Lecture : 02

The Role of Measurement in SPM

Software Process Management

Today’s Objective

1) What is the need to measure process?

2) Process Vs Project characteristics

3) Responsibilities and objectives of SPM

4) Software process model

5) perspective vs descriptive process model

6) relationship between product and process

Why Measure?

❑ Advances in technology are continually increasing

❑ the demand for software that is larger more robust, and more reliable over ever-widening ranges of application

❑ new technologies,

❑ more competitive markets,

❑ increased competition for experienced personnel,

❑ demands for faster responsiveness

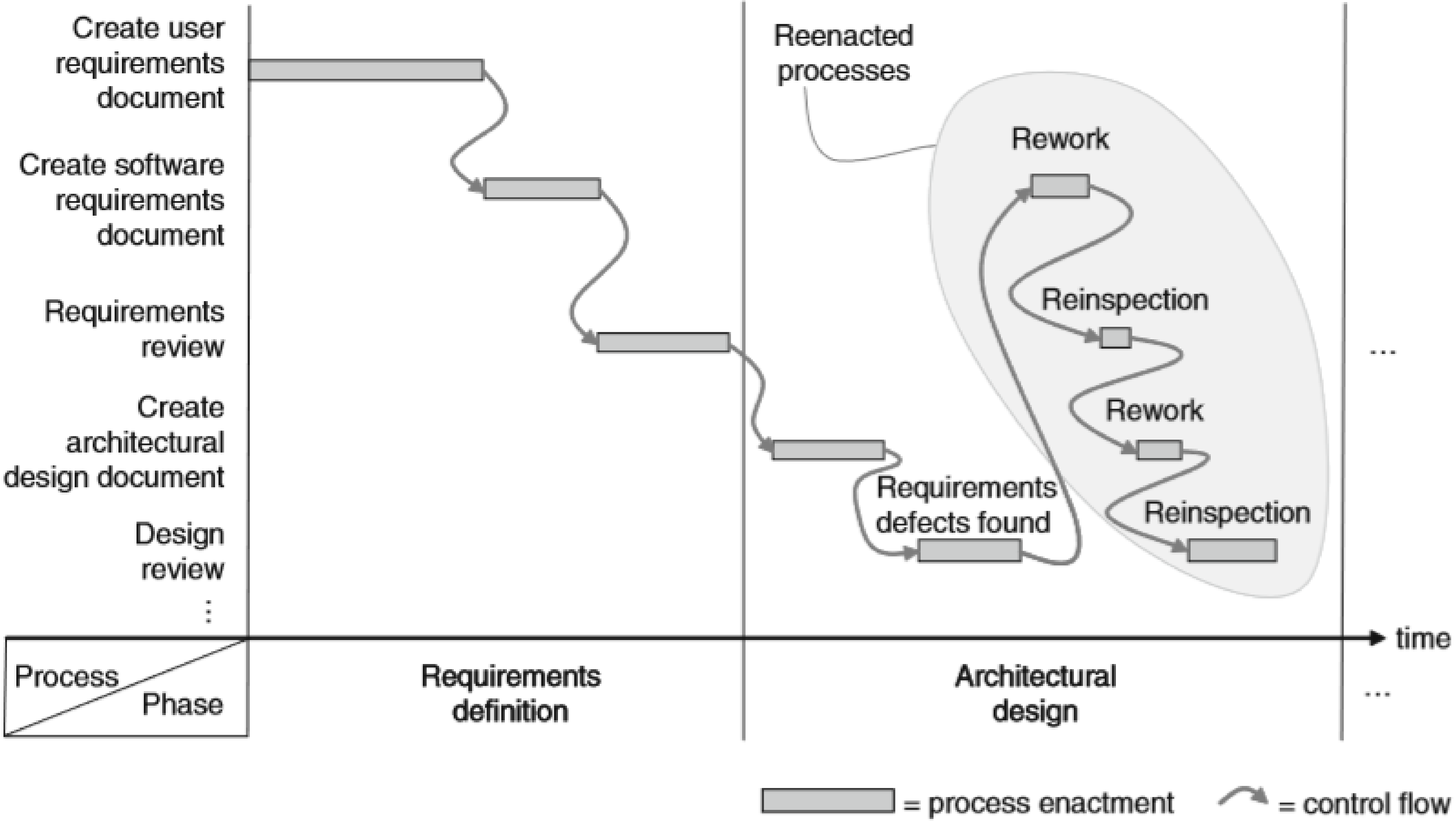
Concerns

- open-ended requirements
- uncontrolled changes
- insufficient testing
- inadequate training
- arbitrary schedules
- insufficient funding
- Issues related to standards, product reliability, and product suitability

Process Vs Project Phase

1. They are enacted in the real world
2. They usually transform one or more input products into one or more output products by consuming further products (e.g., guidelines)
3. They can be performed by humans (“enactment“) or machines (“execution“) or both together
4. They can be refined by subprocesses, each of which can also be refined

1. Phases are mainly completed sequentially, but can overlap in some project situations
2. Phases can be subdivided into subphases
3. Unlike a process, a phase is always defined by a start date and an end date. If this period is finished, the phase is finished. Typically, processes can be activated multiple times
4. Typical examples of phases are the elaboration phase, the construction phase, or the transition phase. Phases are usually used when looking at a project from a management perspective



Create user requirements document
Create software requirements document
Requirements review
Create architectural design document
Design review
⋮
Process
Phase
Requirements definition
Architectural design
…
time
Reenacted processes
Rework
Reinspection
Rework
Reinspection
Requirements defects found
…
= process enactment
= control flow

Elements of a Software Process

1) A framework (essential supporting structure)

2) an adaptable workflow

3) A model (a real-world representation of description)

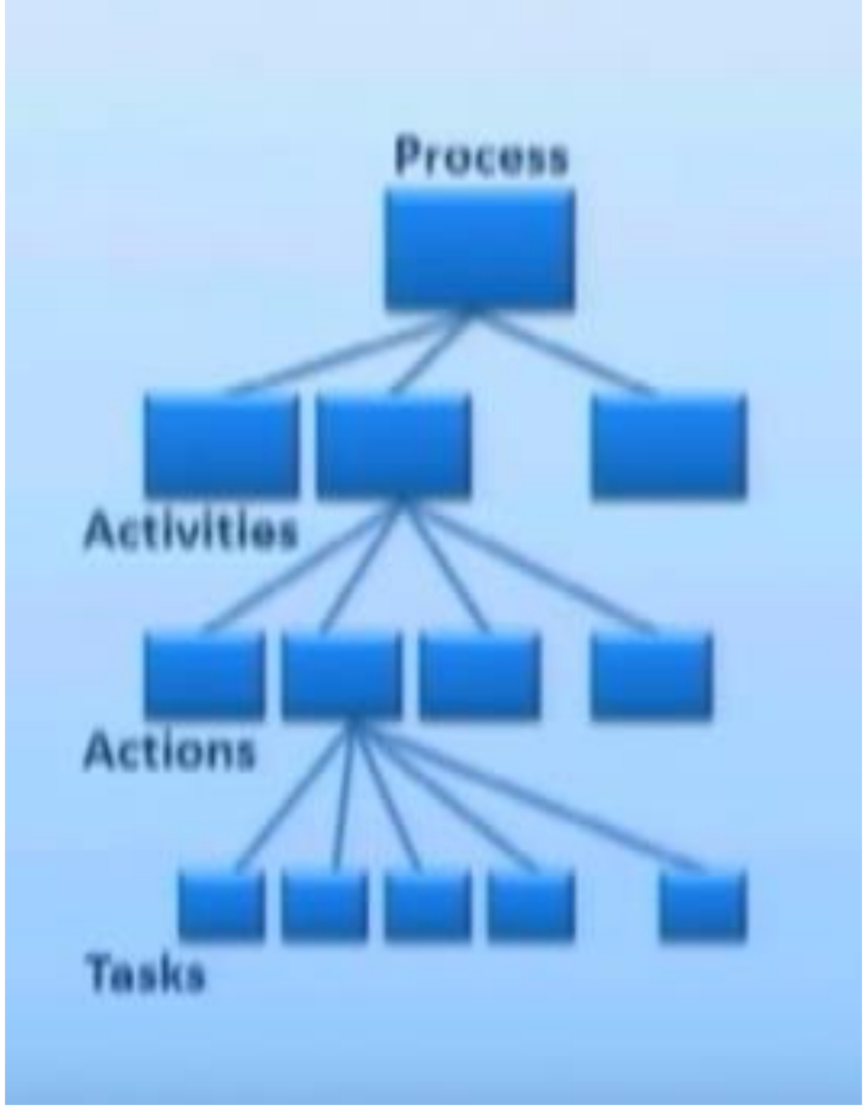
A process model can describe a process on different levels of abstraction (e.g., lifecycle process level, engineering process level, atomic step level

Key- Process Elements

Activities: major workflow elements that are always performed

Actions: important management and technical events that perform a key project function

Tasks: work that practitioners perform to accomplish an action



The Software Process …

Has a **common process framework** containing:

framework activities - for all software projects

- work tasks
- project milestones
- software work products and deliverables
- quality assurance points

umbrella activities - occur throughout the process

- software quality assurance
- software configuration management
- software metrics or measurement

Process Framework

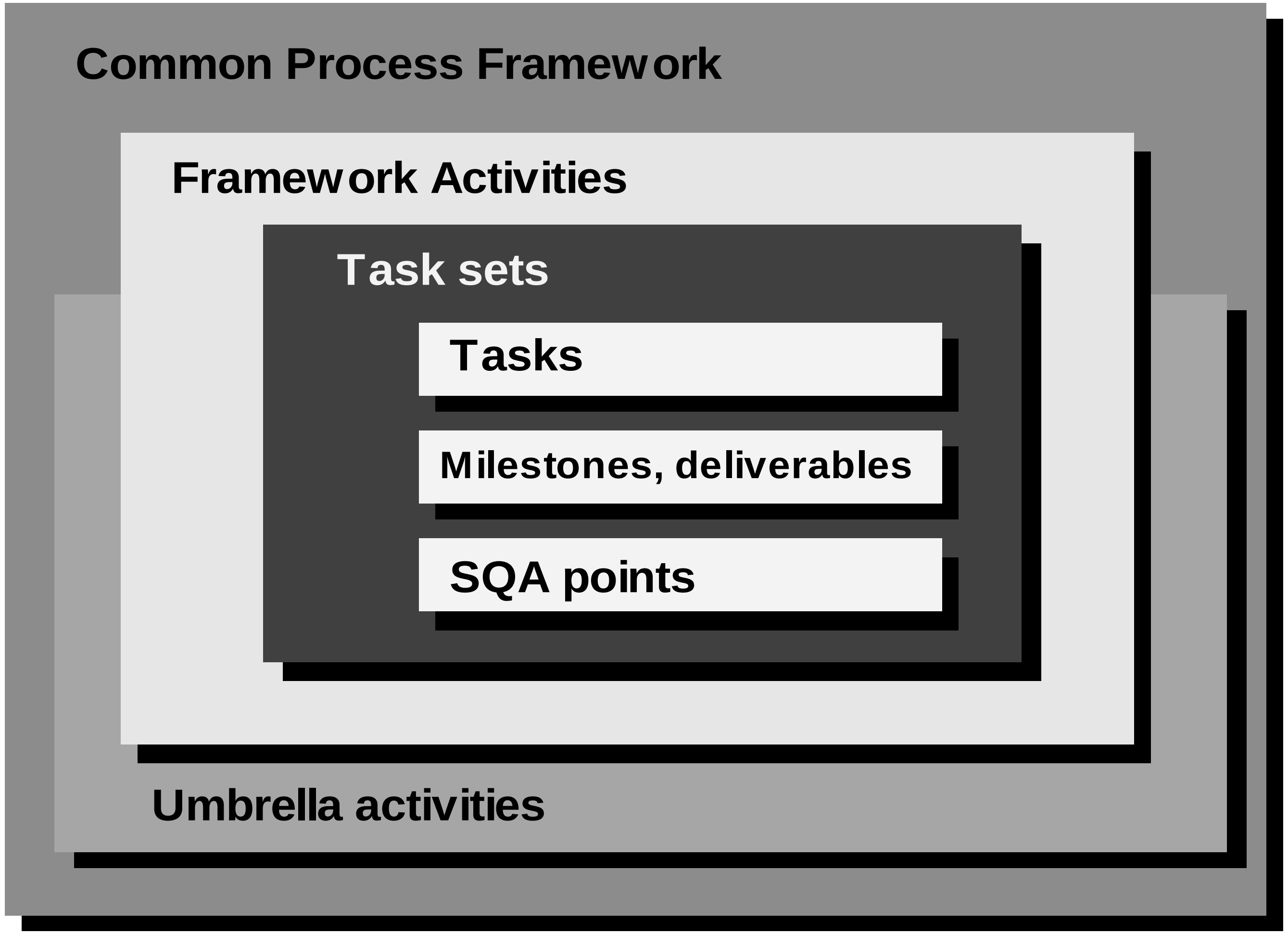
A *process framework* establishes the foundation for a complete software engineering process by identifying a small number of *framework activities* that are applicable to all software projects, regardless of their size or complexity.

The process framework encompasses a set of “umbrella activities” that are applicable across the entire software process, see figure(1).

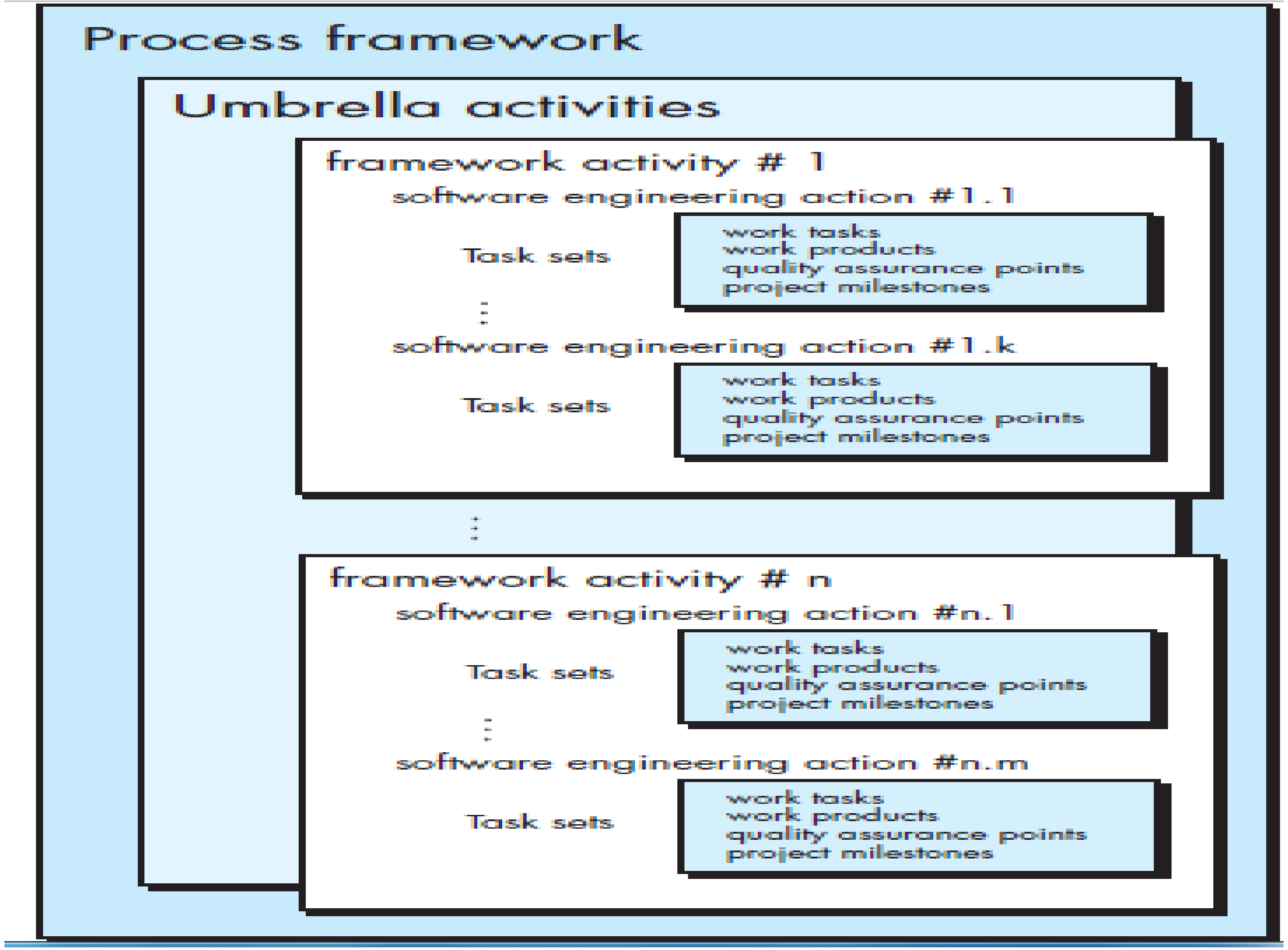
umbrella activities are applied throughout a software project and help a software team manage and control progress, quality, change, and risk.

A Common Process Framework

A Common Process Framework



Software process



Process framework

Umbrella activities

framework activity # 1

software engineering action #1.1

Task sets

work tasks
work products
quality assurance points
project milestones

⋮

software engineering action #1.k

Task sets

work tasks
work products
quality assurance points
project milestones

⋮

framework activity # n

software engineering action #n.1

Task sets

work tasks
work products
quality assurance points
project milestones

⋮

software engineering action #n.m

Task sets

work tasks
work products
quality assurance points
project milestones

Typical Generic Activities

Communication:
In this activity, heavy communication with customers and other stakeholders, requirement gathering is done.

Planning:
In this activity, we discuss the technical related tasks, work schedule, risks, required resources etc.

Modeling:
Modelling is about building representations of things in the ‘real world’.In modelling activity, a product’s model is created in order to better understanding and requirements.

Construction:
In software engineering, construction is the application of set of procedures that are needed to assemble the product. In this activity, we generate the code and test the product in order to make better product.

Deployment:
In this activity, a complete or non-complete products or software are represented to the customers to evaluate and give feedback. on the basis of their feedback we modify the products for supply better product.

Umbrella Activities

In the definition of software process ,activities, actions, and tasks resides within a framework or model that defines their relationship with the process and with one another.

Software engineering process framework activities are complemented by a number of umbrella activities.

The software process is represented schematically in Figure, Referring to the figure, each framework activity is populated by a set of software engineering actions. Each software engineering action is defined by a *task set* that identifies the work tasks that are to be completed, the work products that will be produced, the quality assurance points that will be required, and the milestones that will be used to indicate progress

Typical umbrella activities include:

Typical umbrella activities include:

1. **Software project tracking and control-** allows the software team to assess progress against the project plan, take necessary action to maintain the schedule.
2. **Risk management-** assesses risks that may affect the outcome of the project or the quality of the product.
3. **Software quality assurance-** defines the activities required to ensure software quality.

Typical umbrella activities include:

4. **Technical reviews-** uncover and remove errors before they are propagated to the next activity.
5. **Measurement-** defines and collects process, project, and product measures.
6. **Software configuration management-** manages the effects of change throughout the software process.
7. **Reusability management-** defines criteria for work product reuse and establishes mechanisms to achieve reusable components.
8. **Work product production-** the activities required to create work products such as models, documents, logs, forms, and lists.

Terminology

1) Process Model → description of process (specification)

2) Atomic Process → no sub processes

3) Process Enactment → performance of Process steps

4) Process Performer → Agent (human or machine)

5) Process Script → interpretation for humans

6) Process Program → interpretation for machines

7) Process schema → process metamodel

8) Process Product → artifact

Key Responsibilities of SPM

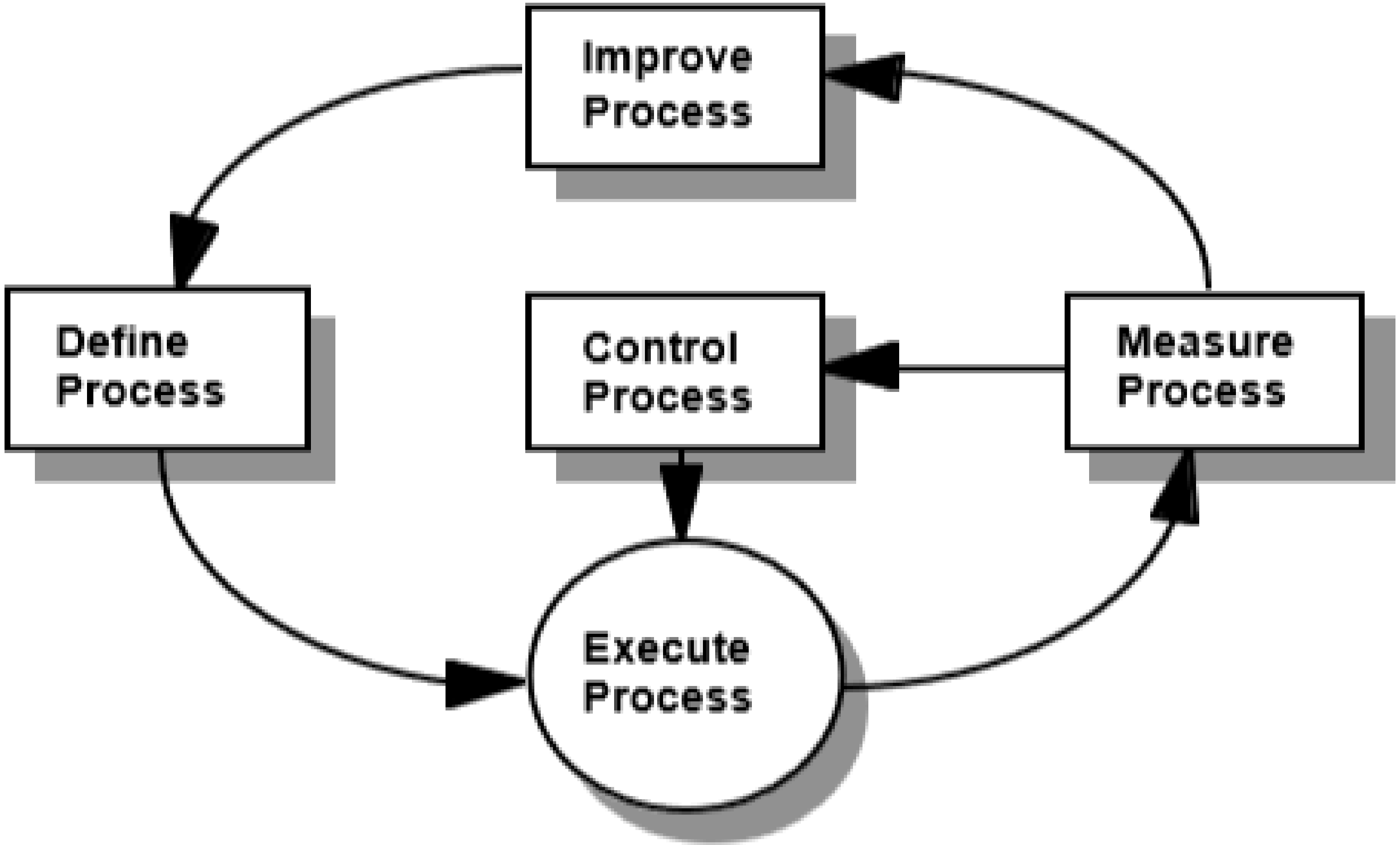
1) Define the Process

2) Measure the Process

3) Control the Process (ensure that variability is stable so that results are predictable)

4) Improve the Proecss

Key Responsibilities of SPM



Define the Process

✓ It creates a disciplined and structured environment for controlling & improving the process.

Objective:

1) Design processes that meet / support business and technical objectives
2) Identify and define the issues, models & measures that relate to the performance of the processes
3) Provide the infrastructure required for software activities
4) Ensure the software organization has the ability to execute & sustain the processes.

Measure the Process

✓ basis for detecting deviations from acceptable performance and identifying opportunities for process improvement.

Objective:

1) Collect data that measure the performance of each process.

2) Analyze the performance of each process.

3) Retain and use the data to:

- access process stability and capability
- predict future costs and results
- plot trends
- identify opportunities

Control the Process

✓ means keeping the process within its normal (inherent) performance boundaries.

Objective:

1) measurement → collecting information about process performance.
2) detection → analyzing the information to identify variations in the process that are due to assignable causes.
3) correction → remove variation due to assignable causes and remove the results from the process drift

Improve the Process

✓ process can be improved by making changes that improve their existing capabilities or by replacing existing subprocesses with others that are more effective and efficient.

Objective:

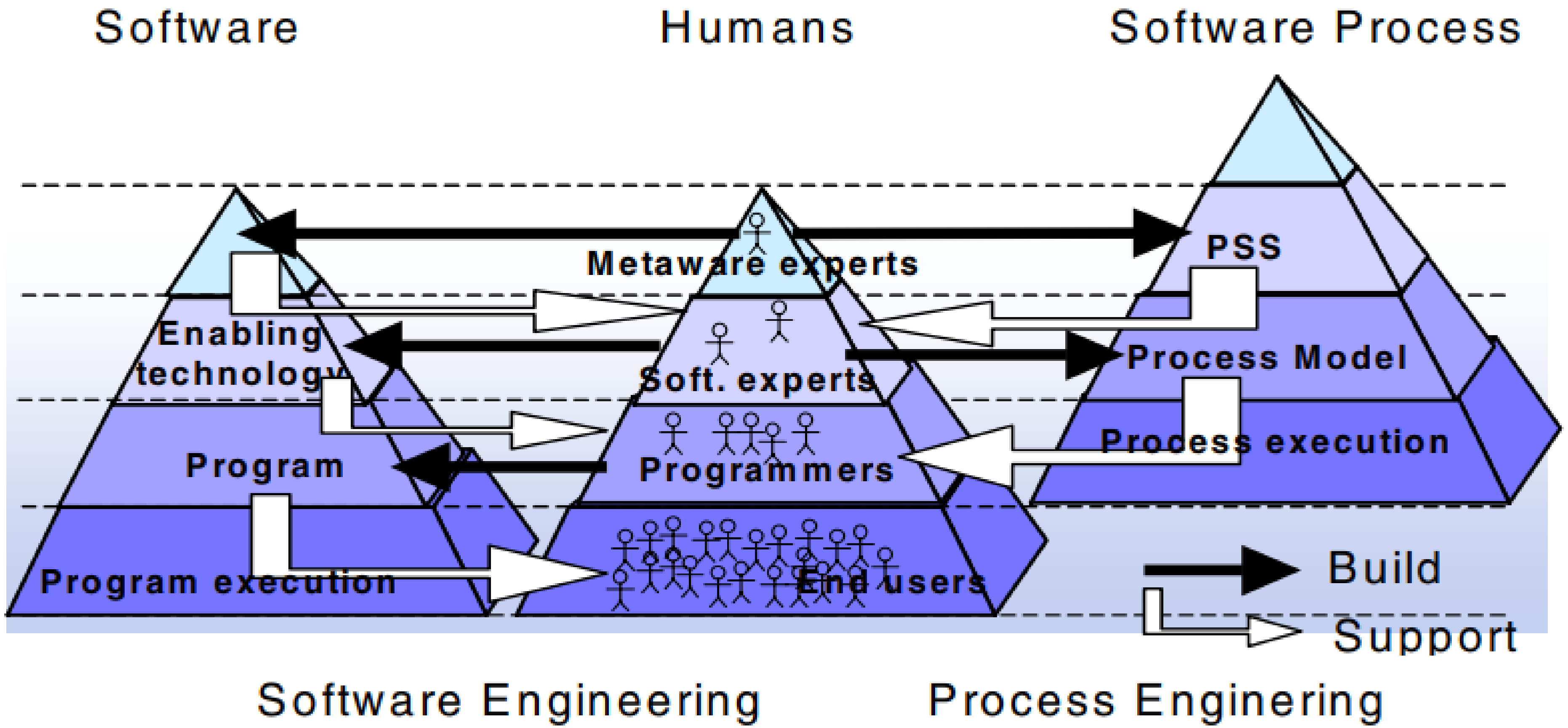
1) understand the existing process parameters /characteristics

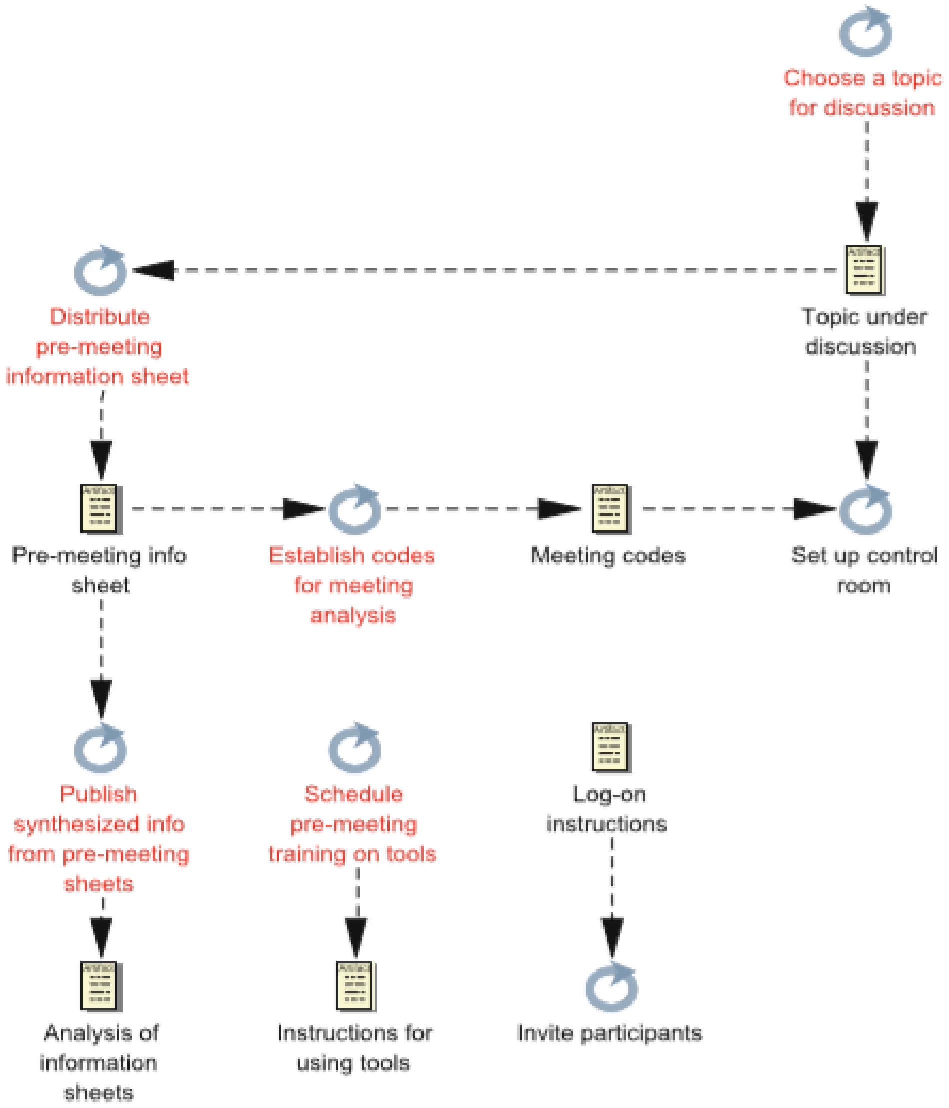
2) plan, justify and implement actions that will modify the processes to meet business needs

that are due to assignable causes.

3) Access the impacts and benefits gained

Process Eng. Vs Soft Eng.




Choose a topic for discussion
Topic under discussion
Distribute pre-meeting information sheet
Pre-meeting info sheet
Establish codes for meeting analysis
Meeting codes
Set up control room
Publish synthesized info from pre-meeting sheets
Schedule pre-meeting training on tools
Log-on instructions
Analysis of information sheets
Instructions for using tools
Invite participants