Faculty of Computer Science
University of Indonesia

Topic 02:
Generic Process Model

Previous Session: Review

- What were we discuss in the previous session?
- What is the difference between hardware and software?
- What is software engineering?
- What are framework activities?
- What are umbrella activities?

Outline

- Why do we need Process
  - ❖The meaning of process
- Software Development Process
- Five Generic Framework Activities
- Software Development Process Flows
- Generic Software Development Process Models

References

- [Pressman, 2010] Pressman, Roger S. Software Engineering: A Practitioner's Approach. New York: McGraw-Hill Higher Education, 2010.
- [Dennis, 2010] Dennis, Alan, et. al., System Analysis and Design with UML 3rd Edition, John Wiley & Sons, 2010.

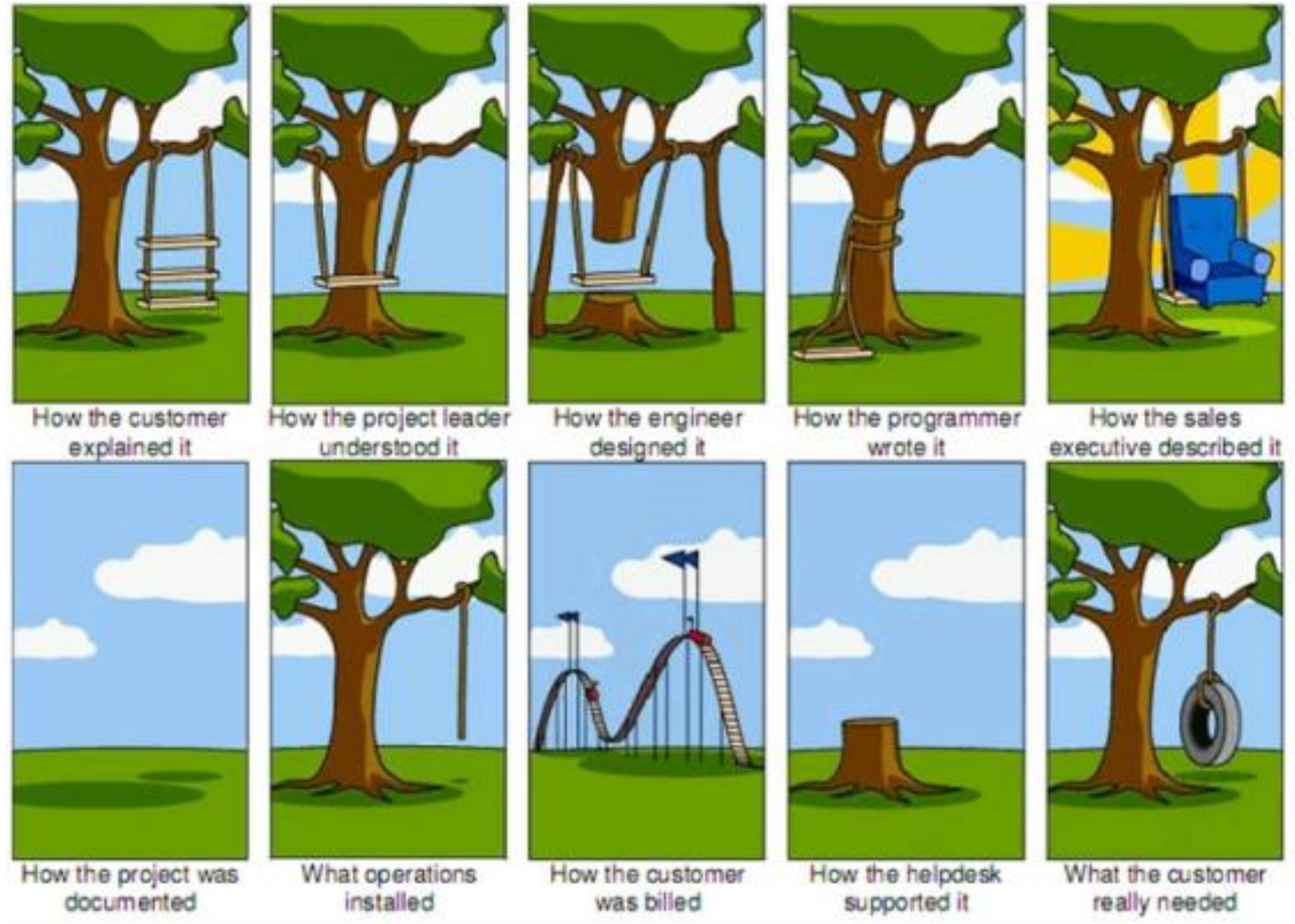
Why do we need to use a process model?

- Many failed systems were abandoned because software engineers tried to build wonderful systems without understanding how the system would fit with the organization's goals

The primarily goal of information system is to create value for the organization

- ❖Profit for most organization/company


How the customer explained it


How the customer explained it
How the project leader understood it
How the engineer designed it
How the programmer wrote it
How the sales executive described it
How the project was documented
What operations installed
How the customer was billed
How the helpdesk supported it
What the customer really needed

“If the process is right, the results will take care of themselves”

Takashi Osada

Software Process

- Software, like all capital, is embodied knowledge, and because that knowledge is initially dispersed, tacit, latent, and incomplete in large measure, software development is a social learning process.
- The process is a dialogue in which the knowledge that must become the software is brought together and embodied in the software.
- The process provides interaction between users and designers, between users and evolving tools, and between designers and evolving tools [technology].
- It is an iterative process in which the evolving tool itself serves as the medium for communication, with each new round of the dialogue eliciting more useful knowledge from the people involved.

Prologue

- Engineering software is both a creative and a step-by-step process which often involving many people.
- Engineering software is also an iterative social learning process.
  - ❖The outcome is an embodiment of knowledge collected, distilled and organized as process is conducted

- How would you define “process”?

The Meaning of Process

- A process is a series of steps composed of:
  - ❖activities
  - ❖actions, and
  - ❖tasks

that are performed when some work product is to be created.

- A process defines who is doing what, when, and how to reach a certain goal (Ivar Jacobson, Grady Boach, and J Rumbaugh)

The Meaning of Process

- Process is also called **life cycles** when it involves the building of some product
- Software development process is also called **software life cycle**
  - ❖It describes the life of a software product from its conception to its implementation, delivery, use and maintenance.
- Processes impose consistency and structure on a set of activities.

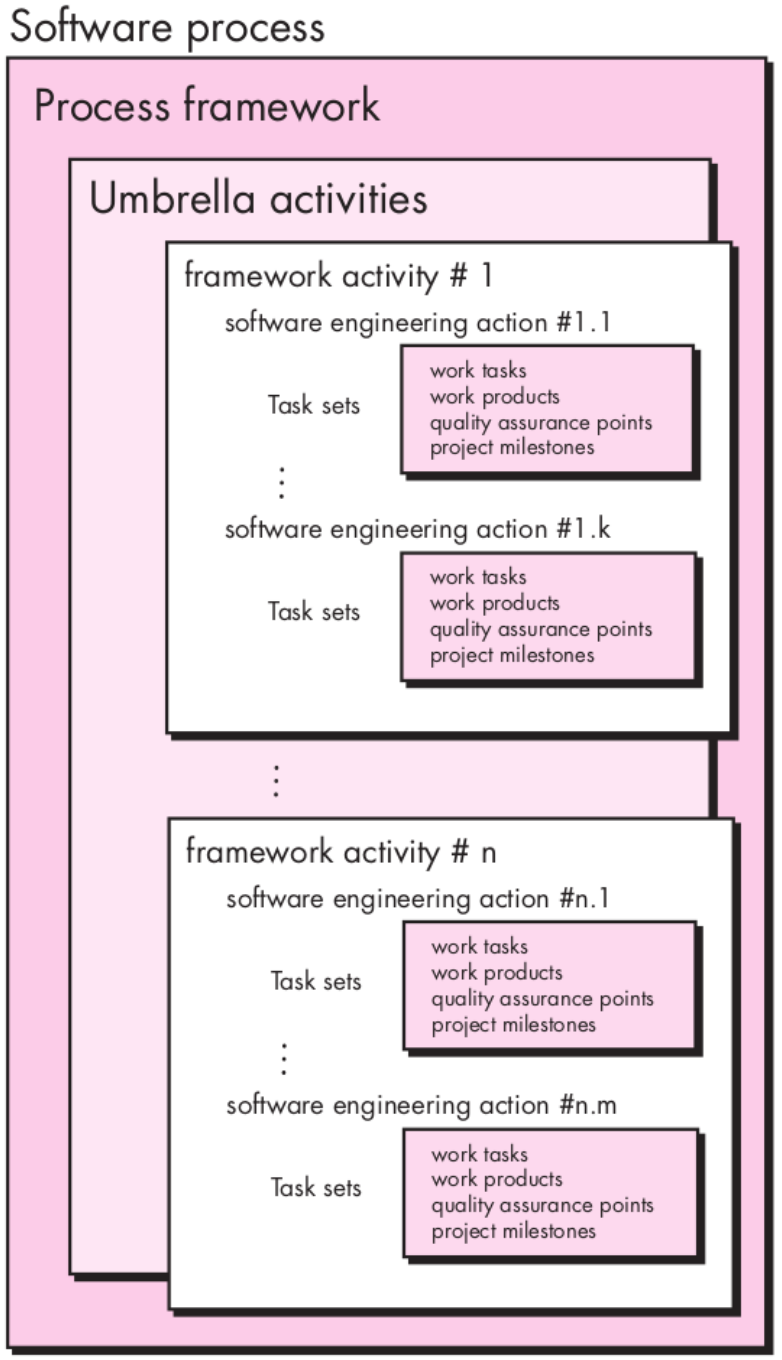
Software Development Process

- Software process is **a framework for the activities, actions, and tasks** that are required to build high-quality software [Pressman, 2010].
- A structured set of activities required to develop a software system [Sommerville, 2007].

Characteristics of Software Process Model

- [Sommerville, 2007] describes the characteristic of software process as:
  - ❖ prescribes major activities
  - ❖ utilizes resources, subject to constraints such as schedule, to produce intermediate and final results
  - ❖ constraints and controls apply to activities, resources, and products
    - constraints on activities: time, budget, tools
    - controls on activities: config. mgmt, reports

Software Process Framework



Software Development Process

- An **activity** strives to achieve a broad objective (e.g. communication with stakeholders) and is applied regardless of:
  - ❖the application domain
  - ❖size of the project
  - ❖complexity of the effort, or
  - ❖degree of rigor with which software engineering is to be applied

Software Development Process

- An **action** (e.g. architectural design) encompasses a set of tasks that produce a major work product (e.g. architectural design model)
- A **task** focuses on small, but well-defined objective (e.g. conducting a unit test) that produces a tangible outcome.

Activity, Action, Task (Case 1)

- Case Study 1:

- A small software project requested by one person (at a remote location) has a simple, straightforward requirements.

Activity, Action, Task (Case 1)

- Activity: Communication
- Action: Requirement Gathering
- Tasks:
  - Make contact with stakeholder via telephone
  - Discuss requirements and develop notes
  - Organize notes into a brief written statement of requirements
  - Email to stakeholder for review and approval

Activity, Action, Task (Case 2)

- Case Study 2:

- A large and complex software project with many stakeholders.

Activity, Action, Task (Case 2)

- Activity: Communication
- Action: Requirement Gathering
- Tasks:
  - Make a list of stakeholders
  - Interview each stakeholder separately to determine overall wants and needs
  - Build a preliminary list of functions and features based on stakeholders input
  - Scheduled a series of facilitated application specification meetings

Activity, Action, Task (Case 2)

- Tasks:
  - Conduct meetings
  - Produce informal user scenarios as part of each meeting
  - Refine user scenarios based on stakeholder feedback
  - Build a revised list of stakeholder requirements
  - Discuss methods for validating the system
  - …

Five Generic Framework Activities

- Communication
- Planning
- Modeling
- Construction
- Deployment

[Pressman, 2010]

Communication

- Conducted before any technical work can commence
- Communicate and collaborate with customers and other stakeholders
- The intent is to understand stakeholders' objectives for the project and to gather requirements that help define software features and functions

Planning

- Any complicated journey can be simplified if a map exists.
- Planning activity creates a “map” that helps guide the team as it makes the journey.
- The map is called software project plan (defines software engineering work)
  - ❖technical tasks to be conducted
  - ❖risks that are likely
  - ❖the resource required, the work product to be produced, and work schedule

Modeling

- Create a “sketch” of the thing so that you’ll understand the big picture
  - what it will look like architecturally
  - how the constituent parts fit together
  - etc
- The goal is to better understand software requirements and the design that will achieve those requirements

Construction

- **Code generation** (either manual or automated)
- **Testing** that is required to uncover errors in the code

Deployment

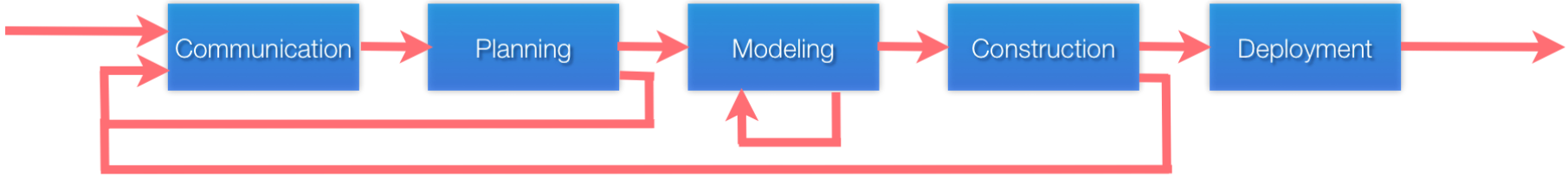
- Completed software is delivered to the customer who evaluates the delivered product and provides feedback based on the evaluation

Software Development Process Flows

- Process flow describes how the framework activities and the actions and tasks that occur within each framework activity are organized with respect to sequence and time.
- There are four process flow, based on [Pressman, 2010], (see next slide for illustrations)

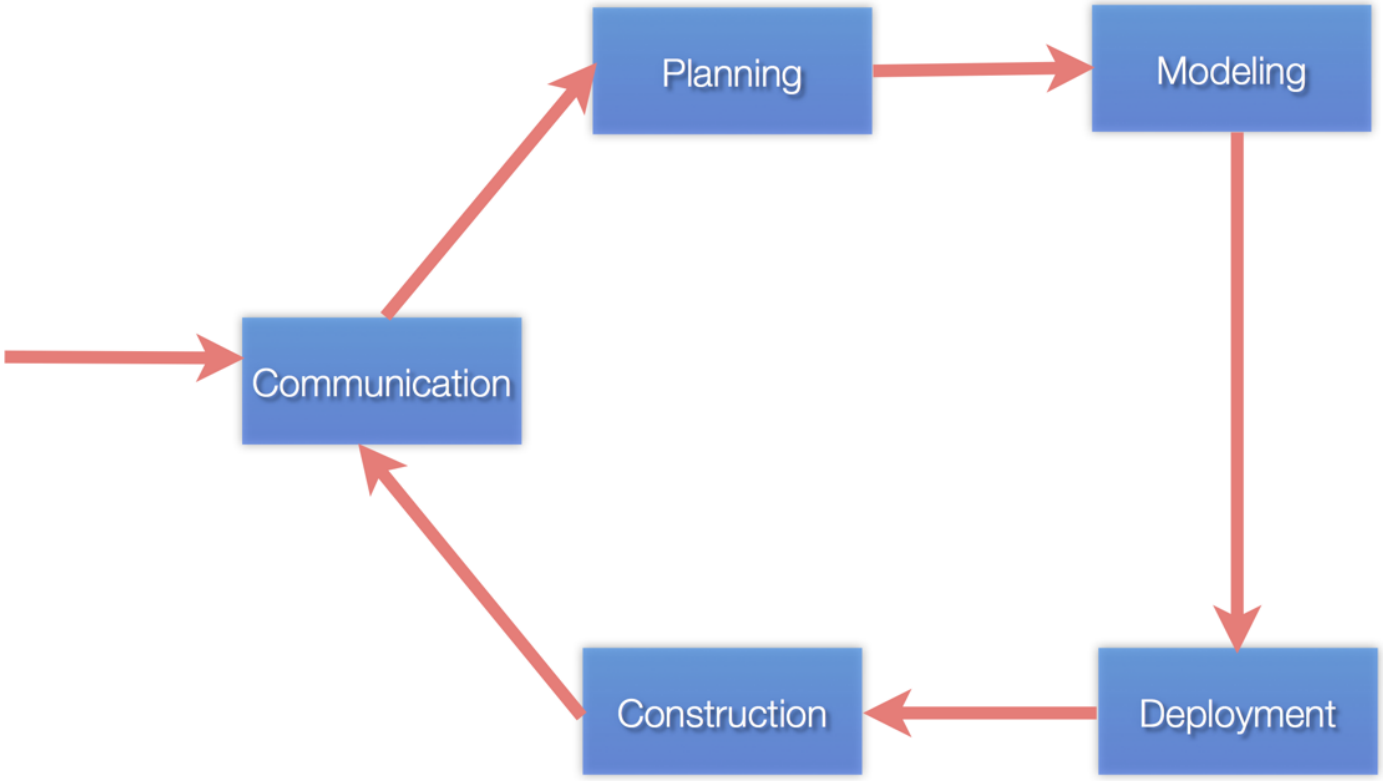
Software Development Process Flow

(a) Linear process flow



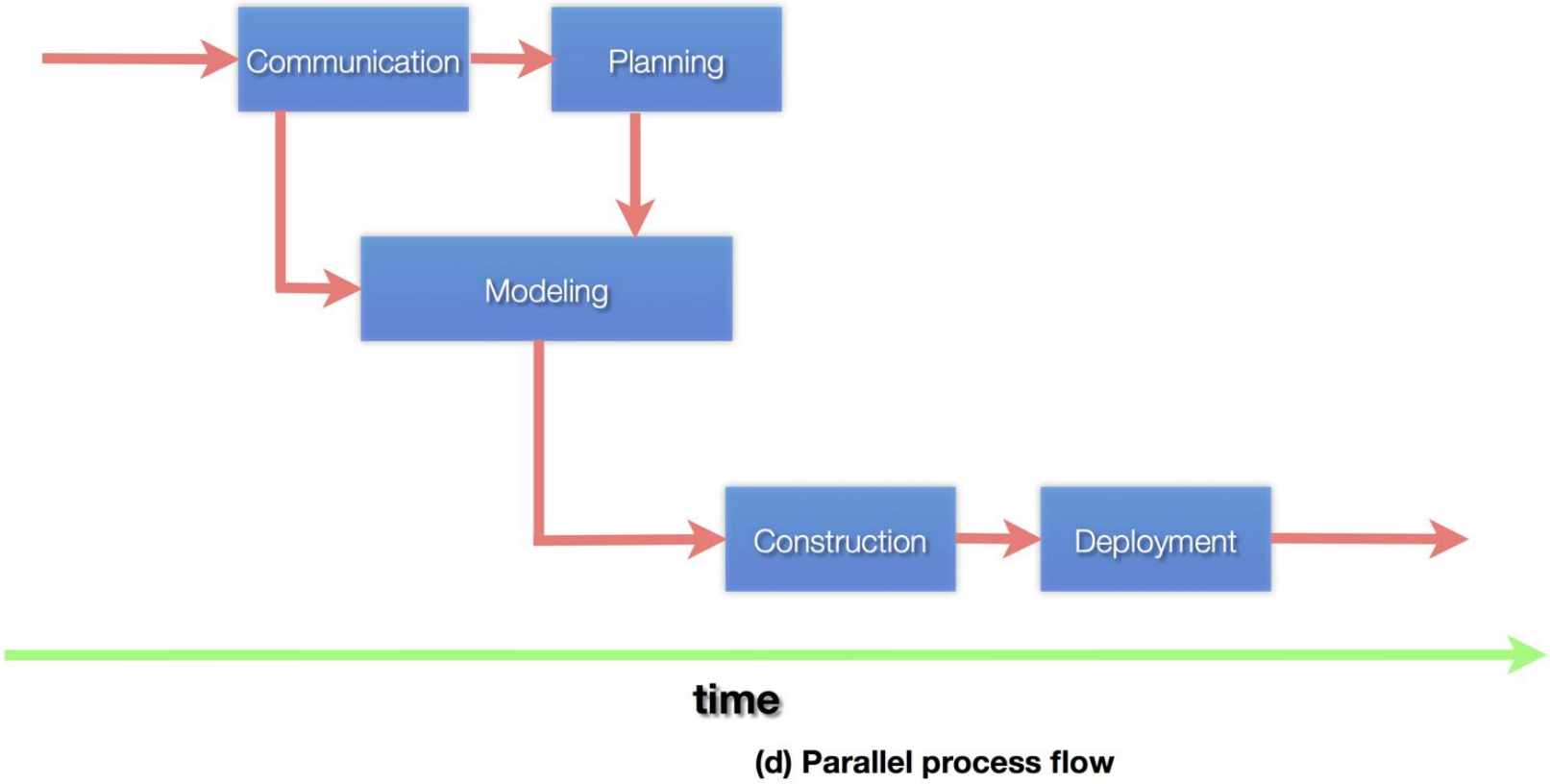
(b) Iterative process flow

Software Development Process Flow



(c) Evolutionary process flow

Software Development Process Flow



(d) Parallel process flow

Generic Software Development Process Models

- A software process model is **an abstract representation of a process**. It presents a description of a process from some particular perspective.
- Process should be:
  - **Visible**: Activities should provide clear indications of progress (deadlines/milestones)
  - **Understandable**: Activities and their order of execution are well-defined
  - **Supportable**: Automated support for activities is available
  - **Usable**: Process is acceptable to and usable by developers

Q & A

What's Next?

- Generic Process Model [DONE]
- Prescriptive Process Model
- Agile Development

Your turn!

Group Assignment 1

- Study and prepare the topic for presentation
- Submit presentation file (ppt) to Scele (deadline: 09-09-2019)
- Each group member must get a chance to speak during the presentation/discussion
- Scoring will be based on:
  - Document (presentation file)
  - Individual Performance (clarity, comprehension)
  - Ability to answer question

Topic

1) Waterfall
2) Incremental
3) Prototyping
4) Spiral
5) Unified Process
6) Agile Development
7) Extreme Programming
8) Scrum

Schedule

Presentation: 10 minutes

Discussion: 5 minutes

09-09-2019: Group 1, 2, 3

11-09-2019: Group 4, 5

16-09-2019: Group 6, 7, 8, Quiz 1