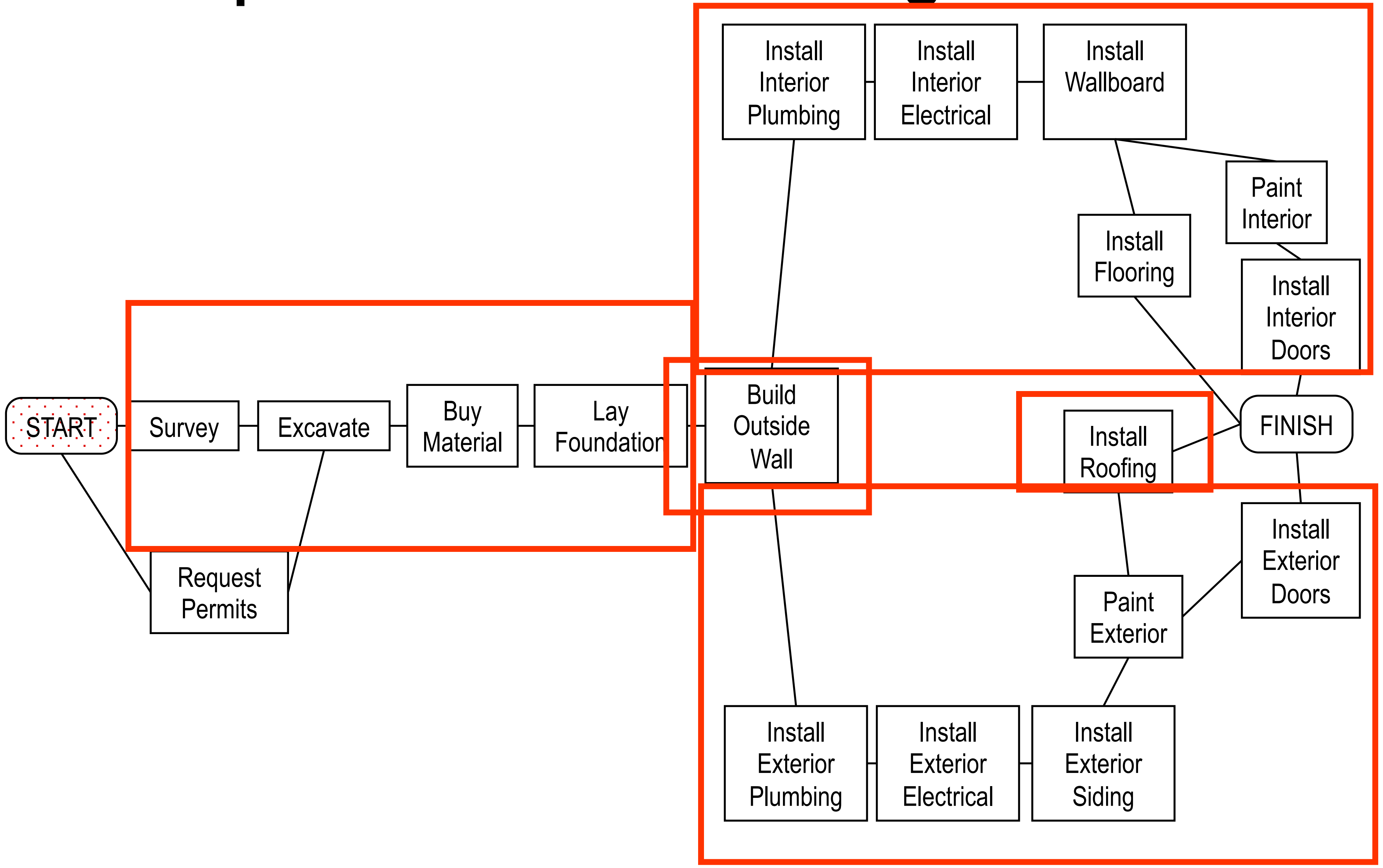
Task Sizes

- Tasks are decomposed into sizes that allow monitoring
  - You may not know how to decompose the problem into tasks at first
  - Depends on the nature of work and how well task is understood.
- Finding the appropriate size is crucial
  - To-do lists from previous projects
  - Each software development activity identifies more tasks and modifies existing ones.

Activities

- Major unit of work
- Culminates in a major project milestone:
  - Scheduled event used to measure progress
  - Internal checkpoints should not be externally visible
  - A project milestone usually produces a baseline
- Activities are often grouped again into higher-level activities with different names:
  - Phase 1, Phase 2 …
  - Step 1, Step 2 …
- Allows separation of concerns
- Precedence relations can exist among activities
  - Example: "A1 must be executed before A2"

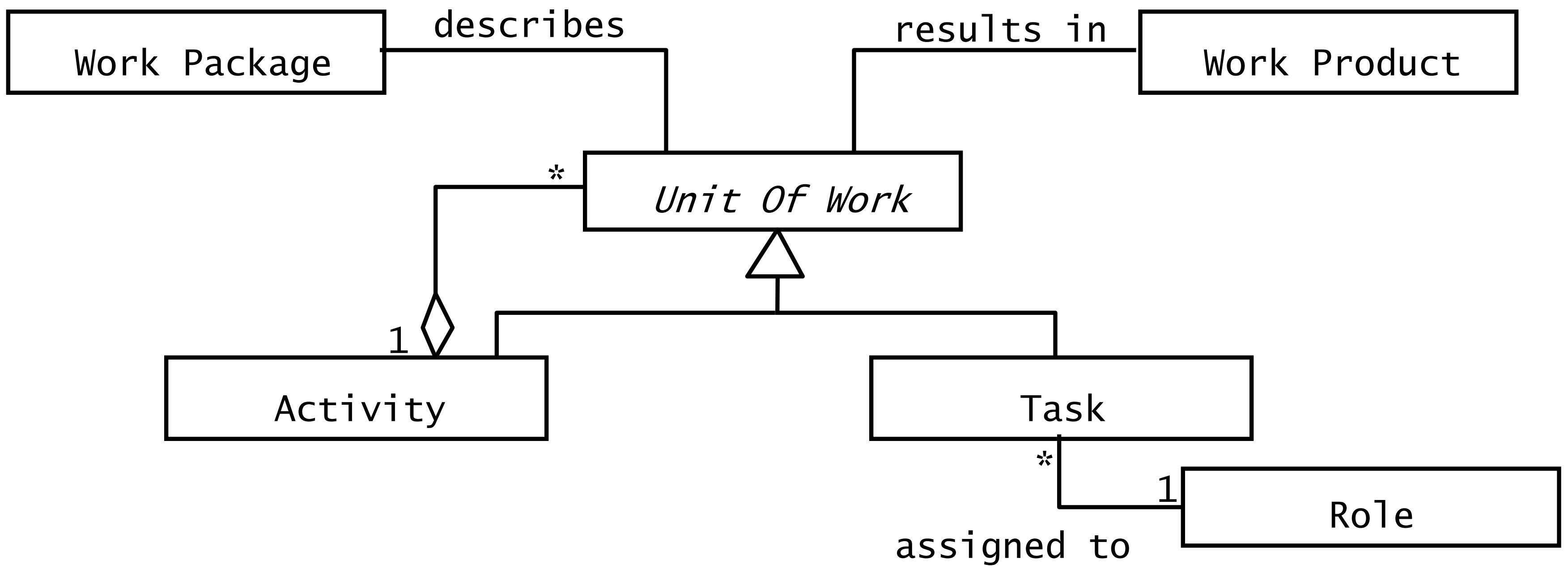
Example: Activities for Building a House



Examples of Software Engineering Activities

- Planning
- Requirements Elicitation
- Analysis
- System Design
- Object Design
- Implementation
- Testing
- Delivery

Associations between Tasks, Activities, Roles, Work Products, and Work Packages



Summary

- Projects are concerted efforts towards a goal that take place within a limited time
- Project participants are organized in terms of teams, roles, control relationships, and communication relationships.
- An individual can fill more than one role.
- Work is organized in terms of tasks assigned to roles and producing work products.

Communication is critical

- In large system development efforts, you will spend more time communicating than coding
- A software engineer needs to learn the so-called soft skills:
  - Collaboration
    - Negotiate requirements with the client and with members from your team and other teams
  - Presentation
    - Present a major part of the system during a review
  - Management
    - Facilitate a team meeting
  - Technical writing
    - Write part of the project documentation.

Communication Event vs. Mechanism

Communication event

- Information exchange with defined objectives and scope
- *Scheduled*: Planned communication
  - Examples: weekly team meeting, review
- *Unscheduled*:Event-driven communication
  - Examples: problem report, request for change, clarification

Communication mechanism

- Tool or procedure that can be used to transmit information
- *Synchronous*: Sender and receiver are communicating at the same time
- *Asynchronous*: Sender and receiver are not communicating at the same time.

Typical Initial Communication Activities in a Software Project

- Understand problem statement
- Join a team
- Schedule and attend team status meetings
- Join the communication infrastructure.

Understand the Problem Statement

- The problem statement is developed by the client
    - Also called scope statement
- A problem statement describes
    - The current situation
    - The functionality the new system should support
    - The environment in which the system will be deployed
    - Deliverables expected by the client
    - Delivery dates
    - Criteria for acceptance test.

Join a Team

- During the project definition phase, the project manager forms a team for each subsystem
- Additional cross-functional teams are formed to support the subsystem teams
- Each team has a team leader
- Other roles can include
  - Configuration manager
  - API-Liaison
  - Technical writer
  - Web master
- The responsibilities of the team and the responsibilities each member must be defined to ensure the team success.

Attending Team Status Meetings

- Important part of a software project: The regular team meeting (weekly, daily,…)
- Meetings are often perceived as pure overhead
- Important task for the team leader:
  - Train the teams in meeting management
    - Announce agendas
    - Write minutes
    - Keep track of action items
  - Show value of status meeting
  - Show time-saving improvements.

Join the Communication Infrastructure

- A good communication infrastructure is the backbone of any software project
  - Web-Portal, e-mail, Newsgroups, Lotus Notes
- Learn to use the appropriate communication mechanism for the information at hand
  - The appropriateness of mechanisms may depend on the organizational culture.
- Register for each communication mechanism which is used by the software project
  - Get an account, get training
- Questions to ask:
  - Are meetings scheduled in a calendar?
  - Does the project have a problem reporting system?
  - Do team members provide peer reviews in meetings or in written form?