Project Management

Part 6

1. Introduction
2. People & Teams
3. Classical Project Management
4. Agile Project Management
5. Hybrid Project Management

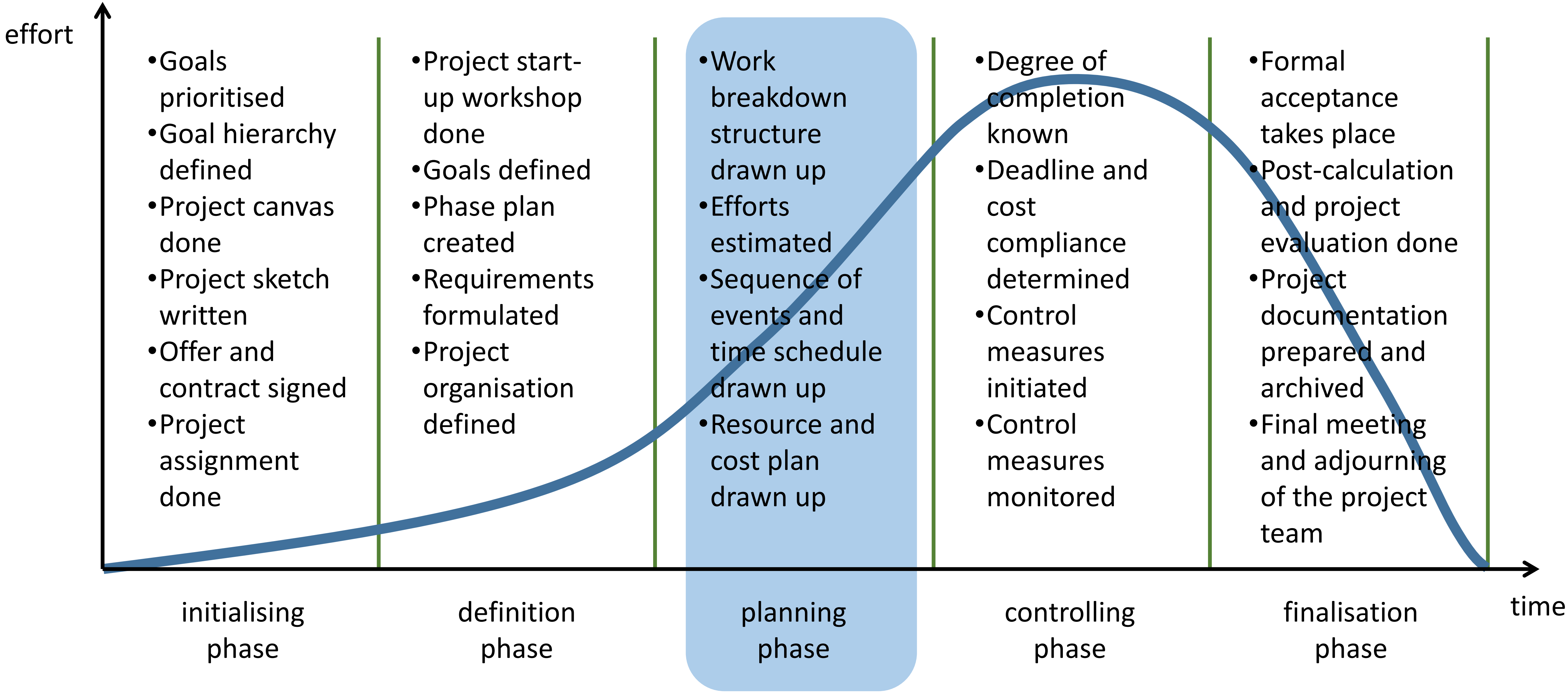
Planning

6 Phases of planning 😉

1. Enthusiastic enthusiasm
2. Sudden confusion
3. Total disillusionment
4. Searching for the guilty
5. Punishment of an innocent person
6. Award for a completely uninvolved person

Planning = replacing coincidence with error ?

Project life cycle



initialising phase

- Goals prioritised
- Goal hierarchy defined
- Project canvas done
- Project sketch written
- Offer and contract signed
- Project assignment done

definition phase

- Project start-up workshop done
- Goals defined
- Phase plan created
- Requirements formulated
- Project organisation defined

planning phase

- Work breakdown structure drawn up
- Efforts estimated
- Sequence of events and time schedule drawn up
- Resource and cost plan drawn up

controlling phase

- Degree of completion known
- Deadline and cost compliance determined
- Control measures initiated
- Control measures monitored

finalisation phase

- Formal acceptance takes place
- Post-calculation and project evaluation done
- Project documentation prepared and archived
- Final meeting and adjourning of the project team

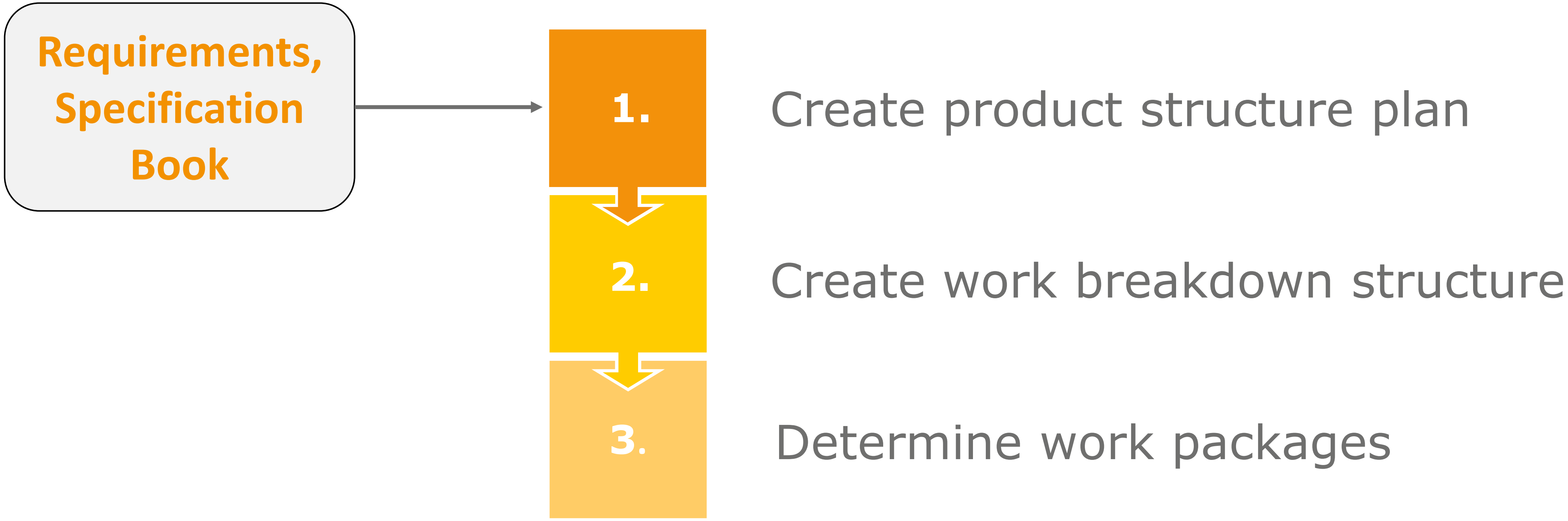
What all is to be planned?

- Project Organisation / Organisational Planning
- Project Group / Personnel Planning
- Project Goals / Goal Planning
- Project Tasks / Task Planning
- Project Timelines / Scheduling
- Project Task Carrier / Personnel Deployment Planning
- Between and End Dates / Scheduling
- Methods and tools / material resource planning
- Material and personnel costs / cost planning
- Emergency Response / Contingency Planning
- Other: test planning, report planning, documentation planning, versioning planning, security policy planning

Planning

- Requirements for the development of a software product
  - Tasks
  - Effort
  - Dates
  - Resources
  - Cost
  - Finances
  - Accompanying measures (e.g. quality assurance)
  - Precautionary measures (e.g. security and emergency planning)
- Breakdown of the software product into plannable work with verifiable results and small teams
- Task of the entire project organisation

Structural planning



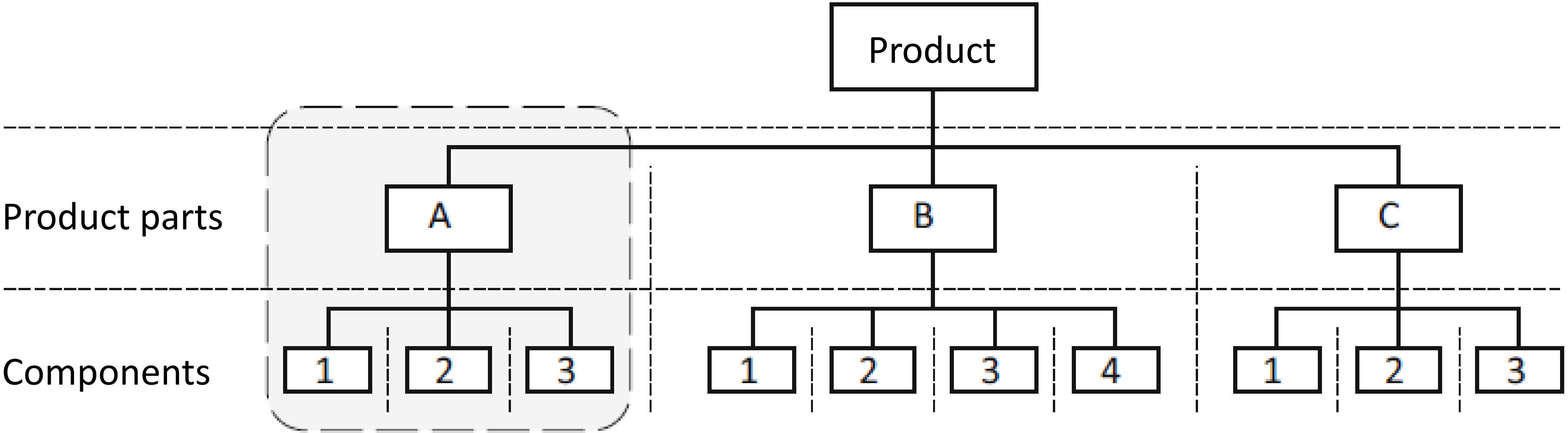
Create product structure plan

Create work breakdown structure

Determine work packages

Product structure plan (PSP)

- Complete list of all individual deliverables, which is hierarchically structured



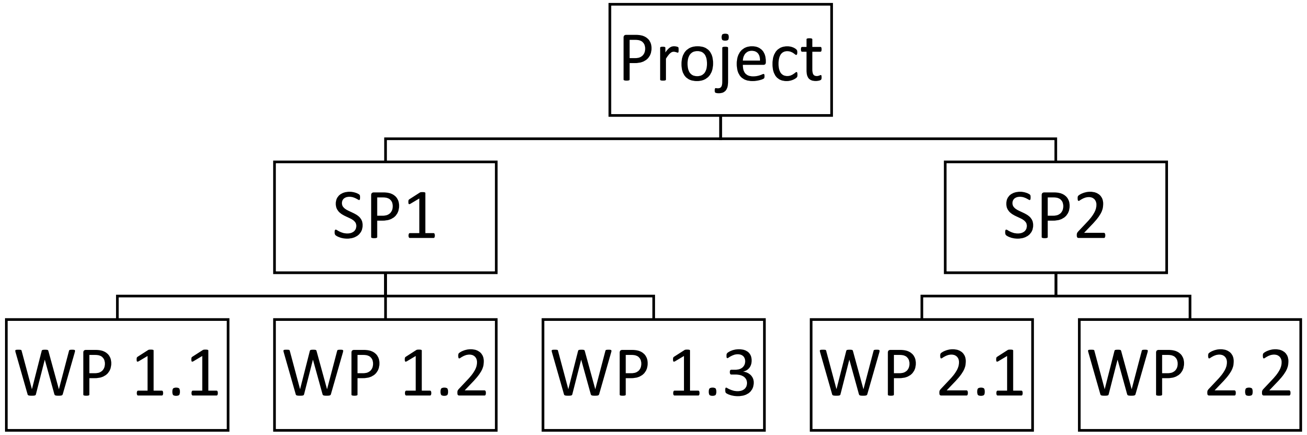
- Important:
  Integration of intermediate and auxiliary products as well as documentation!

Work breakdown structure (WBS)

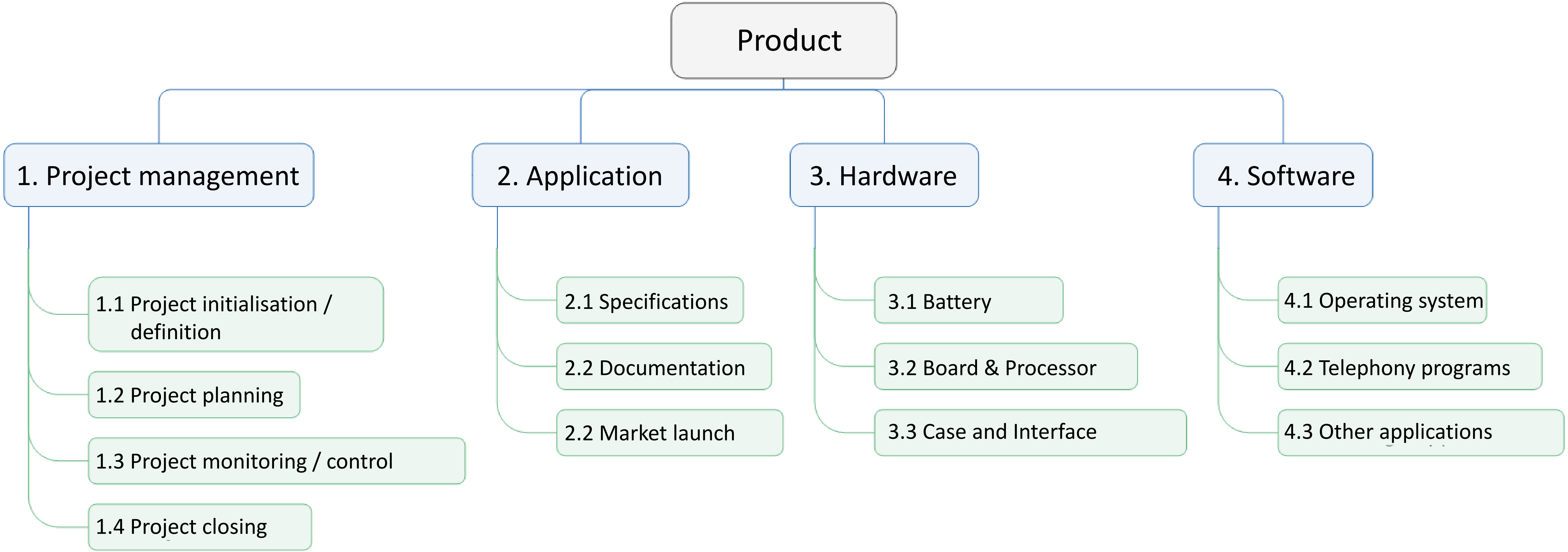
= Hierarchical list of all work to be carried out in the project

- presented in tabular or graphical form
- product- or process-oriented

◢ **Project**
◢ **Sub-project 1**
Work package 1.1
Work package 1.2
◢ **Sub-project 2**
Work package 2.1
Work package 2.2



Example: Product-oriented WBS



Product

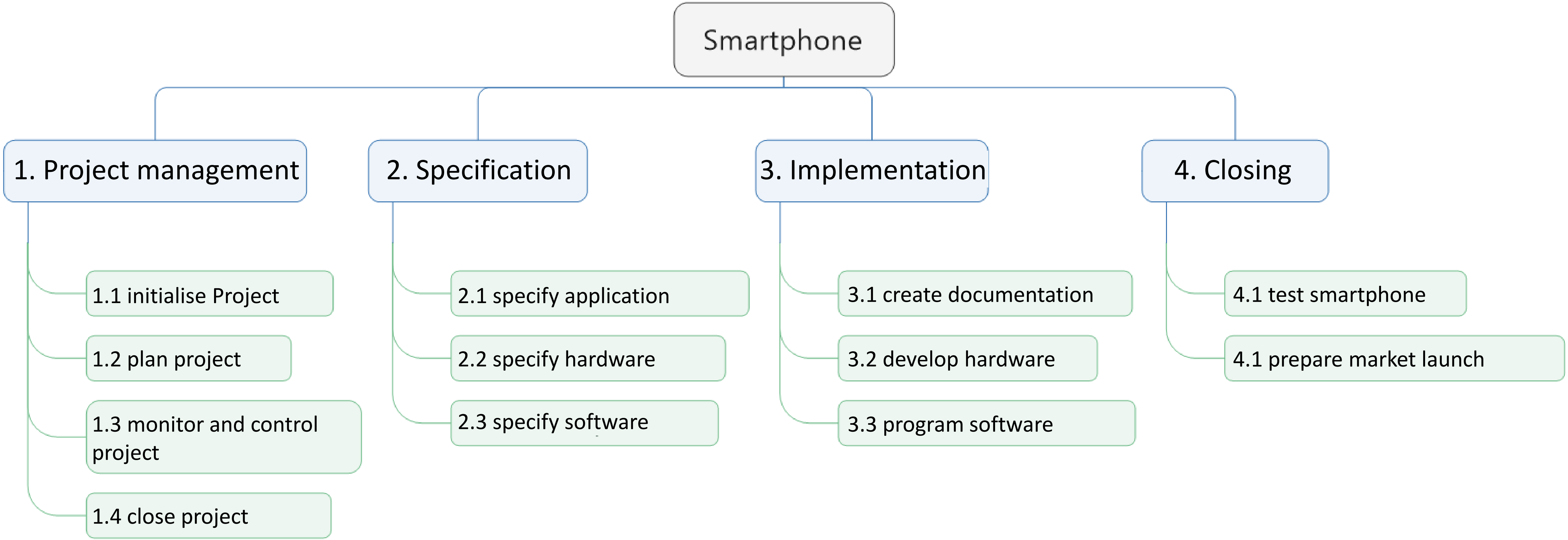
1. Project management
- 1.1 Project initialisation / definition
- 1.2 Project planning
- 1.3 Project monitoring / control
- 1.4 Project closing

2. Application
- 2.1 Specifications
- 2.2 Documentation
- 2.2 Market launch

3. Hardware
- 3.1 Battery
- 3.2 Board & Processor
- 3.3 Case and Interface

4. Software
- 4.1 Operating system
- 4.2 Telephony programs
- 4.3 Other applications

Example: Process-oriented WBS



Smartphone

1. Project management
   - 1.1 initialise Project
   - 1.2 plan project
   - 1.3 monitor and control project
   - 1.4 close project

2. Specification
   - 2.1 specify application
   - 2.2 specify hardware
   - 2.3 specify software

3. Implementation
   - 3.1 create documentation
   - 3.2 develop hardware
   - 3.3 program software

4. Closing
   - 4.1 test smartphone
   - 4.1 prepare market launch

Work breakdown structure: Procedure

Decomposition method

- Naming of the overall project
- Establishment of appropriate outline criteria
- Breakdown into sub-projects
- Listing of tasks
- Selection of outline criteria
- Breakdown into work packages

Composition method

- Collection of tasks (e.g. through brainstorming)
- Analysis of relationships
- Structure and composition in the form of a hierarchy
- Addition of missing tasks, deletion of double nominations

Rules for disassembly

Disjunction rule

The elements of a level must be completely different in terms of content

Completeness rule

If an element in a lower level is resolved into several levels in terms of content, this must be done completely

Structural development

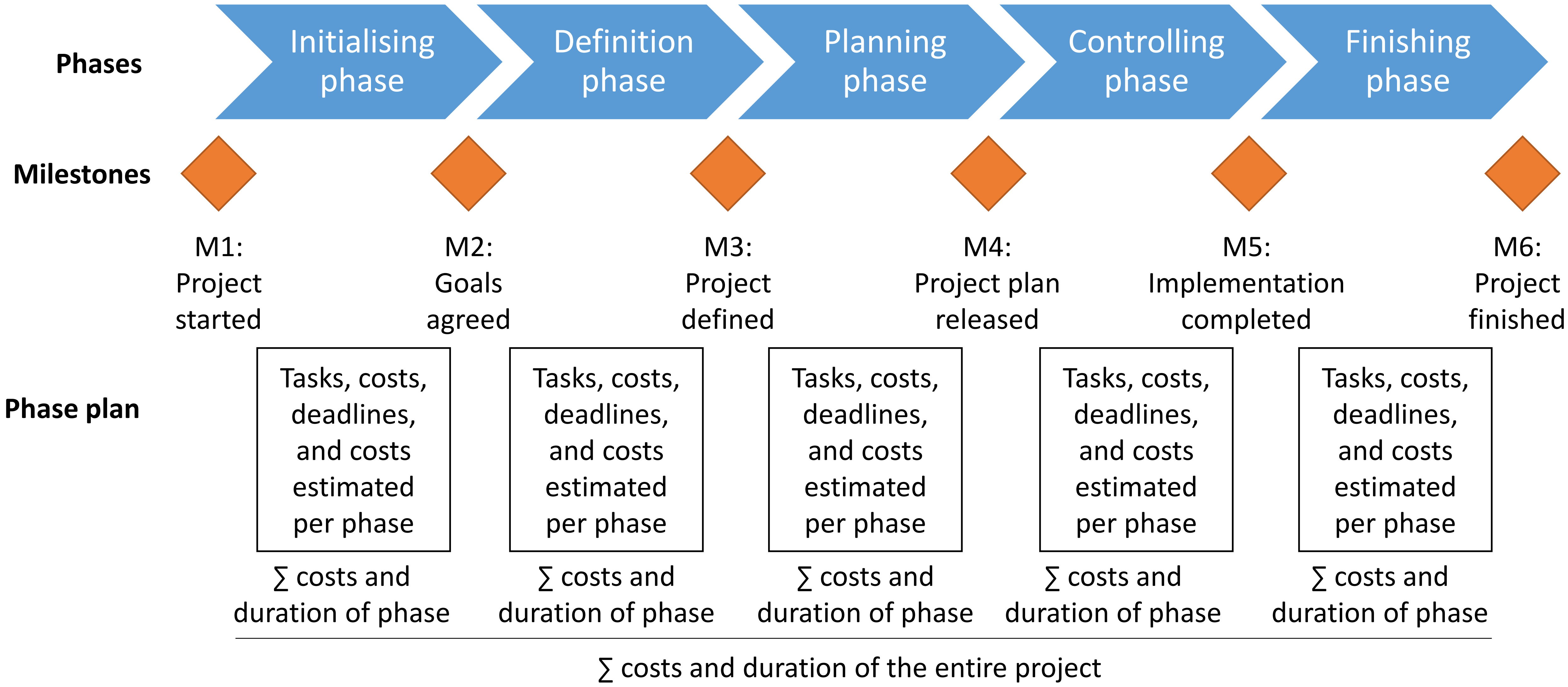
Successor – point of view

- What will the project start with?
- What work follows immediately afterwards?
- What is the nature of the dependence?

Predecessor – point of view

- What should be achieved at the end of the project?
- What work needs to be done immediately beforehand?
- What is the nature of the dependence?

Components of phase and milestone planning



Phases

Initialising phase

Definition phase

Planning phase

Controlling phase

Finishing phase

Milestones

M1: Project started

M2: Goals agreed

M3: Project defined

M4: Project plan released

M5: Implementation completed

M6: Project finished

Phase plan

Tasks, costs, deadlines, and costs estimated per phase

∑ costs and duration of phase

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∑ costs and duration of phase

Tasks, costs, deadlines, and costs estimated per phase

∑ costs and duration of phase

Tasks, costs, deadlines, and costs estimated per phase

∑ costs and duration of phase

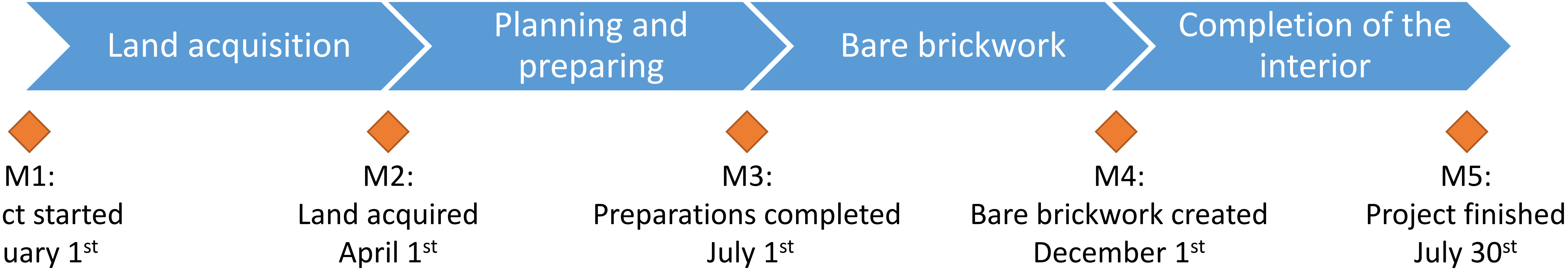
Tasks, costs, deadlines, and costs estimated per phase

∑ costs and duration of phase

∑ costs and duration of the entire project

Sample planning

❶ Overall goal: Construction of a two-storey single-family house with 100 sqm of living space without basement



❷ Land acquisition → Planning and preparing → Bare brickwork → Completion of the interior

❸

M1:
Project started
January 1st

M2:
Land acquired
April 1st

M3:
Preparations completed
July 1st

M4:
Bare brickwork created
December 1st

M5:
Project finished
July 30st

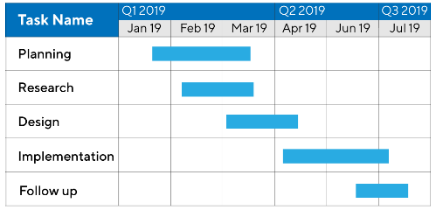
❹ ❺	Buying land 250 €/m^2 125,000 € Paying ancillary purchase costs 20,000 € **Duration: 3 months**	Hire architects 30,000 € Creating a foundation / floor slab 200 €/m^2 10,000 € **Duration: 3 months**	Create bare brickwork 500 €/m^2 100,000 € **Duration: 5 months**	Create interior fittings 500 €/m^2 100,000 € Conduct inauguration ceremony and procession 5,000 € **Duration: 5 months**
❻	**3 months** **145,000 €**	**3 months** **40,000 €**	**5 months** **40,000 €**	**5 months** **105,000 €**

❼ ∑ total duration: 16 months
total costs: 390,000 €

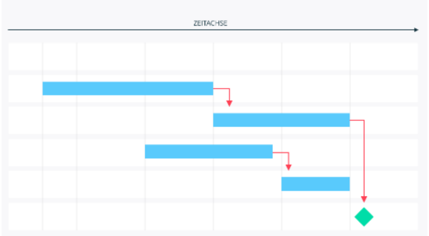
Scheduling Methods

- **Schedule**
  List with all dates

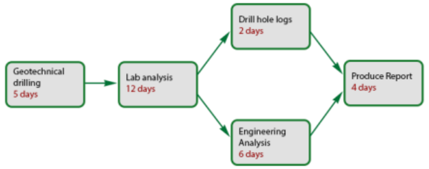
- **Gantt chart**
  List of all tasks that are graphically entered in the form of bars along a timeline



- **Networked Gantt Chart**
  Gantt chart showing the interdependencies of the tasks



- **Network plan**
  Representation of tasks and their interdependencies



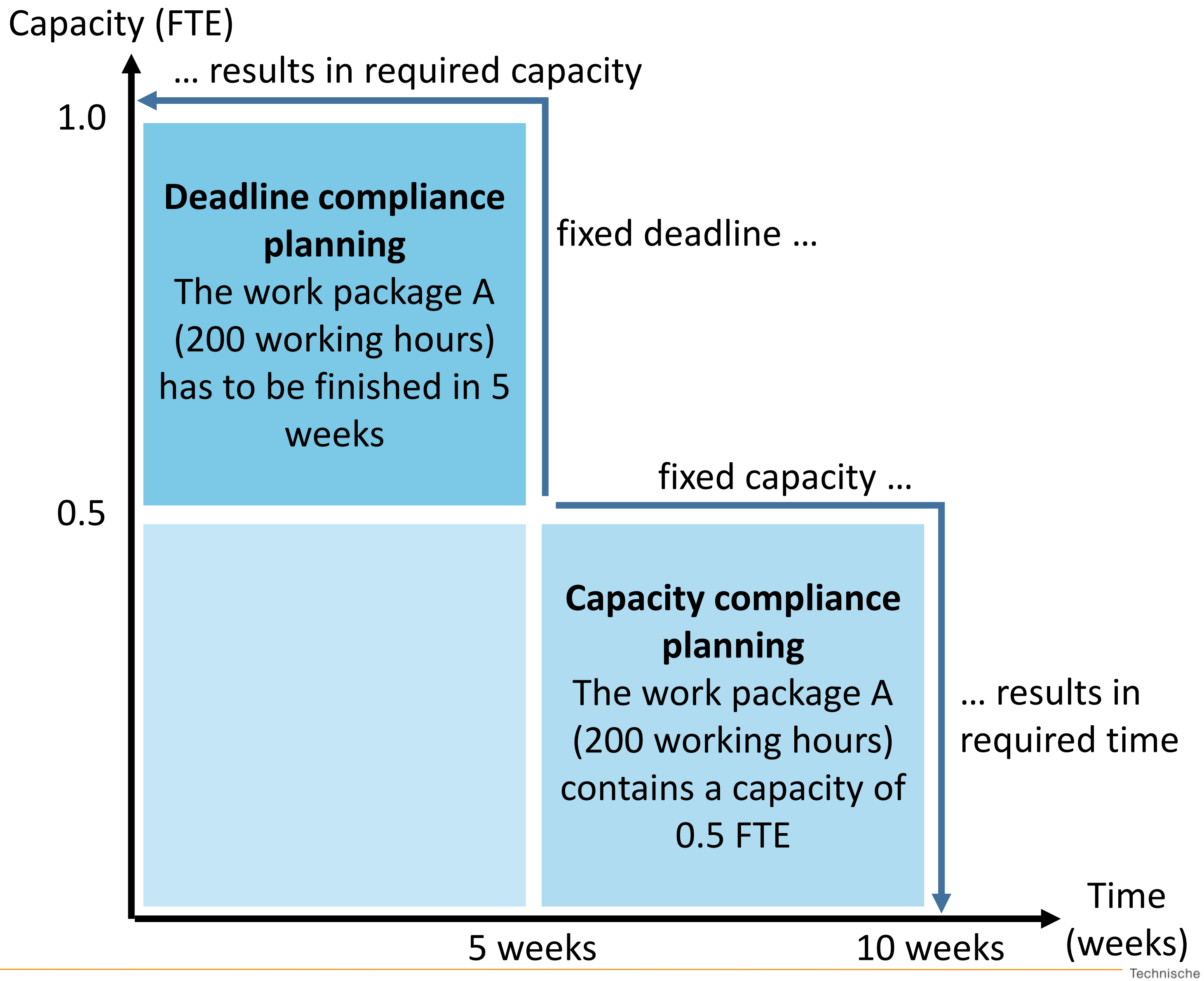
Project estimation

- Goal
  - Make statements about the workload and the duration of the planned work packages
  - generate statements from incomplete information
- Definitions
  - Effort = Demand or consumption of time, money or personal and material resources (typical unit: person-days pd)
  - Duration = Pure time required for the processing of the work package (unit: days), taking into account the resources available for this purpose
  - E.g.: Effort for programming a component was estimated at 4 person-days,
    i.e. 1 person needs 4 days;
    2 people will be ready in 2 days or 4 people in 1 day

Two variants of planning

- **Deadline compliance**
  Deadline is very important

- **Capacity compliance**
  Costs or other projects have higher priority



Deadline compliance planning
The work package A (200 working hours) has to be finished in 5 weeks

Capacity compliance planning
The work package A (200 working hours) contains a capacity of 0.5 FTE

FTE = Full time equivalent

Problems of effort estimation

- How can the effort for a software project be determined in advance?
- How long will it take to develop?
- What requirements should be met and how well are they already specified?
- How many people are needed?

➔ Effort estimation as a basis for

  - Calculation and preparation of quotations
  - Personnel planning and medium-term scheduling
  - Preparation of a decision "make or buy"
  - Post calculation

Methodological foundations of estimation

Methods of obtaining covert information:

- Intuitive estimation ("perceived" assessment based on experience)
- Comparative estimates (explicit use of experience from similar projects)
- Quantitative estimation methods (single or multi-parametric models with the help of experience-based key figures)
- Estimation by a group of people involved

Effort estimation

Goal: Determination of the effort for a project

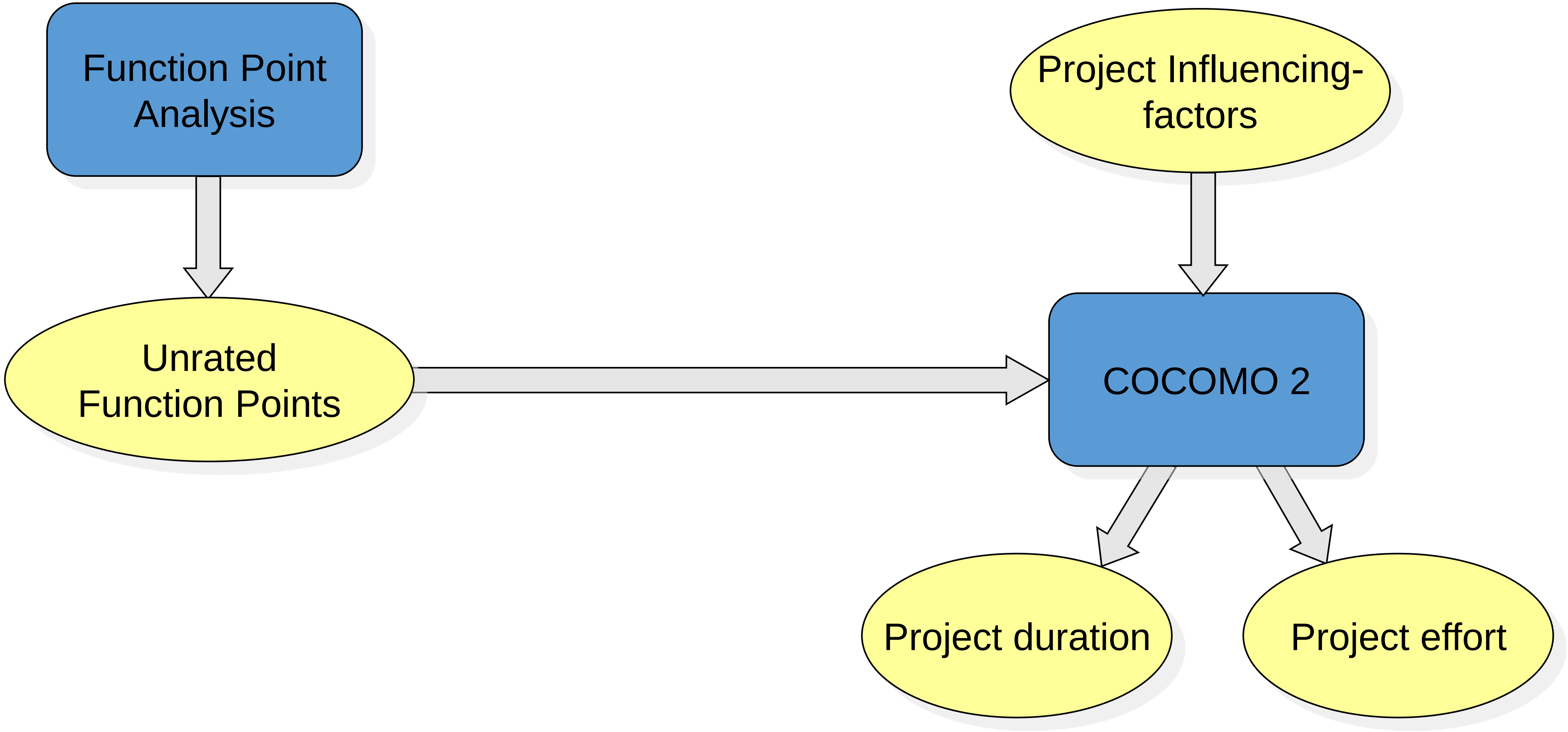
- Analogy estimation
  - Advantage: Possible at an early stage
  - Disadvantage: Years of preparatory work needed
- Expert estimate
  - Advantages: Little effort, very simple
  - Disadvantages: Incomprehensible, inaccurate results for large projects
- Decomposition estimation
  - Advantages: Always the same procedure, higher estimation accuracy, can be used for planning, easier documentation, involvement of the team, use of templates
  - Disadvantages: higher effort, determination of the duration difficult, forgetting tasks, a lot of project information necessary, unmanageable for large projects
- Parametric estimation methods
- Agile estimation methods

Parametric Effort Estimates for Software Projects

= Estimate of the size of a software project

- **SLIM** (software lifecycle management)
  Software equation with development time and system size (http://www.qsm.com)
- **FP** (function points)
  Determination of the project effort from the estimated scope of functionality (http://www.functionpoints.com, http://www.ifpug.org)
- **COCOMO** (constructive cost model)
  Relationship between program lines and costs by means of correlation analysis (http://softwarecost.org/tools/COCOMO/)
- **OP** (object points)
  Adaptation of function points for object-oriented development (http://www.pricesystems.com)

Combination
parametric estimation methods



Function Point Analysis

Unrated Function Points

Project Influencing-factors

COCOMO 2

Project duration

Project effort

The Fermi Problem: how to estimate the inestimability

- Quantitative estimation for a problem for which virtually no data are initially available, but the relationships in the context of the problem are well known
- Named after the nuclear physicist Enrico Fermi, who was known for being able to provide good estimates spontaneously despite a lack of information
- Prerequisite: General knowledge and "common sense"
- Procedure:
  - Quantify prior knowledge by substantiating the assumptions
  - Make partial assessments based on empirical values for subproblems
  - Merging the partial estimates into the overall result. If there is a sufficient number of partial estimates, it is likely that the estimation errors will be cancelled out.
- Example: Number of piano tuners in Chicago

Agile estimation methods

- Procedures for agile approaches in software projects
- Time for the development of program parts is fixed
  (e.g. 3 weeks = 1 sprint)
- The requirements are adapted to the capacity of the development team (man-hours) and the time frame
- Client and contractor (team members) commit together to what will be done by the next specified date
- In the event of differences of opinion and capacity between the client and the contractor, negotiations are held
  "Planning Game", "Poker"