IT Project Management

Lecture 3-2 – Classical Approach Planning

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Classical approach – Planning

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Introduction

- Project stage: Planning phase
  - Basis for a successful project
  - Dividing and structuring a project to
    - reduce the complexity,
    - have an overview, and
    - keep track.
  - Comprises planning activities and the determination of the project organization.
  - Completed when the project plan is approved and a kickoff has been executed.
  - Central function of a project manager

Contents

Objective/Results

- Goal of the planning phase is to do and to align a complete planning to be presented in a kickoff event
- Results
  - Project plan
    - Work breakdown structure (WBS)
      with work packages at the lowest level
    - Time schedule
    - Resource plan/Cost Schedule
      Resource plan covers personnel planning
    - Project organization
  - Alignment of project plan
  - Presentation of project plan in a kickoff event

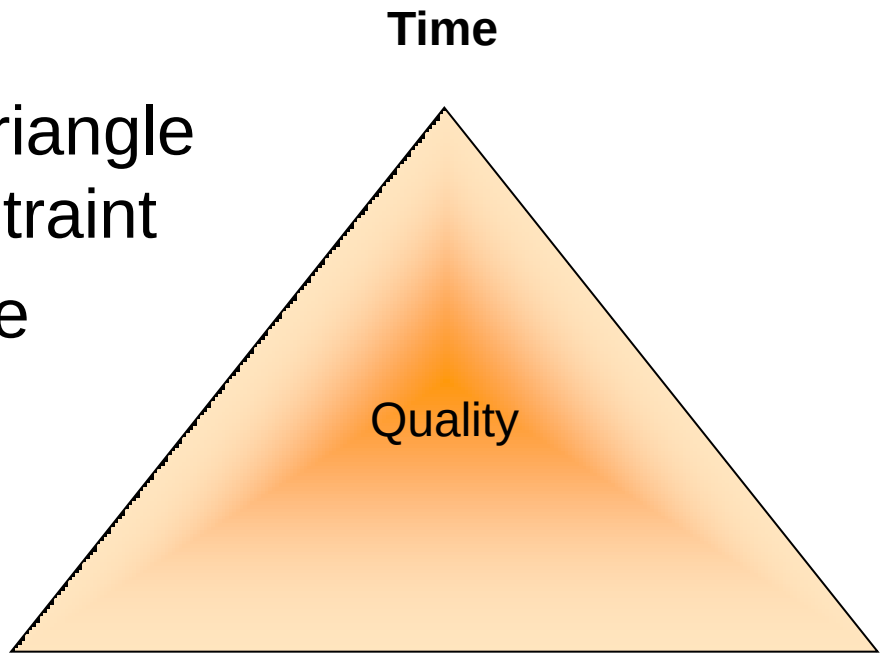
Objective/Results

- A plan is an estimation, it is
  - never exact
  - outdated as soon as finished
- A wrong plan is better than no plan
- Project management means achievement of goals, not meeting plans!
- Planability has limits
  Do not adapt the project to the plan

Contents

Planning

- Magical triangle
  - Each side of the triangle represents a constraint
  - Changing one side affects the others



Planning

- Project members need orientation – visualize the plan if applicable
- Always integrate involved people into the planning!
  - Personal goals, expectations, identification with the project?
  - Do the participants have time?

Planning

Project plan:
totality of all existing plans in a project [DIN 69901-5:2009-01]

- should answer following questions:
  - What?
    - Identification and depiction of sub-projects, working packages, and tasks
    - Result: work breakdown structure (WBS)
  - Until when?
    - Result: time schedule and milestone planning
  - How much?
    - Result: resource plan/cost schedule
  - Who?
    - Result: project organization
  - What are prerequisites or constraints?
    Technical and spatial preconditions, known constraints

Planning

- Discussion:
  - Changes of requirements (change management)
- Recommendation:
  - Accepting changes from the beginning
  - Establishing change management
  - Planning buffer for requirement changes, especially in larger projects
    - ➢ Simplifies change management as no additional assignment, no additional budget, etc. necessary

Work Breakdown Structure (WBS)

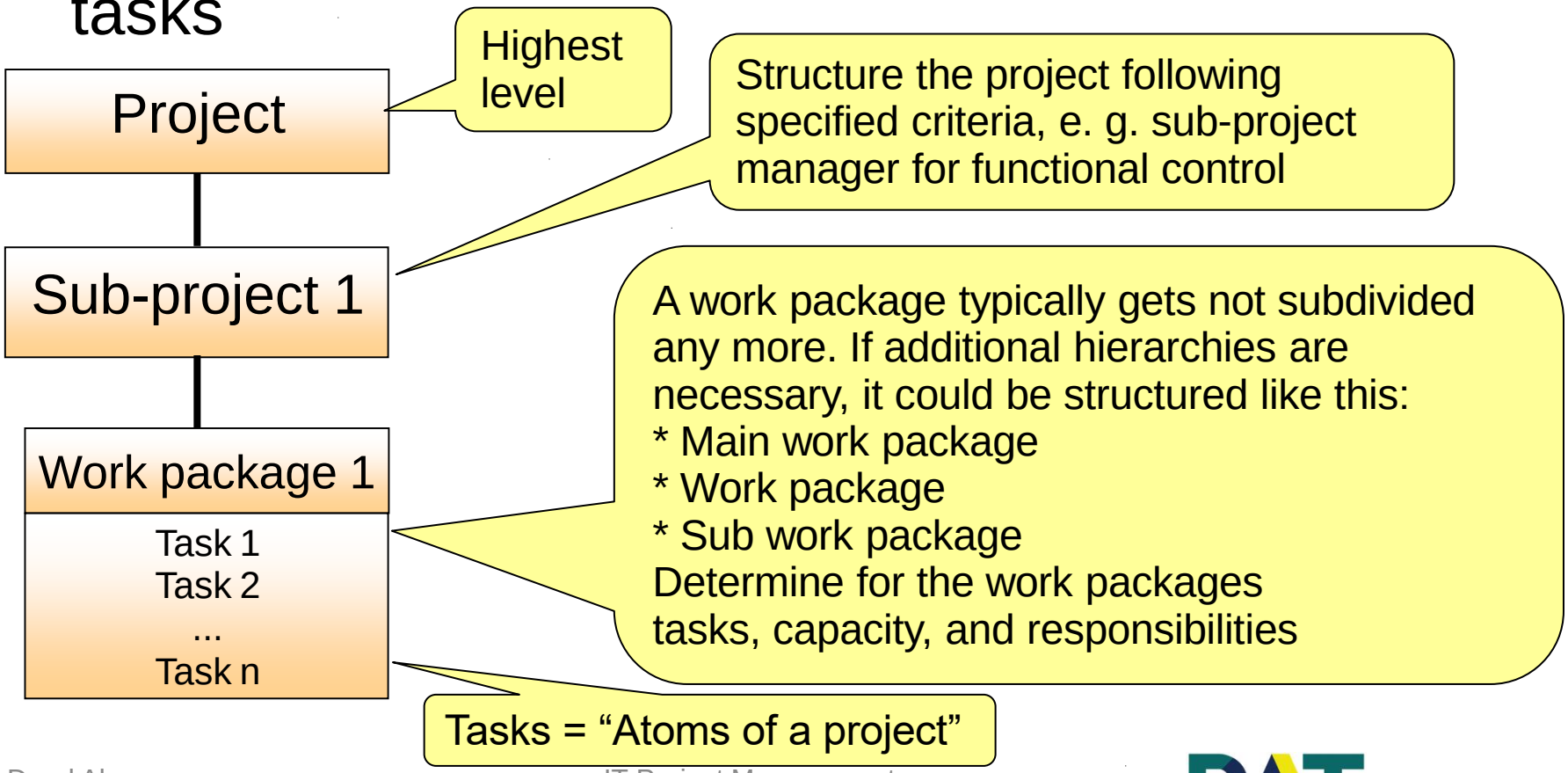
- ***Work breakdown structure***: A hierarchical decomposition of the total scope of work to be carried out by the project team to accomplish the project objectives and create the required deliverables. [PMI17]
- Alternatively PRINCE2 defines instead a **product breakdown structure**: A hierarchy of all the products to be produced during a plan. [axe20]
- More definitions are available [Wid17]

Work Breakdown Structure (WBS)

- Why and for what do I need a WBS?
  - Distribution of responsibilities in the project
  - Basis for
    - estimation of time needed and project costs,
    - project control,
    - structuring the project documentation.
- The structuring of a WBS could be done following
  - functions,
  - objects, or
  - processes.

Work Breakdown Structure (WBS)

- A WBS splits a project hierarchically down to the tasks



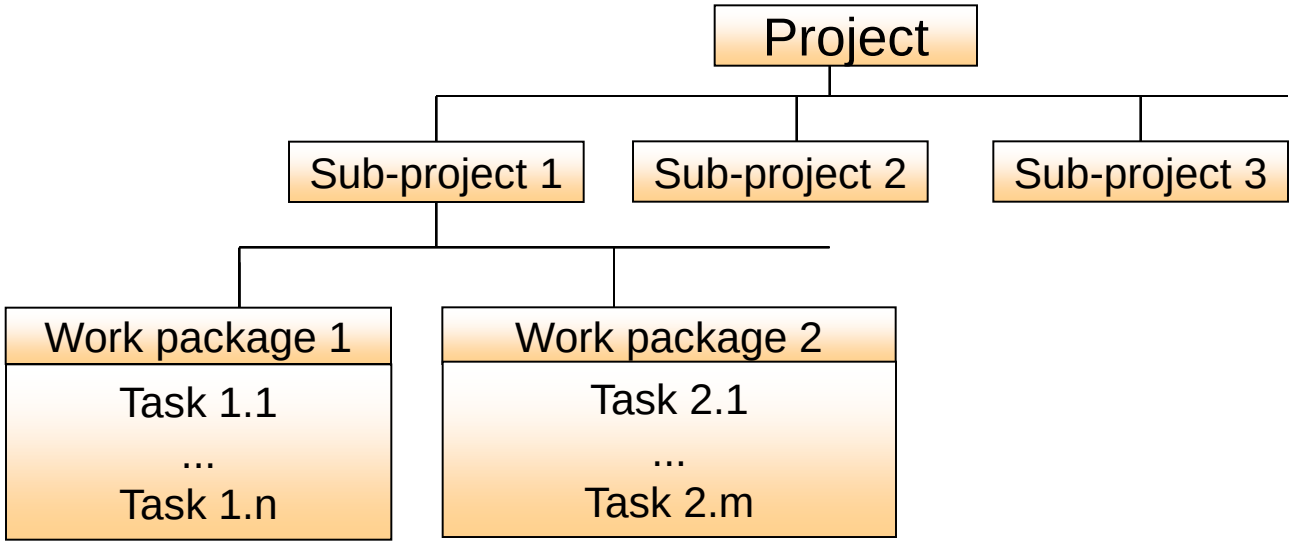
Work Breakdown Structure (WBS)

The WBS structures a project into smaller items, making it easier to plan and control

- sub-projects
  - Segmentation following regional, organizational, or functional criteria
- Work packages
  - Complete assignment of tasks that could be done normally by one person
- Optional:
  - Main work package
  - Sub work package
- Tasks
  - "Elementary particles" of a project

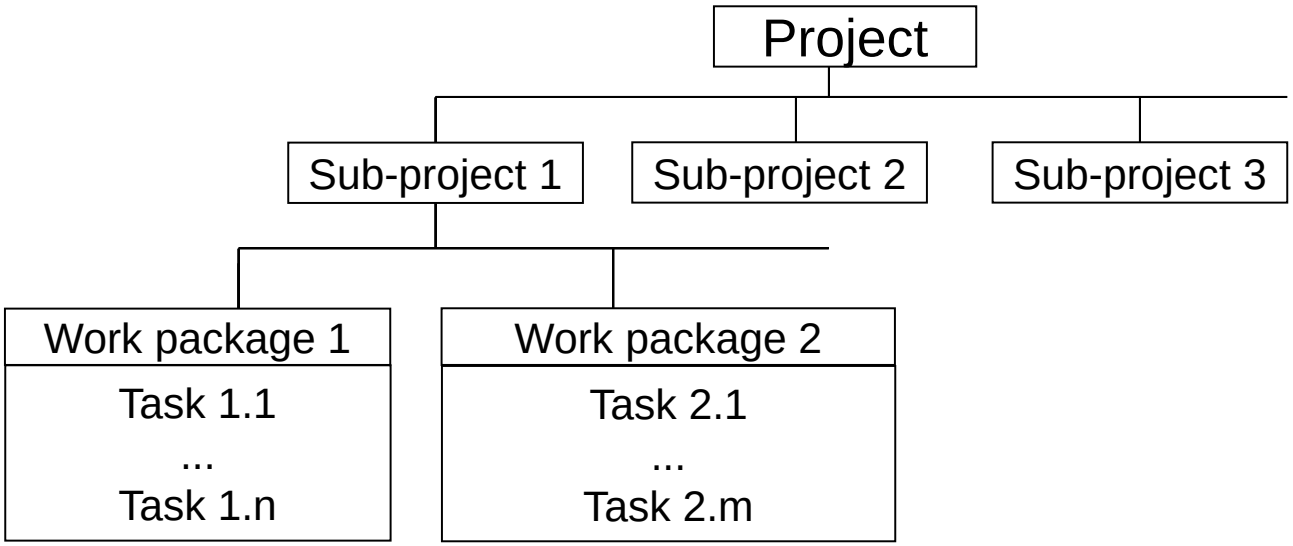
Work Breakdown Structure (WBS)

- Result is a complete WBS covering the project



Work Breakdown Structure (WBS)

- How to develop a WBS?
  Bottom up / Top down approach



Deductive
from general to specific

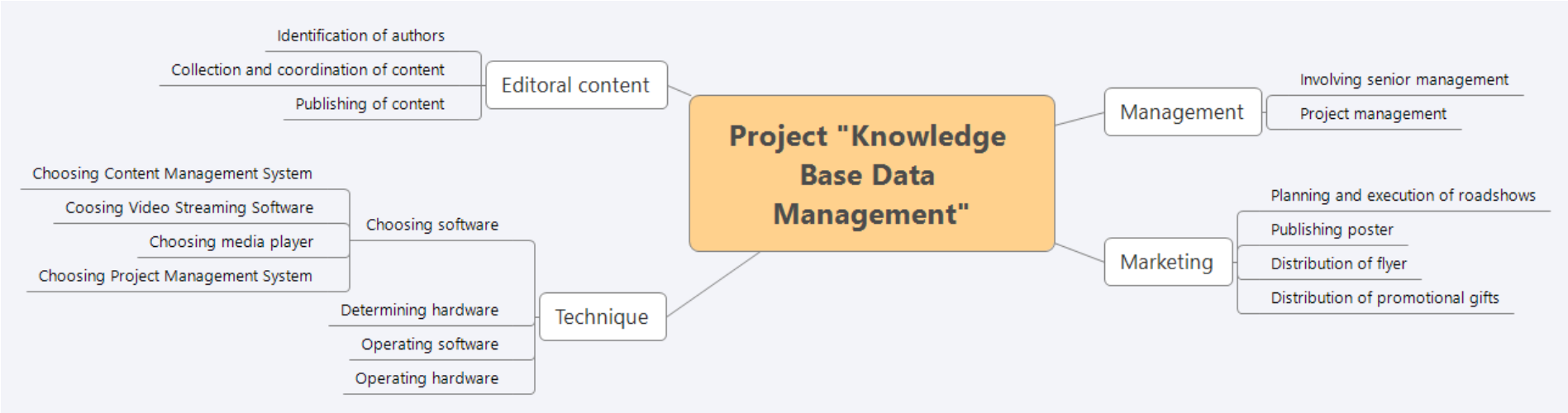
Top down

Bottom up

Inductive
from specific to general

Work Breakdown Structure (WBS)

- How to structure a WBS?
  - Function oriented
    Following functions, makes assignment of tasks to functional areas easier

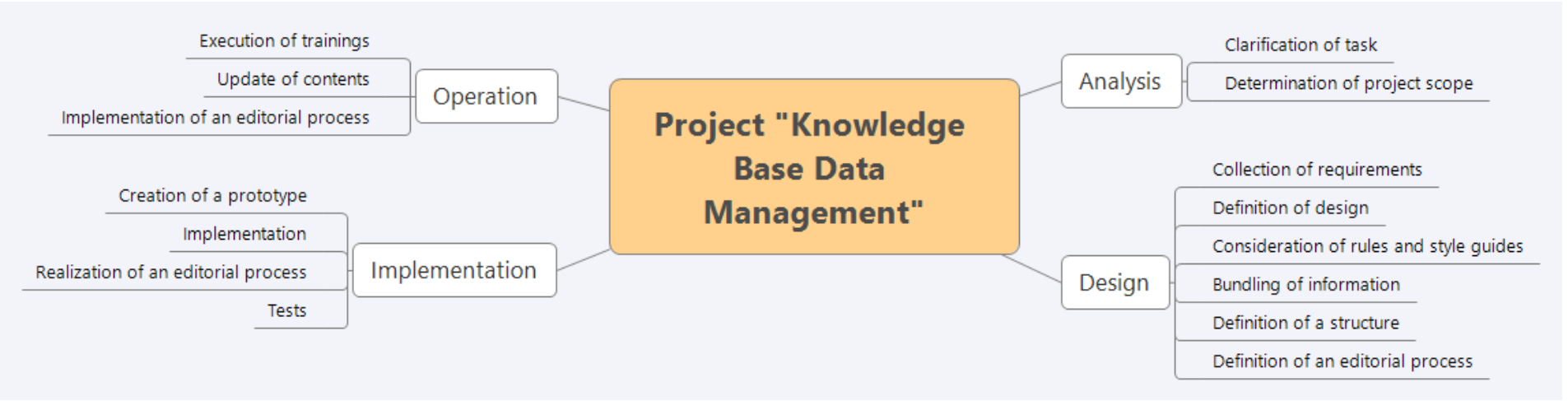


Work Breakdown Structure (WBS)

- How to structure a WBS?
  - Object oriented
    Following parts of a product to be designed

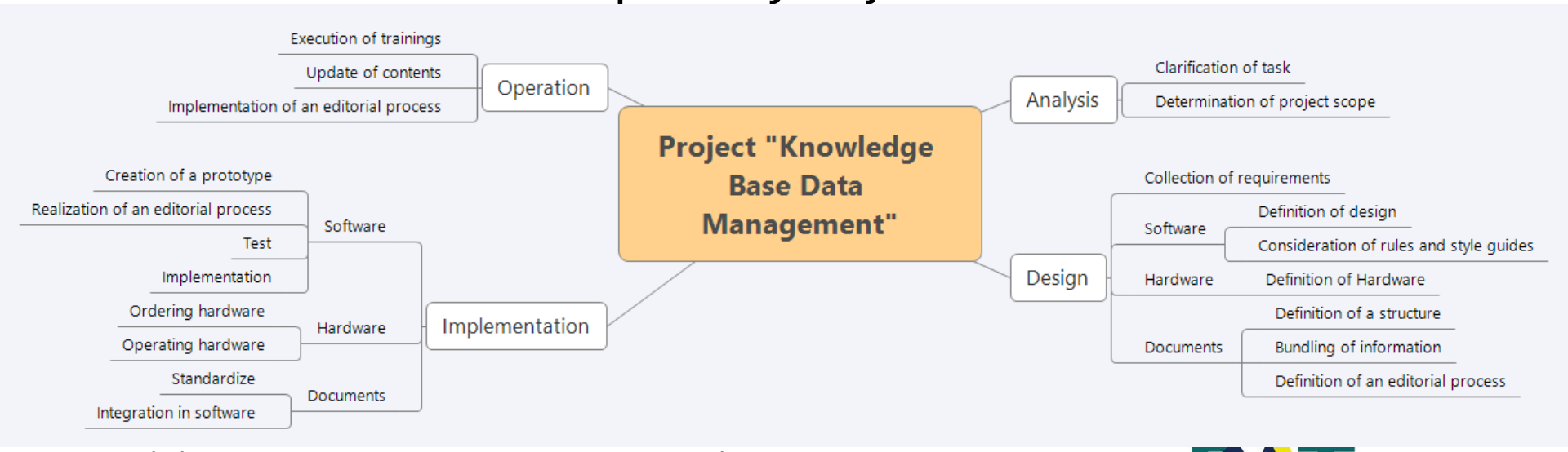
Work Breakdown Structure (WBS)

- How to structure a WBS?
  - Process oriented
    Following a chronological order



Work Breakdown Structure (WBS)

- How to structure a WBS?
  - Mixed oriented
    - ➢ Related to practice
    - ➢ In example below: first level process oriented, second level partially object oriented



Work Breakdown Structure (WBS)

- Work package
  - lowermost object of the work breakdown structure
  - should be unambiguous and verifiable, without contradictions and overlapping to other work packages
- Aim of work packages is an assignment of
  - costs,
  - resources, and
  - expenditure of time.
- Homogeneous granularity recommended
  - Oversized work packages → more difficult to keep an overview of the project progress.
  - Too small work packages → high administrative effort.

Work Breakdown Structure (WBS)

- Example for a work package (1/2)

Project name	*<Name of project>*	**Project No.**	*<Number of project>*
WP name	*<Name of work package>*	**WP Id**	*<Work package ID>*
WP owner	*<Name of responsible for work package>*		
WP approval	*<Name of person who approves the work package>*		
Version / Date	*<0.0.1 / dd.mm.yyyy>*	**Status**	*<initiated, in progress, done, cancelled>*

Progress control	**Plan**		**Actual**	
	Amount of work	**Duration**	**Amount of work**	**Duration**
	<e.g. 2 person months>	*<e. g. 3 weeks>*	*<e.g. 3.5 person months>*	*<e.g. 6 weeks>*
	Start	**End**	**Start**	**End**
	<dd.mm.yyyy>	*<dd.mm.yyyy>*	*<<dd.mm.yyyy>*	*<dd.mm.yyyy>*
Comments	*<Explanations, remarks>*			

Work Breakdown Structure (WBS)

- Example for a work package (2/2)

Objective	• *<Goal 1>* • *<Goal 2>* • …
Preconditions **(Input)**	• *<e.g. document 1>* • *<e.g. working result out of WP nnn2>* • *…*
Scope	• *<Task 1>* • *<Task 2>* …
Results **(Output)**	• *<Result1>* *Finished on dd.mm.yy., approved by NN ..., available at location ...* • *<Result2>* *Finished on dd.mm.yy., approved by NN ..., available at location ...*

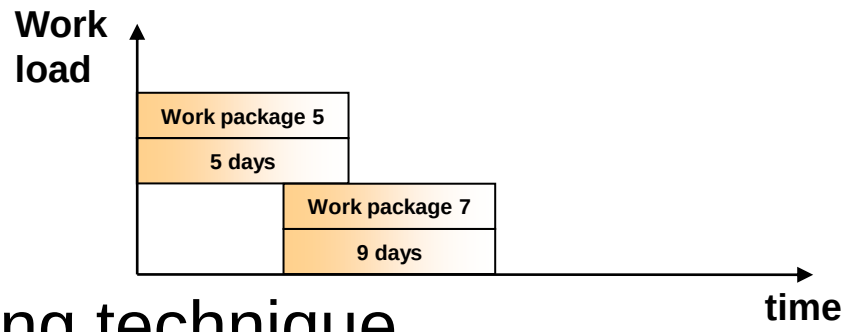
Contents

Time Schedule

- Alignment of the working packages out of the WBS to a realistic project schedule
- Consider dependencies to resource planning/cost schedule!
- Definition of start and finish date
- Duration of the working packages, buffer time, and constraints have to be considered
- Milestones
  - You can't do everything at once
  - Coordinate stage plan with principal
  - Activities flow together at milestones

Time Schedule

- Planning techniques / Methods
  - Bar chart



  - Network planning technique
    - ➢ Forward calculation
      Starting from project start day
    - ➢ Backward calculation
      Rollback from planned project end date
  - Milestone planning

Time Schedule

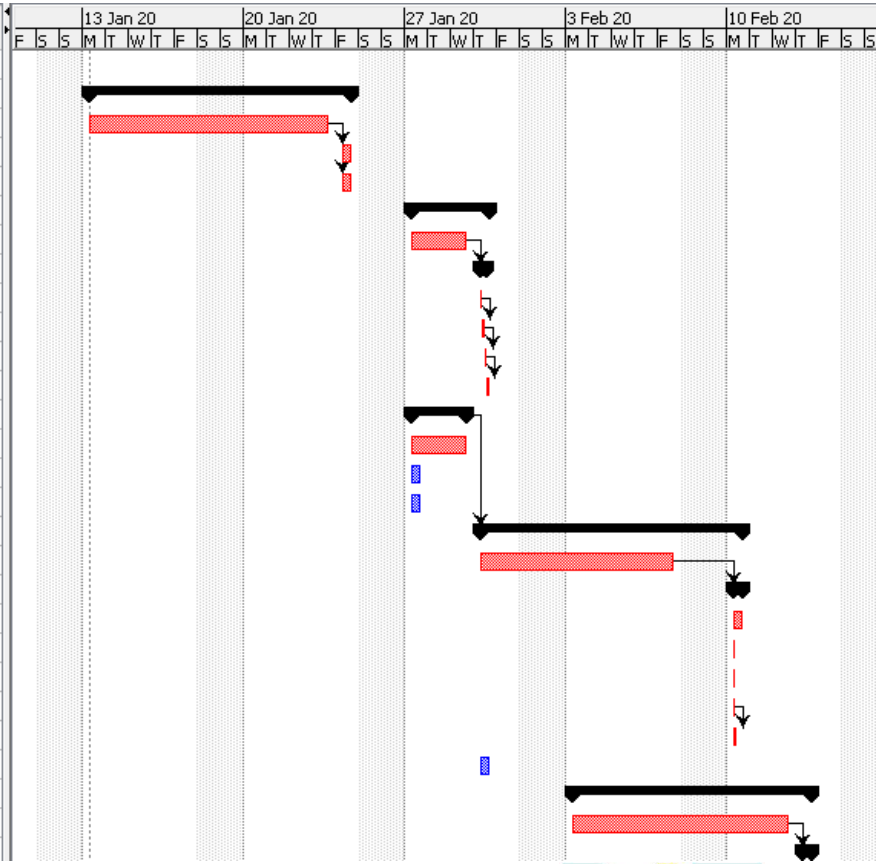
Proposal for proceeding

- Define start and end milestones for all work packages
- Chronological arrangement dependent on
  - duration of work packages,
  - buffer time,
  - access to resources.

Time Schedule

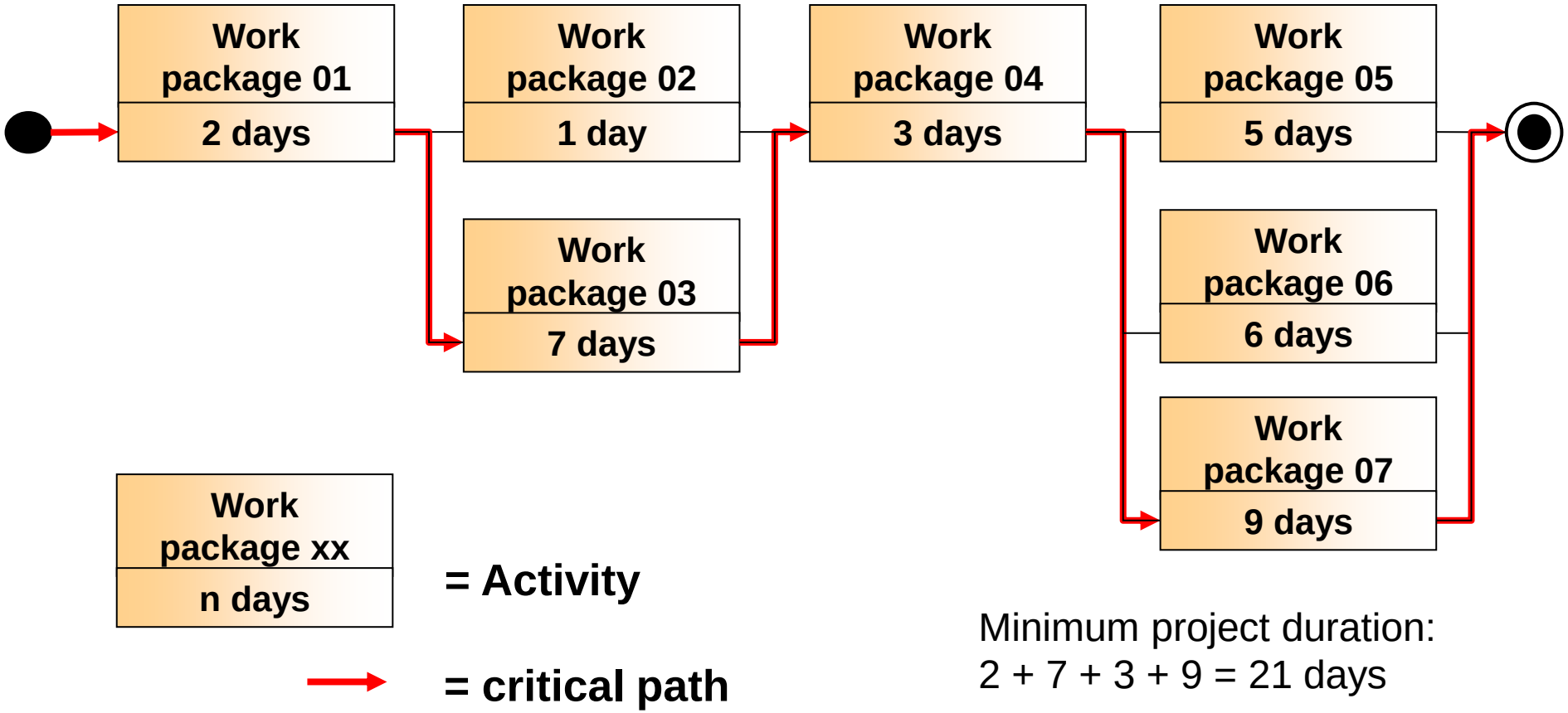
Example, done with ProjectLibre™ [PL20]

	Name	Duration	Start	Finish
2	**Lecture 1**	10 days?	**13/01/20 08:00**	**24/01/20 17:00**
3	Preparation	9 days	13/01/20 08:00	23/01/20 17:00
4	00 General Information	1 day?	24/01/20 08:00	24/01/20 17:00
5	01 Introduction	1 day?	24/01/20 08:00	24/01/20 17:00
6	**Lecture 2**	4 days	**27/01/20 08:00**	**30/01/20 17:00**
7	Preparaton	3 days	27/01/20 08:00	29/01/20 17:00
8	**Project Strategy**	0.75 days	**30/01/20 08:00**	**30/01/20 15:00**
9	Situation analysis	0.25 days	30/01/20 08:00	30/01/20 10:00
10	Environmental analysis	0.25 days	30/01/20 10:00	30/01/20 13:00
11	Project order	0.25 days	30/01/20 13:00	30/01/20 15:00
12	Risk Managment	0.25 days	30/01/20 15:00	30/01/20 17:00
13	**Lecture 3**	3 days?	**27/01/20 08:00**	**29/01/20 17:00**
14	Preparation	3 days	27/01/20 08:00	29/01/20 17:00
15	Requirements Engineering	1 day?	27/01/20 08:00	27/01/20 17:00
16	Communication	1 day?	27/01/20 08:00	27/01/20 17:00
17	**Lecture 4**	8 days?	**30/01/20 08:00**	**10/02/20 17:00**
18	Preparation	7 days	30/01/20 08:00	07/02/20 17:00
19	**Project Planning**	1 day	**10/02/20 08:00**	**10/02/20 17:00**
20	Work Breakdown Structure	1 day	10/02/20 08:00	10/02/20 17:00
21	Time schedule	0.125 days	10/02/20 08:00	10/02/20 09:00
22	Resource / Personnel Planning	0.125 days	10/02/20 08:00	10/02/20 09:00
23	Project organization	0.125 days	10/02/20 08:00	10/02/20 09:00
24	Prioject Kickoff	0.125 days	10/02/20 09:00	10/02/20 10:00
25	Project Culture	1 day?	30/01/20 08:00	30/01/20 17:00
26	**Lecture 5**	9 days	**03/02/20 08:00**	**13/02/20 17:00**
27	Preparation	8 days	03/02/20 08:00	12/02/20 17:00
28	**Project Execution**	1 day	**13/02/20 08:00**	**13/02/20 17:00**



Time Schedule

Example for critical path to consider dependencies



Minimum project duration:
2 + 7 + 3 + 9 = 21 days

Time Schedule

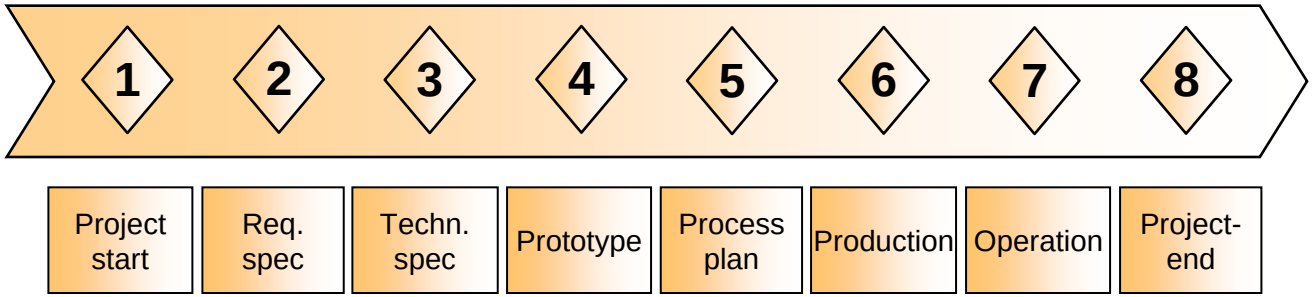
- ***Milestone***
  *(**Synonyms**: Stop-or-go points, Quality Gates, review points, release, customer approval)*:
  Event of special relevance
  [DIN 69901-5:2009-01]
  - typically interim goals with an important project result
  - important part of project management, especially of project controlling

Time Schedule

- A milestone includes
  - a due date,
  - checkable criteria.
- Typical contents of a milestone plan
  - Start date of the project
  - Milestone dates because of important events and their scope
  - End date of the project
- Proposal for proceeding
  - Plan in detail next milestone
  - Plan roughly the next but one milestone

Time Schedule

- Example for a milestone overview



Time Schedule

- Example for a milestone plan

No.	Plan date	Actual date	Milestone	Id	Criterion	Result
<1>	*<dd.mm.yy>*	*<dd.mm.yy>*	*<Project start>*	*<1.1>*	*<e.g. Project order signed>*	*<open, in progress, passed, not passed>*
<1>				*<1.2>*		
<n>	*<dd.mm.yy>*	*<dd.mm.yy>*	*<Project end>*	*<n.1>*	*<e.g. Project delivery accepted>*	*<open, in progress, passed, not passed>*

Contents

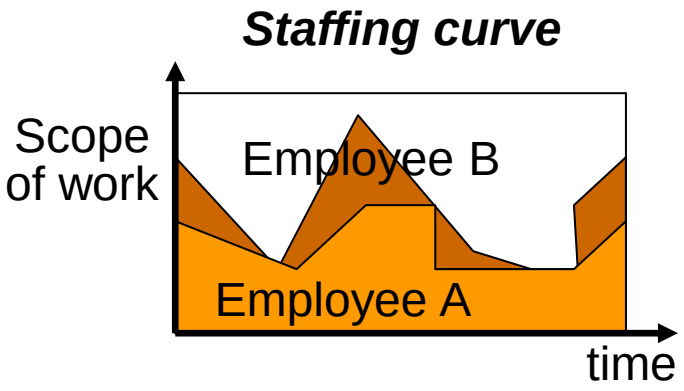
Resource Plan/Cost Schedule

- ***Resource plan***:
  based on the WBS and identifies the quantity of labor, equipment and materials required for a project.
  - Objectives and constraints to be considered.
- A resource plan covers
  - personal planning,
  - cost schedule.
- ***Cost schedule***:
  describes the estimated costs of a project.

Personal costs:
Often the highest costs in a project

Resource Plan/Cost Schedule

- Goal: Optimal workload of resources
- Especially in matrix project management:
  - Clarification, which resources in which volume are available from the business units
- Scope:
  - Planning of staff members (Personnel plan), machines, tools, and additional needed resources
  - Typically resource plan and cost schedule are done in parallel



Resource Plan/Cost Schedule

- Cost schedule to calculate costs of the project
  - Personnel costs (Project management, internal / external staff members)
  - Material costs (Printers, computers, furniture)
  - Consumption costs (rent, electricity, network)
  - Additional costs
- For structuring of the costs use the work packages from the WBS

Resource Plan/Cost Schedule

Proposal for a personnel planning proceeding

- Determine the staff requirements
- Determine the available capacity
- Compare capacity and requirement
- Do capacity balancing and/or optimizing concerning deadlines (time) and costs

Resource Plan/Cost Schedule

Proposal for proceeding for a cost schedule:

- Based on the structures in the WBS each working package delivers target figures
- The target figures of the working packages are added for the subprojects
- Finally the plan for the overall project takes place

Resource Plan/Cost Schedule

- More procedures to estimate the costs of a project:
  - Simple estimation with a description how the estimation has been done
  - Cost estimation following phases with personnel or material costs
  - Expert estimate* like the Delphi method
  - Comparison with similar projects
  - Algorithmic cost model like the Constructive Cost Model (COCOMO)
- Risk surcharge recommended
- Consider cost estimation workshops

*In Scrum planning poker is used as an expert method

Resource Plan/Cost Schedule

Example personnel costs

Personnel costs			Plan			Actual		
WBS No.	**Working package / Name**	**Int. / ext.**	**Hours**	**Rate**	**Costs**	**Hours**	**Rate**	**Costs**
<1.1>	*<Project management>*	*<Int>*	*<20>*	*<50B>*	*<1.000B>*	*<30>*	*<50B>*	*<1.500B>*
<1.1>	*<PMO>*	*<Int>*	*<40>*	*<40B>*	*<1.600B>*	*<50>*	*<40B>*	*<2.000B>*
Sub-total personal costs					*<2.600B>*			*<3.500B>*

Resource Plan/Cost Schedule

Example material costs

Material costs			Plan			Actual		
WBS No.	Working package	Item	Quantity	Price	Costs	Quantity	Price	Costs
<6.3>	*<Implementation>*	*<Laptop>*	*<4>*	*<5.000B>*	*<20.000B>*	*<4>*	*<4.500B>*	*<18.000B>*
<7.4>	*<Meetings>*	*<Food>*	*<60>*	*<50B>*	*<3.000B>*	*<60>*	*<50B>*	*<3.000B>*
Sub-total material costs					*<23.000B>*			*<21.000B>*
Total					*<25.600B>*			*<24.500B>*

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Project Organization

Project organization: totality of the organizational units and the organizational control to process a defined project [DIN 69901-5:2009-01].

- A project organization covers all organizational units and regulations concerning the execution of a project
- The project organization answers, who accepts which results

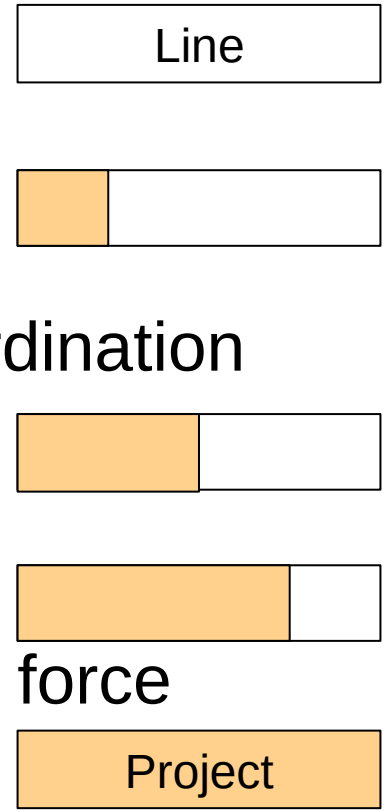
Project Organization

- Roles in the project
  - Principal (synonym executive, sponsor)
  - Steering Committee (synonym project board)
  - Project Manager (synonym project lead)
  - Project team/core team
  - Controller
  - Quality assurance (synonym project assurance)
- Further roles (depending on size/area)
  - Project office
  - Documentation
  - Supplier
  - Business user representative …

Project Organization

Possible organization forms

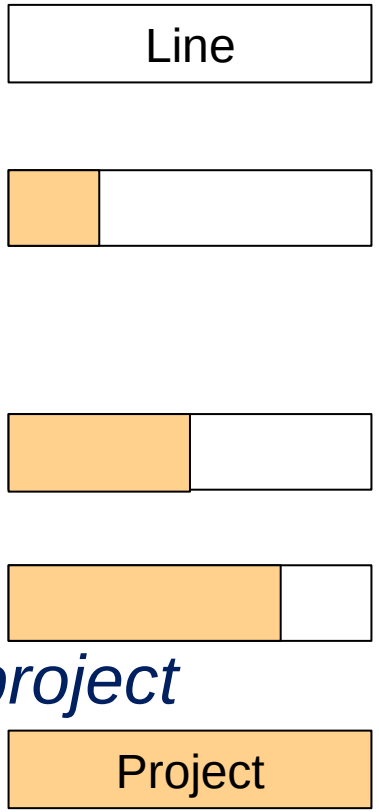
- Pure functional project organization (following division, departments)
- Functional project organization
  Synonyms: Influence project organization, influence project management, project coordination
- Matrix project organization
  Synonym: Matrix project management
- Pure project organization
  Synonyms: Pure project management, task force
- Project society



Project Organization

Roles of people in possible organization forms

- Pure functional project organization
  People stay in the line
- Functional project organization
  People work partly in the project and are controlled in the functional unit
- Matrix project organization
  People work partly in project, belong to line
- Pure project organization
  For a defined time people work only in the project
- Project society



Project Organization

Scope concerning setup of a project organization

- Definition of boards and teams like
  - steering committee,
  - core team,
  - project team,
  - working teams.
- Organizational regularization like definition of a
  - central communication platform or
  - project handbook.

Project Organization

- The project organization chart (org chart) shows
  - project roles,
  - their relationships among each other
    - Who reports to whom?
    - Who decides?
  - the communication channels in the project.
- Additionally it could depict specified meetings and their frequency

2.3

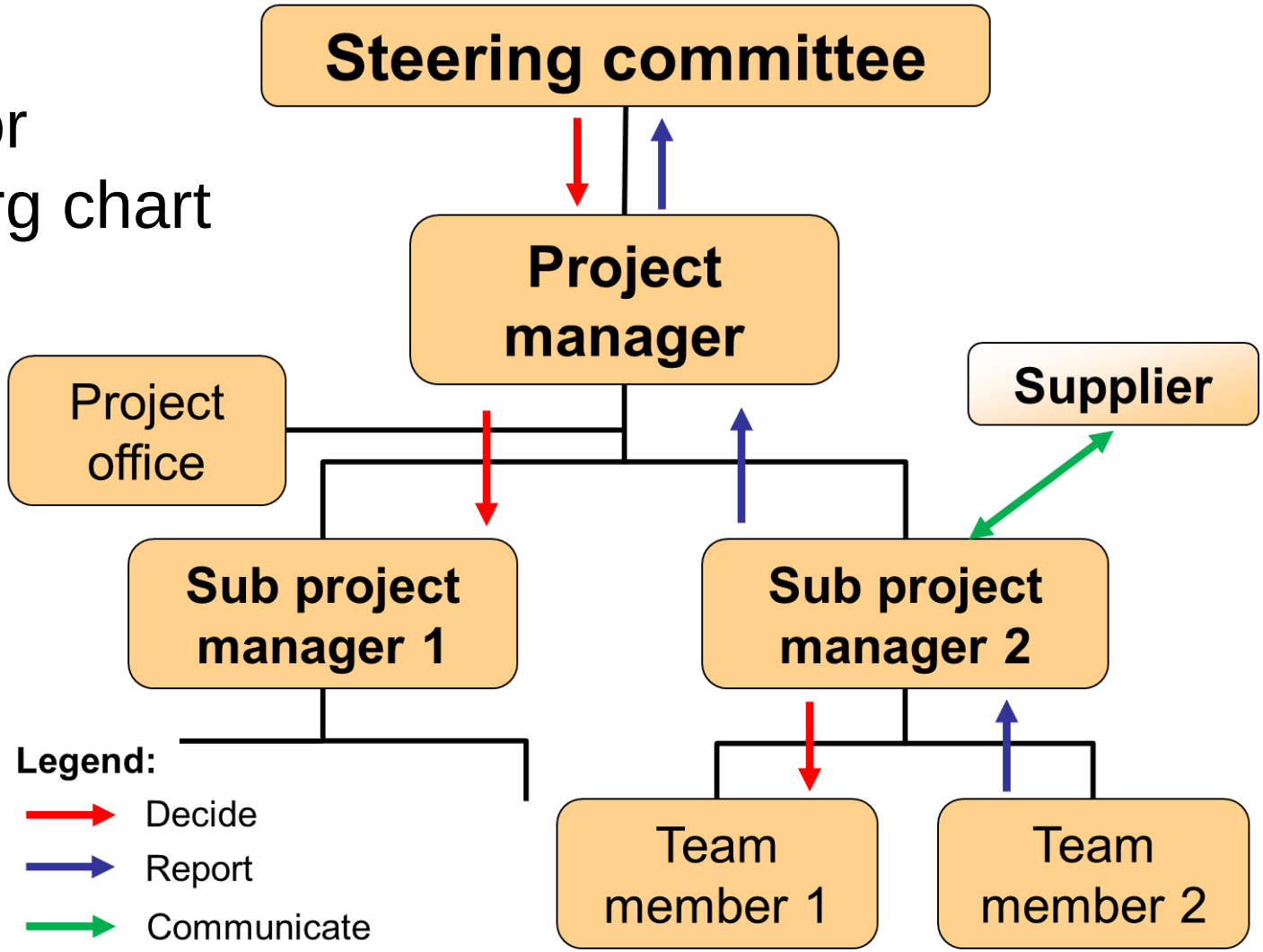
- Assignment of tasks
  Every project role is assigned to work packages and tasks

Project Organization

- How do I set up my project team?
  - Structuring the project in manageable sub teams
  - Every sub team should have about 7 people
  - Social mixing:
    - Female/male
    - Old/young (experienced, carefree)
    - International
  - Mixing competence
    - Technical know-how/business know-how
    - Method know-how/expert know-how
    - Generalists/specialists
    - Practical/theoretical
  - Creation of tandems across-the-board (working, reviewing)
  - Collaboration with functional units

Project Organization

Example for
a project org chart



Contents

Plan Optimization

- Project plan iteration – possibilities to optimize
  - Resources
    - Vacation/sickness/absence planning (functional tasks, training needs, other projects)
    - Equalization of load (avoiding of overload)
  - Time schedule
    - Plan optimization using network planning technique → critical path analysis
    - Planning of buffer
  - Costs
    - Start risky work packages as soon as possible
    - Start cost intensive work packages as late as possible

Alignment

- Main goal: Get agreement from principal
- Sub goal: Get agreement from project members
  - Plan coordination
  - Communication with supervisors of project members
    - Goal: achieve their commitment to the project
    - Important especially in matrix project management
  - Plan should get reviewed and accepted by the project members
  - Clarification of conflicts in advance

Contents

Project Kickoff

- Project kickoff, when planning is done:
  - Information about the project objective
    Every project member should understand the project goal including sub goals
  - Information about the project plan
  - Motivation
    - Project is important and decision maker support the project
    - To get to know each other
    - Corporate feeling: It could work like this!
  - Conflicts and critical points are solved

Project Kickoff

- Scope
  - Information, motivation
  - Results of planning
  - Next two milestones
    - In detail: next milestone
    - Roughly: next but one milestone
- The more political, the more important:
  Be consequent!

Contents

Summary

- Main goal of planning phase is not the plan but the activity of planning
- Core of project plan:
  Work breakdown structure (WBS)
  - Lowest level: Work package
  - Top down/Bottom up approach
  - Approaches to structure a WBS
    - function oriented
    - object oriented
    - process oriented
    - mixed approach

Summary

- Derive from the WBS
  - Time schedule
    Consolidate activities to milestones
  - Resource plan – focus on personnel plan
    Cost schedule
    - personnel costs
    - material costs
- Project organization to define roles and relationships
- Plan optimization to improve
- Plan alignment
  to get an agreement of parties and people involved
- Kickoff as start of the project
  Every project member knows the project goal!