

Project Organization & Communication

Books:

1. B. Bruegge and A. H. Dutoit, Object-Oriented Software Engineering: Using UML, Patterns, and Java
2. Quality Software Project Management by Robert T. Futrell et al.



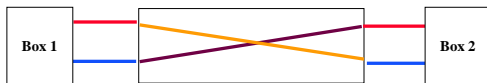
A Communication Example

"Two missile electrical boxes manufactured by different contractors were joined together by a pair of wires.



A Communication Example (continued)

Thanks to a particular thorough preflight check, it was discovered that the wires had been reversed."



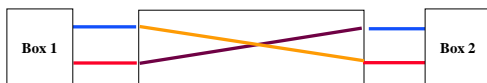
After the Crash...

...

"The postflight analysis revealed that the contractors had indeed corrected the reversed wires as instructed."



"In fact, both of them had."



Communication is important

In large system development efforts, you will spend more time communicating than coding

A software engineer needs to learn the so-called soft skills: technical writing, reading documentation, communication, collaboration, management, presentations.

In this section of the course, we ask each of you to (acquire and) demonstrate the following skills:

- Management
- Presentation
- Collaboration
- Technical writing



Definitions

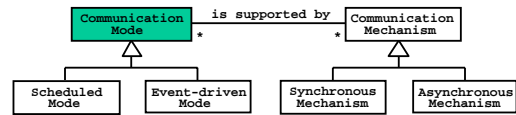
Communication mode

- Type of information exchange that has defined objectives and scope
- Scheduled: Planned Communication
- Event Driven: Unplanned Communication

Communication mechanism

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

Classification of Communication



Scheduled Communication Modes

Problem Definition

- Objective: Present goals, requirements and constraints
- Example: Client Presentation
- Usually scheduled at the beginning of a project.

Project Review: Focus on system model

- Objective: Assess status and review system model, system decomposition, and subsystem interfaces
- Examples: Analysis Review, System Design Review
- Scheduled around project milestones and deliverables

Client Review: Focus on requirements

- Objective: Brief client, agree on requirements changes
- Client Review
- Usually scheduled after analysis phase

Scheduled Communication Modes (continued)

Walkthrough (Informal)

- Objective: Increase quality of subsystem
- Example: Developer presents subsystem to team members, informal, peer-to-peer
- To be scheduled by each team

Inspection (Formal)

- Objective: Compliance with requirements
- Example: Client acceptance test (Demonstration of final system to customer)
- To be scheduled by project management

Scheduled Communication Modes (continued)

Status Review

- Objective: Find deviations from schedule and correct them or identify new issues
- Example: Status section in regular weekly team meeting
- Scheduled every week

Brainstorming

- Objective: Generate and evaluate large number of solutions for a problem
- Example: Discussion section in regular weekly team meeting
- Scheduled every week

Scheduled Communication Modes (continued)

Release

- Objective: Baseline the result of each software development activity
- Software Project Management Plan (SPMP)
- Requirements Analysis Document (RAD)
- System Design Document (SDD)
- Object Design Document (ODD)
- Test Manual (TM)
- User Manual (UM)
- Usually scheduled after each phase

Postmortem Review

- Objective: Describe Lessons Learned
- Scheduled at the end of the project

Event Driven Communication Modes

Request for clarification

- The bulk of communication among developers, clients and users.
- Example: A developer may request a clarification about an ambiguous sentence in the problem statement.

Request for change

- A participant reports a problem and proposes a solution
- Change requests are often formalized when the project size is substantial.
- Example: A participant reports of a problem the air conditioner in the lecture room and suggests a change.

Issue resolution

- Selects a single solution to a problem for which several solutions have been proposed.
- Uses issue base to collect problems and proposals



Synchronous Communication Mechanisms

Smoke signals

- Supports: ?, Pros: ?, Cons: ?

Hallway conversation (face-to-face)

- Supports: Unplanned conversations, Request for clarification, request for change
- Pro: Cheap and effective for resolving simple problems
- Con: Important information can be lost, misunderstandings can occur when conversation is relayed to others.

Meeting (face-to-face, telephone, video conference)

- Supports: Planned conversations, client review, project review, status review, brainstorming, issue resolution
- Pro: Effective mechanism for resolution of issues, and building consensus
- Con: High cost (people, resources); difficulty of managing them and getting effective results



Meeting Roles

• Primary facilitator

- Responsible for organizing the meeting and guiding the execution.
- Writes the agenda describing objective and scope of meeting.
- Distribute the agenda to the meeting participants

• Minute taker

- Responsible for recording the meeting.
- Identifies action items and issues
- Release them to the participants

• Time keeper

- Responsible for keeping track of time



Asynchronous Communication Mechanisms

E-Mail

- Supports: Release, change request, brainstorming
- Pro: Ideal for event-driven communication modes and announcements.
- Con: E-mail taken out of context can be easily misunderstood, sent to the wrong person, lost or not read by the receiver.

Newsgroups

- Supports: Release, change request, brainstorming
- Pro: Suited for notification and discussion among people who share a common interest; cheap (shareware available)
- Con: Primitive access control (often, you are either in or out)

World Wide Web

- Supports: Release, change request, inspections
- Pro: Provide the user with a hypertext metaphor: Documents contain links to other documents.
- Con: Does not easily support rapidly evolving documents



Asynchronous Communication Mechanisms

Lotus Notes

- Each user sees the information space as a set of databases, containing documents composed of a set of fields. Users collaborate by creating, sharing and modifying documents
- Supports: Release, change request, brainstorming
- Pro: Provides excellent access control mechanisms and replication of databases.
- Con: Proprietary format, expensive



Example: Document Review with Lotus Notes

• Use cases:

- Fill out a review form
 - Attach document to be reviewed
 - Distribute the review form to reviewers
 - Wait for comments from reviewers
 - Review comments
 - Create action items from selected comments
 - Revise document and post the revised version
 - Iterate the review cycle
- The following example demonstrates a document review database from JAMES project.



Fill out the Review Form

- Select reviewers
- Select the document to be reviewed
- Add comments to reviewers
- Determine deadline

Review Tasks

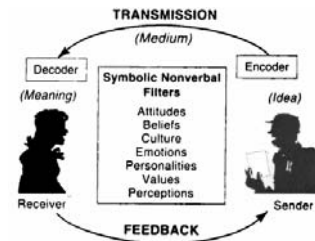
- Editor reviews comments
- Editor selects reviewed comments
- Web Master posts reviewed document and action items
- Team members complete their action items
- Editor integrates changes
- Editor posts changed document on the review database for the next review cycle

Effective Communication I



Effective Communication II

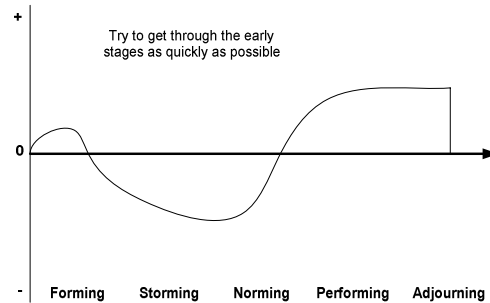
A person (sender) with an idea may simply want to transmit it to another, but the process is really quite complex (cf. figure below)



Communicating with Teams

Stage	Activity	Characterized by
Forming (S1)	Members find out: what they will be doing, the styles of acceptable leadership, and possible kinds of interpersonal and task relationships.	Courtesy, confusion, caution, and commonality
Storming (S2)	Members begin resisting the influence of the group, there is conflict over competing approaches to reaching the group goals	Tension, criticism, and confrontation
Norming (S3)	Resistance is overcome as the group: establishes its rules and standards, develops intragroup cohesiveness, and delineates task standards and expectations.	Cooperation, collaboration, cohesion, and commitment
Performing (S4)	The group is ready to focus attention on task accomplishment. Issues of interpersonal relations, member status, and division of tasks are settled.	Challenge, creativity, group consciousness, and consideration of members
Adjourning	The group has fulfilled its purpose or died	Compromise, communication, consensus, closure

Team Dynamics - Productivity



Expectancy Theory I

- Expectancy theory suggests that the strength of a tendency to act in a certain way (motivation) depends on the strength of an expectation that the act will be followed by a given outcome (the perceived likelihood of getting something) and on the attractiveness of that outcome to the individual. The theory focuses on three relationships:
 - Effort-performance relationships, or the probability perceived by the individual that exerting a given amount of effort will lead to performance
 - Performance-reward relationship, or the degree to which the individual believes that performing at a particular level will lead to the attainment of a desired outcome
 - Rewards-personal goals relationship, or the degree to which organizational rewards satisfy an individual's personal goals or needs, and the attractiveness of those potential rewards for the individual.

Expectancy Theory II

- Motivational Forces = Expectancy x Instrumentality x Valence
- Expectancy (E) (effort-to-performance)
 - Instrumentality (I) (performance-to-outcome expectancy)
 - Valence (V) (perceived performance-reward probability)
- An individual will act in a certain way based on the expectation that the act will be followed by a given outcome and on the attractiveness of that outcome to the individual.
 - Effort leads to performance (How hard will I have to work?). Performance leads to reward (What is the reward?).
 - For workers to be motivated to perform desired behaviors at a high level valence must be high, instrumentality must be high, and expectancy must be high.
- EFFORT = V x I x E**

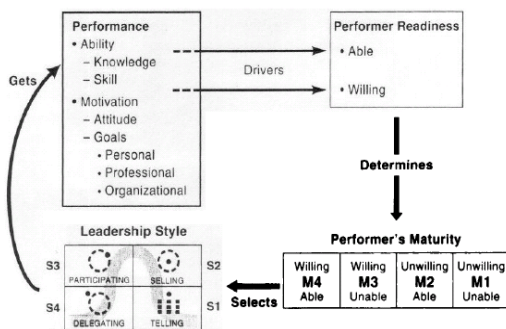
The Equity Theory

- Equity implies that we are being treated fairly in relation to others. This is a psychological state residing within individual. The comparisons that individuals use tend to fall into five classes of comparison:
 - Job equity - Individuals compare their pay to the pay of other individuals in the same position that they hold within their organization.
 - Company equity - Individuals compare their pay to the pay of other individuals holding different positions within their organization.
 - Occupational (market) equity - Individuals compare their pay to the pay of other individuals holding the same position in other organizations.
 - Cohort equity - Individuals compare their pay to the pay of others in similar cohort groups, generally those based on age and education.
 - Self-equity - Individuals compare their pay to the pay that they received at another point in time.

Goal Setting Theory

- Goal setting is the process of improving individual or group job performance with formally stated objectives, deadlines, or quality standards.
- Goals are able to motivate by directing attention, encouraging effort, encouraging persistence, and fostering goal-attainment strategies and action plans.
- The goals must be specific, difficult, and participatively set.
- The theory is that specific and difficult goals lead to higher performance. Goals tell an employee what needs to be done and how much effort will need to be expended.
- Difficult goals, when accepted, result in higher performance than do easy goals.

Project Manager's Role – Situational Leadership



Summary

- Communication Modes
 - Scheduled communication
 - Event-driven communication
- Communication Mechanisms
 - Asynchronous communication mechanisms
 - Synchronous communication mechanisms
- Important modes and mechanisms
 - Weekly meeting
 - Project reviews
 - Online communication (discussion forum, email, web)