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UNIVERSITÄT WÜRZBURG

Institute of Computer Science
Chair of Communication Networks
Prof. Dr.-Ing. P. Tran-Gia

i3

Lecture: Modern Project Management in ICT

Prof. Dr. Harald Wehnes

HUST, 13 Mar 2020

TRƯỜNG ĐẠI HỌC BÁCH KHOA HÀ NỘI
HANOI UNIVERSITY OF SCIENCE AND TECHNOLOGY

Agenda

Exam (online alternatives)

Presentation of the solutions of Task 4

5. Traditional Project Planning

5.1 Project Startup and Project Charter

5.2 Phases and Milestones
- Phase-milestone plan

5.3 Work Breakdown Structures (WBS)
- Phase oriented Work Breakdown Structure

5.4 Working packages, process and time scheduling
- List of WP with dependencies and duration
- Process schedule of the project
- Time schedule of the project

5.5 Resource and cost planning
- Result: personal resources

Task 5: Phases, and milestones of the start-up project (pptx)

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Exam and grades

▶ There is no traditional exam next week and no celebration ceremony

▶ I am looking together with you for an alternative exam solution

▶ Ideas (Brainstorming)
- Alone (1 min)
- Team (5 min) – coordinated by PM of day 4

▶ Solution ideas
- 11, 3: Online quizzes
- 12, 10 – 4, 2, 1: Final presentation as exam

Homework: Task 4

1. Optimize "Story Map and MVP"

2. Stakeholder management

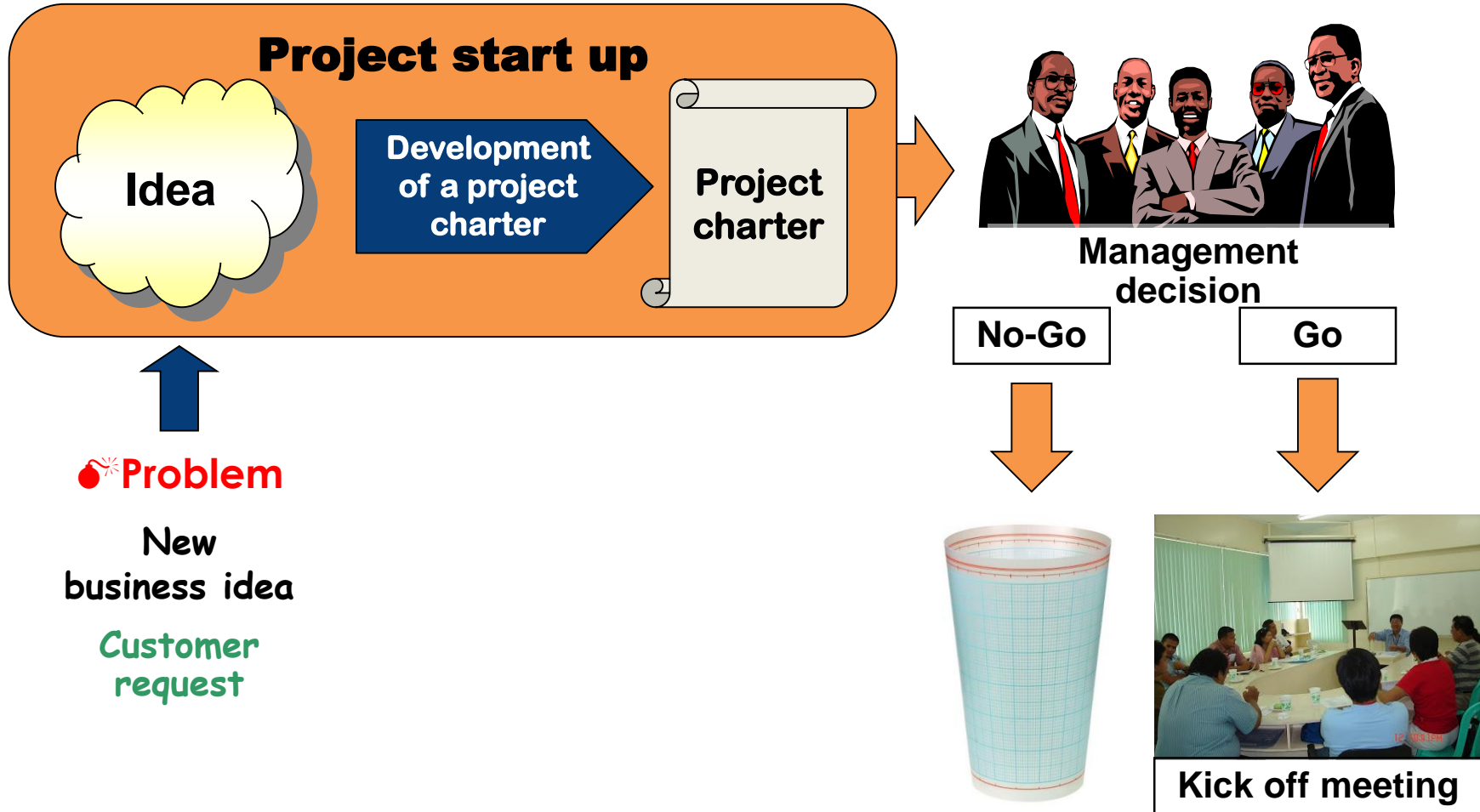- 5 Stakeholder: analysis and measures (only for stakeholder with **"power/influence" = high)**

Upload of the presentation Team_n-Task_4.pptx

by the project manager of day 4!

Deadline: 13th March, 8:00 am

Presentation by the project managers of day 4 this morning

5.1 PROJECT START UP AND PROJECT CHARTER

Project start up: From the idea to the project charter

Project start up

Idea → Development of a project charter → Project charter → Management decision

💣**Problem**

New business idea

Customer request

No-Go | Go

Kick off meeting

Project start up

▶ The project start up is the early phase of a project in which:

- the **preconditions** for a successful project are created
- the **foundation-stone** for the project execution is laid

▶ It is characterised by

- undefined expectations
- great uncertainty
- time pressure

▶ The project start up requires:

- high attention
- broad participation
- carefully thought out and mature decisions

Project charter

▶ A project charter is the document that formally authorizes a project (project initiation document, project mandate, letter of agreement, contract)

▶ Project charters are a high-level view of the project and its objectives

▶ Typical sections of a project charter

- **Sponsor**: the one with the money
- **Project Manager**: The individual responsible for the project
- **Team**: does planning and execution
- **Overview**: short project description
- **Project objectives**: results/deliverables, time, financial, social, non-objectives
- **Key stakeholders**: e.g. customer, external experts
- **Important business plan data**: target groups, customer benefits, unique selling propositions (USP), market potential

Never start a project without a project charter!
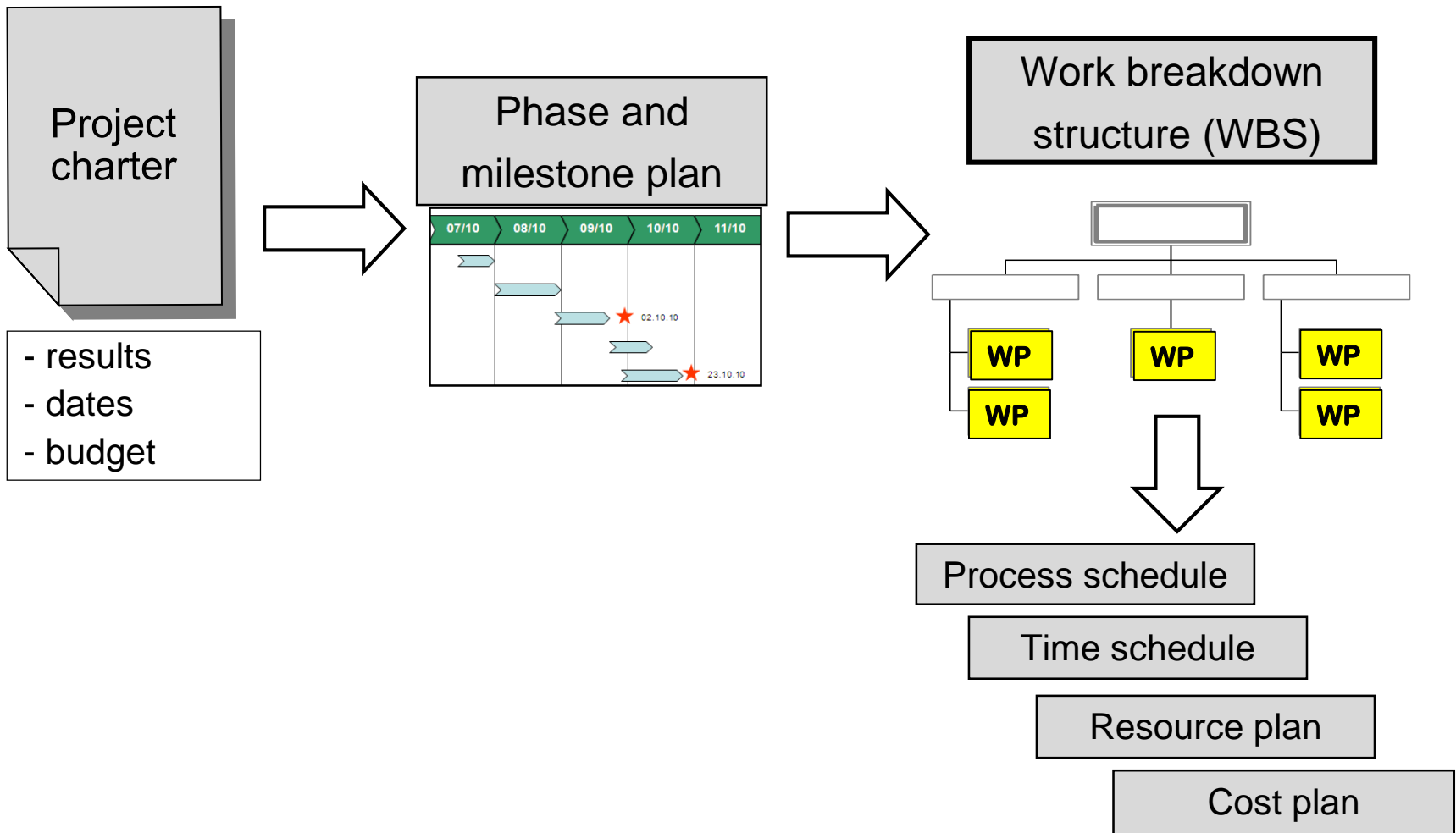
Project charter

Project name:	
Sponsor:	
Project manager:	
Team members:	

Business idea (*short description*)	
Project objectives (*results/deliverables, timing, financial, social*)	
Non objectives	

Times	Duration	
	Start date	
	Finish date	
	Milestones	

Costs	
Key stakeholder	

Business plan	
• Target groups	
• Customer benefits	
• Unique selling propositions (USP)	
• Market potential	

Project charter (Example)

Project name: Sweet-smelling Clothes	
Sponsor: #1 Venture Capital	
#2 School of Textile-Leather and Fashion of HUST and Department of other Universities	
#3 Fashion Brands, Fashion shops	
Project manager:	
Team members:	
Business idea (*short description*)	• Invent a new product called "sweet-smelling clothes" • Features of product: change the stinky sweat smells into sweet smells such as the smell of perfume, fruits…

0.Project objectives (*results/deliverables, timing, financial, social*)	1. Result:
	   a. Develop a new technique to change stinky body sweat into sweet smell base on today's deodorant technologies.
	   b. Have community, supporters, sponsors for later project.
	2. Timing: 1st step : 1 month for preparation and plan
	   2nd step: 1-1.5 year develop the new technique, create prototype and test.
	   3rd step: 1 year building factory, do the design, promotion
	   4th step: then do mass product, online selling and co-operate with others for win-win opportunities, first within our country.
	   5th step: 4-5 years, make it nationwide.
	3. Financial: expected investment: 10 billion for 2nd step, 100 billion for 3rd step.

		Mr. Tung is responsible for marketing and persuading sponsors. Mr. Hoang and Mr. Phong are responsible for develop the technique. Mr. Tu and Mr. Minh are responsible for human resources.
Times	Duration	2 weeks for preparation, making plan, market research and demo selling website.
	Start date	2/3/2015
	Finish date	2/9/2017
	Milestones	2/4/2015: finish preparation 2/4/2016: finish technology development 2/4/2017: finish design the product and build factory 2/9/2017: do mass product and sell the products.
Key stakeholders		Venture Capital School of Textile Fashion Brand Core Team Members Designers
Business plan		
• Target groups		For all customers, focus on 15-30-year old group, and athletes, soldiers.
• Customer benefits		More confident Be more attractive Safe usage and cost effective (durability)
• Unique selling propositions (USP)		Be smelt different
• Market potential		There is no project like this so we believe our products have huge potential in the current market.

SWEET FASHION

# 5.2 PHASES & MILESTONES

Traditional Project Planning: Overview

Project charter

- results
- dates
- budget

Phase and milestone plan

07/10	08/10	09/10	10/10	11/10

02.10.10
23.10.10

Work breakdown structure (WBS)

WP WP WP
WP   WP

Process schedule

Time schedule

Resource plan

Cost plan

Project phases and milestones

► **Project phase** (stage) certain time period within a project, which clearly differentiate themselves from other project periods, and having pre-defined sub-deliverables. Each phase has a **clear objective** and produces defined deliverables

► **Phase plan:** is used for a first orientation about a possible project life cycle. It classifies the project into phases (rough periods)

► The separation of the phases is often done by **milestones** (gates) „**an event of particular significance**"

► At important milestones the steering committee makes **Go/Nogo decisions**. These are the starting shots for the next phase.

► There are **specific phase models** for various industries: automotive, construction, IT, logistics, R&D, etc.

Example: Phases and milestones (table)

Phase	Period	Deliverables of the phase	MS #	Milestone	Date
Preparation	2 w	Project organization	1	Preparation finished	20/6/18
Making demo version	2 m	Complete the demo interface, adding some main language: VN, Japanese, EN, Chinese	2	Finish demo version	20/8/18
Complete demo session	1 m	Free deliver demo version to market for 1 month to get feedback	3	Complete demo session finished	20/9/18
Raising fund	1 m	Finding budget for official version	4	Found out main sponsors	20/10/18
Humen resources	1 m	Finding more members for official version	5	Found enough members	20/11/18
Making official version	5 m	Finishing all feature of app (interface, languages,…)	6	Ready for testing	20/4/19
Testing and debugging	1 m	Finalizing the app	7	Complete official version	20/5/19

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Example: phases and milestones
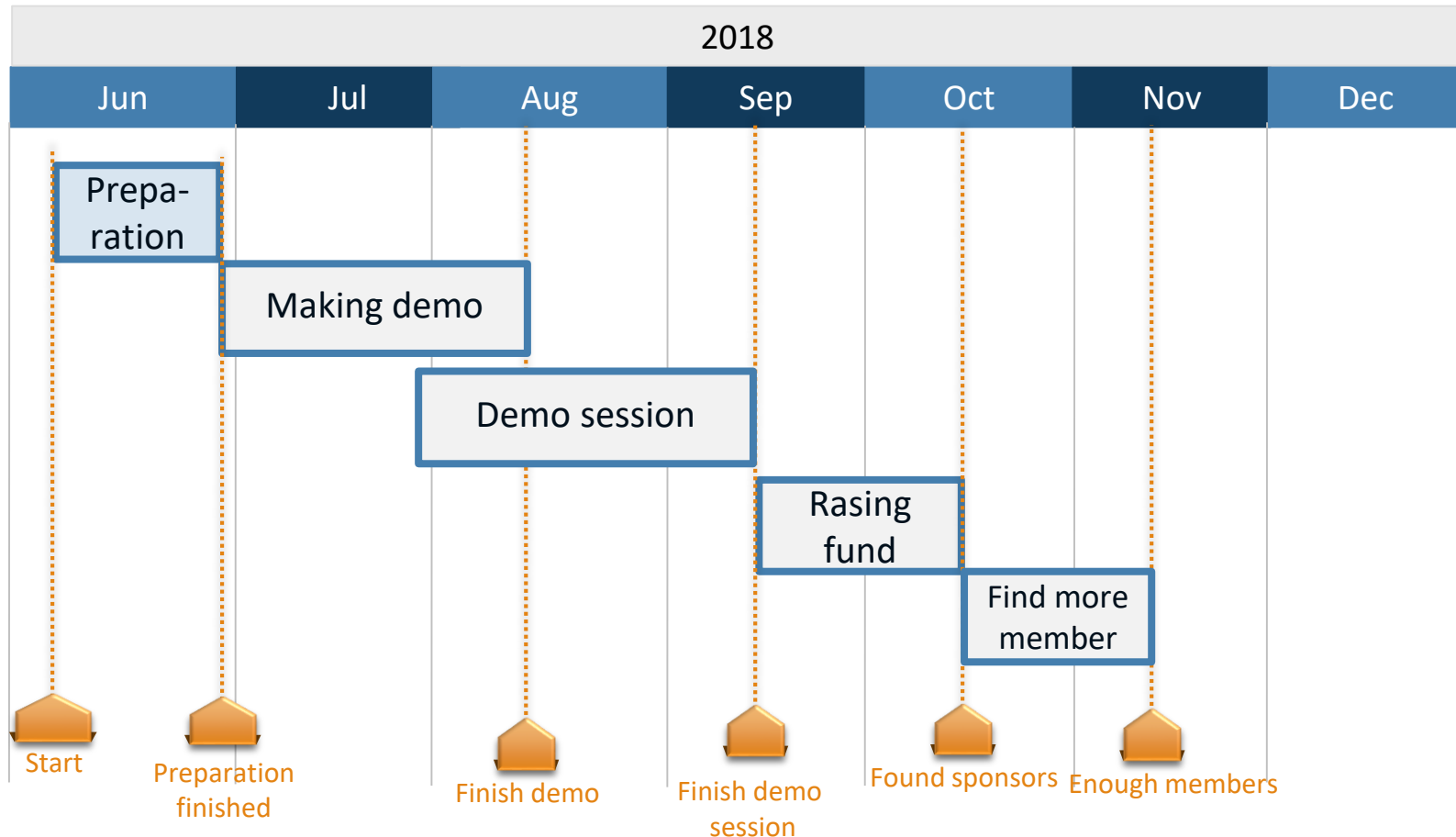
Definition: Deliverables

▶ **Deliverables** are tangible and intangible products generated from a project, a sub-project, a phase, or a work package

Project objective	➡	Deliverables (output, product)
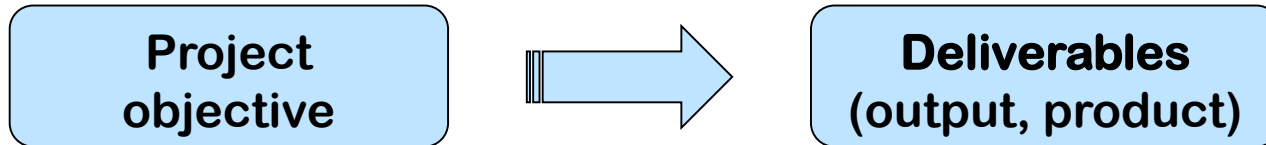
▶ **Examples**
- Concepts
- Planning documents: Project schedule, resource plan, risk plan
- Prototypes, Mock-ups, Applications
- Components of the project product, e.g. DB of the web platform
- Seminar (to enable the team to do the work), Webinar, e-Learning Module
- New processes (described and with roles)

▶ A deliverable is not complete until it has been accepted

Workshop „Phases & milestones" (1)

Create a phase plan with milestones of your project
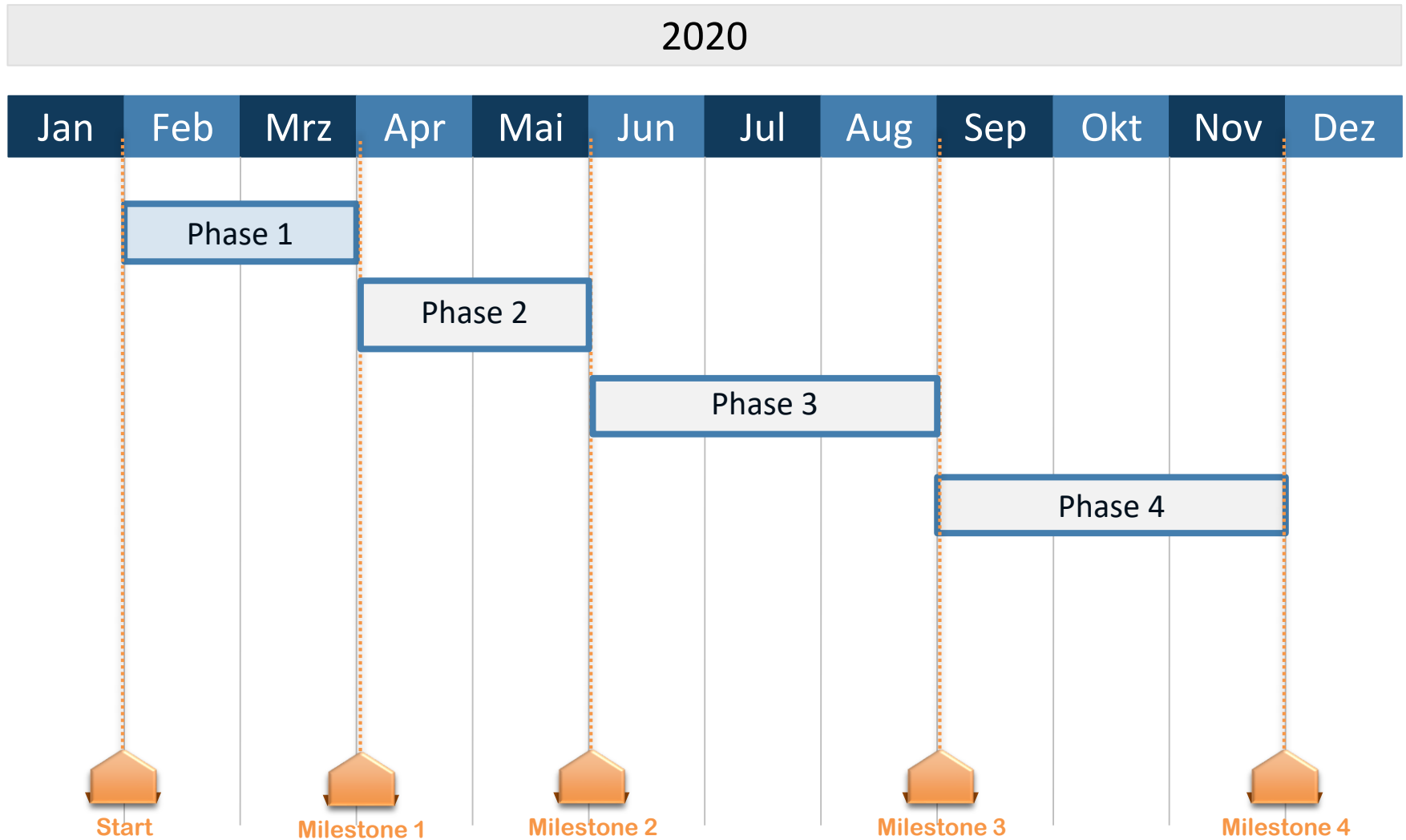
1. Create a **table** with the phases and milestones

Template: Phases_milestones.xls

Phase	Period	Deliverables of the phase	MS #	Milestone	Date
Preparation	01.-28.02	Project organisation: organigram with sponsor, project manager, and team members; logistic plan; …	1	Preparation finished	28.02

Time: 15 minutes

Remark: Name of the phase and of the milestone might be the same in the table

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Phase plan: 1 year (Template)

Workshop „Phases & milestones" (2)

Create a phase plan with milestones of your project

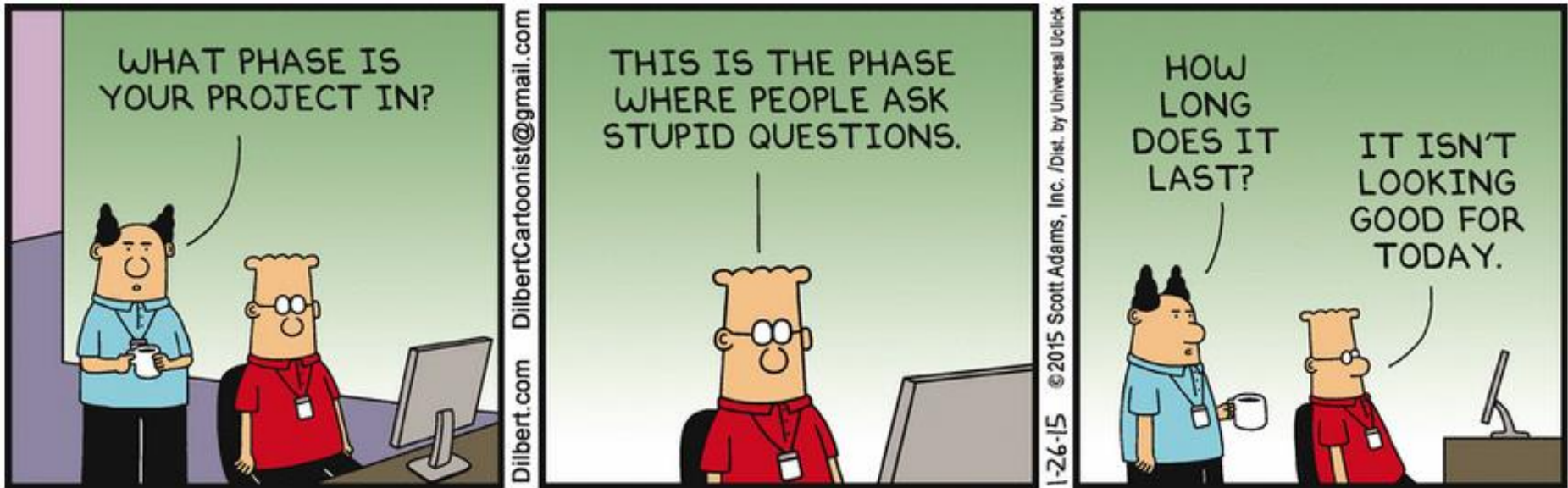2. Create a **bar chart (Gantt chart)** with the phases and milestones

> **Template: phase-plan.pptx**

Time: 15 minutes

Teams present their project phases and milestones

▶ Team 1, 3, 10: Table

▶ Team 6:   Phase plan

Project phases by Dilbert

Homework: Task 5

1. Complete the **phase plan with milestones** (table);
   5 to 7 phases and milestones
2. Develop **a bar chart** with these data
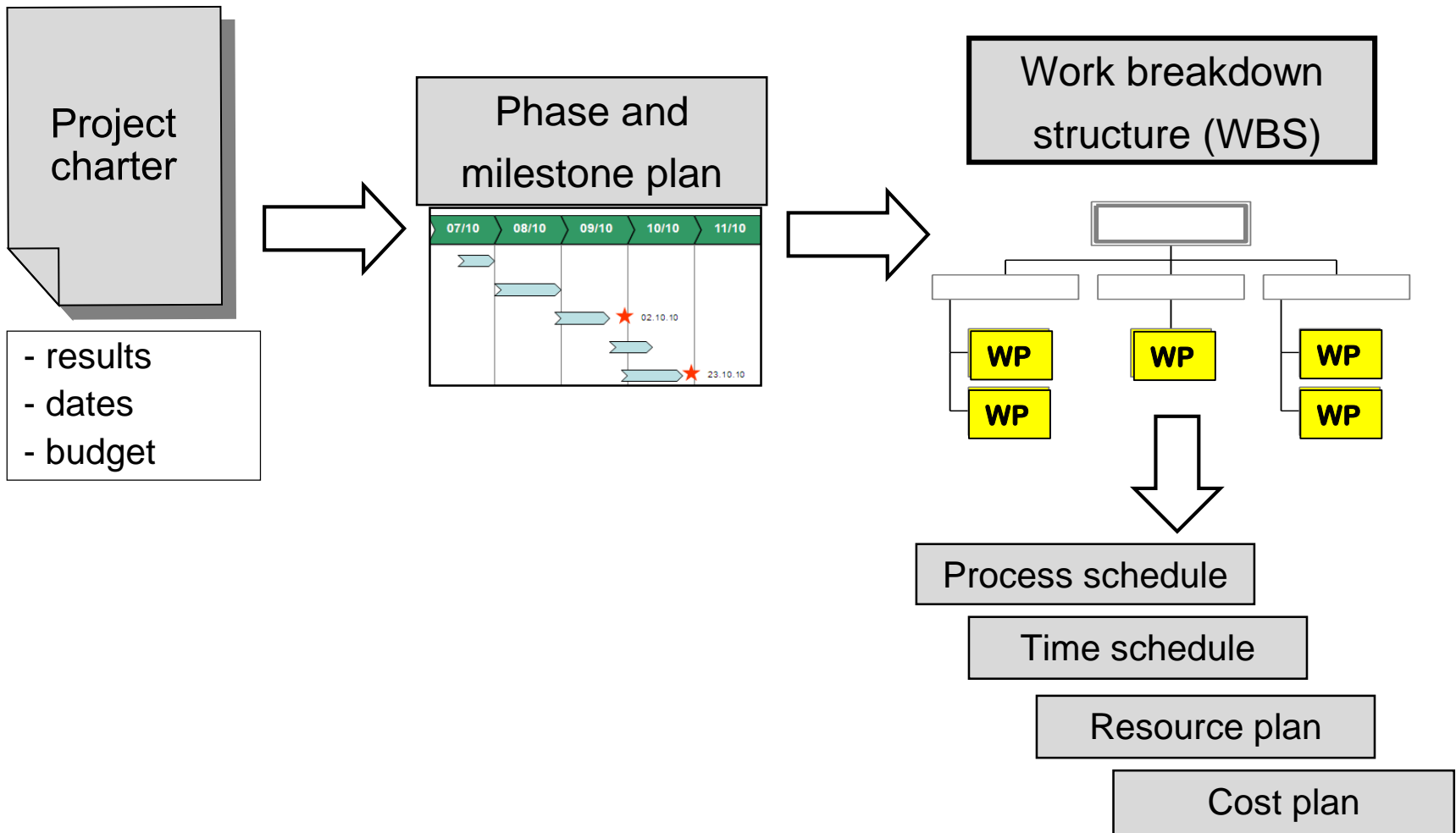3. ~~Complete your phase-oriented **WBS**~~

Upload of the presentation Team_n-Task_5.pptx

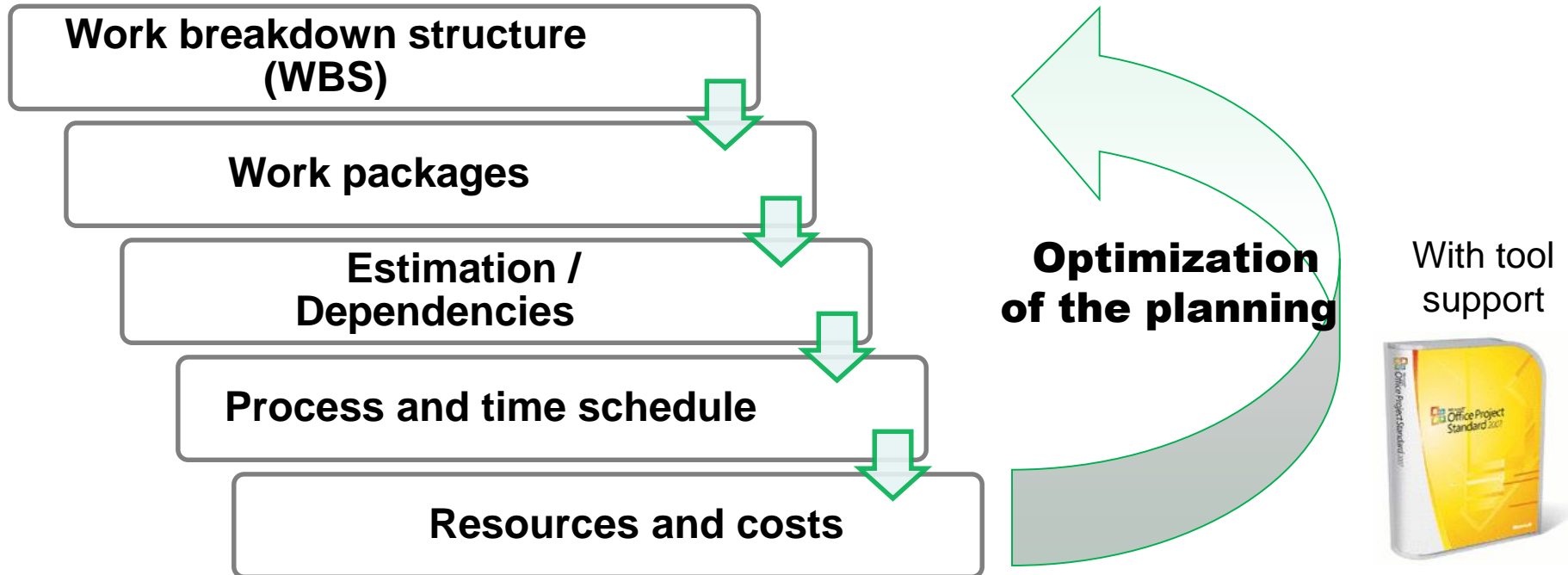by the project manager of day 5!

Deadline: 16th March, 8:00 am

Presentation on Monday morning (Duration: $\leq$ 3 min)
by the project managers of day 5

5.3 WORK BREAKDOWN STRUCTURE (WBS)

Traditional Project Planning: Overview

Project charter

- results
- dates
- budget

Phase and milestone plan

| 07/10 | 08/10 | 09/10 | 10/10 | 11/10 |

02.10.10

23.10.10

Work breakdown structure (WBS)

WP   WP   WP
WP   WP

Process schedule

Time schedule

Resource plan

Cost plan

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Project planning is carried out in steps

Work breakdown structure (WBS)

Work packages

Estimation / Dependencies

Process and time schedule

Resources and costs

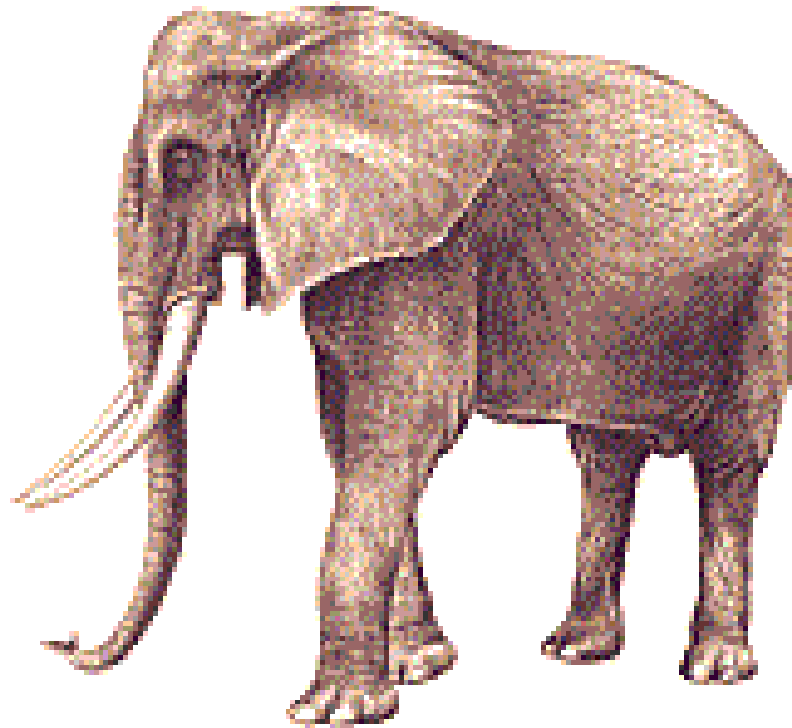**Optimization of the planning**

With tool support

Additional plans, e.g.

- Communication (internal / external) and reporting
- Quality
- Risks and opportunities
- Tools

Project structures

How to eat an elephant?

Bite by bite

Project structures are
a collection of techniques
to create order in a project
by representing certain aspects in a structured manner

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Work breakdown structure (WBS)

Definition: **Work breakdown structure = full, hierarchical representation of all the elements (sub projects, work packages) of the project structure in form of a diagram or list**

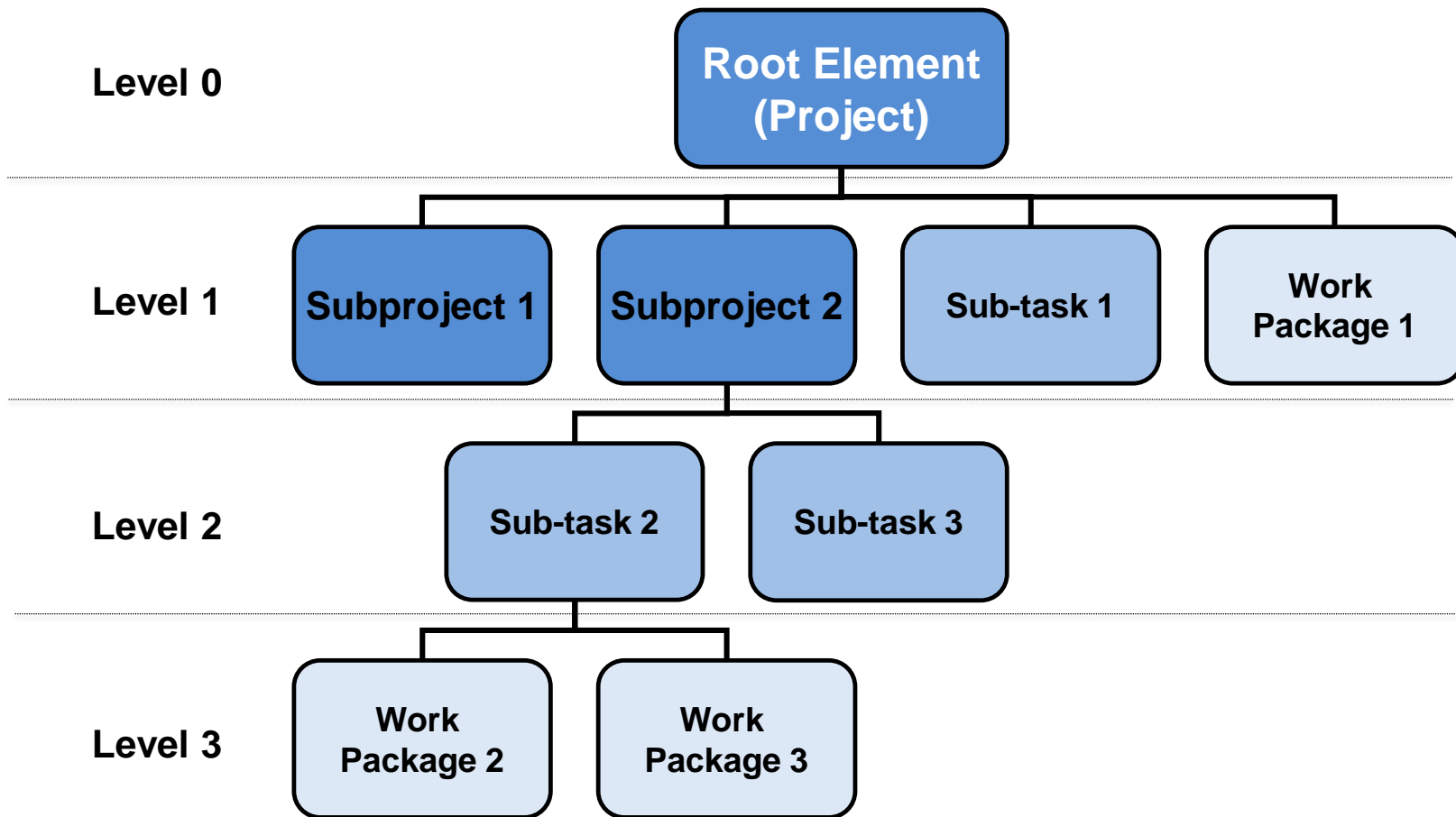**Aims of the Work Breakdown Structure (WBS)**

- Total overview of all tasks (work packages) of the project for establishing a shared understanding
- reducing complexity
- creating transparency
- detection of priority tasks, contexts and critical dependencies

WBS = „Mother of the project planning" (key instrument of pm)

- Basis for all following plans (process/dates, resources, costs, etc.)
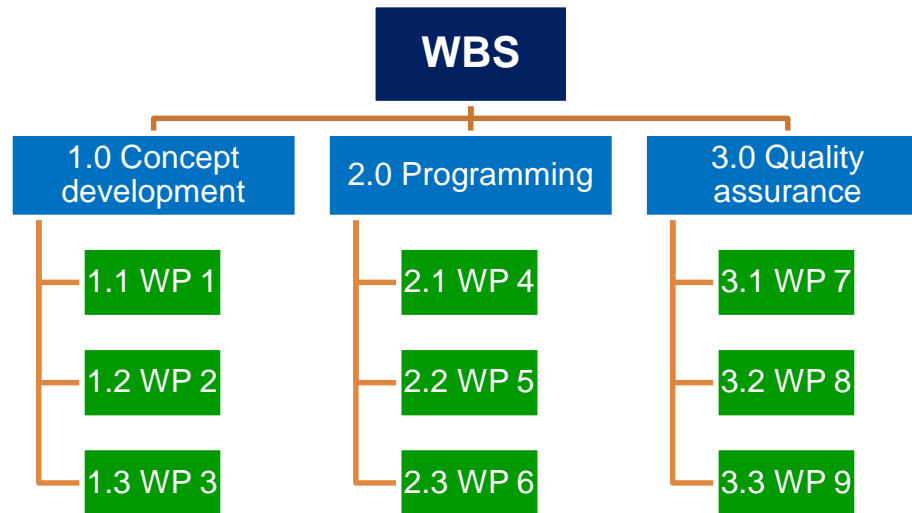- Basis for the control of the project implementation

Work Breakdown Structure (WBS): Projects are broken down to sub project, sub-task and work packages

Hierarchical presentation of the project, broken down into several levels

Level 0 — Root Element (Project)

Level 1 — Subproject 1, Subproject 2, Sub-task 1, Work Package 1

Level 2 — Sub-task 2, Sub-task 3

Level 3 — Work Package 2, Work Package 3

WBS presentation formats

▶ **Diagram**

```
                          ┌──────────┐
                          │   WBS    │
                          └──────────┘
         ┌────────────────────┼────────────────────┐
┌─────────────────┐  ┌─────────────────┐  ┌─────────────────┐
│ 1.0 Concept     │  │ 2.0 Programming │  │ 3.0 Quality     │
│ development     │  │                 │  │ assurance       │
└─────────────────┘  └─────────────────┘  └─────────────────┘
    ├─ 1.1 WP 1          ├─ 2.1 WP 4          ├─ 3.1 WP 7
    ├─ 1.2 WP 2          ├─ 2.2 WP 5          ├─ 3.2 WP 8
    └─ 1.3 WP 3          └─ 2.3 WP 6          └─ 3.3 WP 9
```

▶ **List**

1.0 Concept development
   1.1 WP 1
   1.2 WP 2
   1.3 WP 3
2.0 Programming
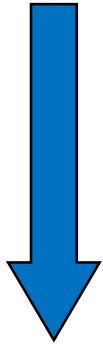   2.1 WP 4
   2.2 WP 5
   2.3 WP 6
3.0 Quality assurance
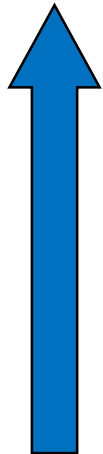   3.1 WP 7
   3.2 WP 8
   3.3 WP 9

Work breakdown structure (WBS): Basic profiling options

Strategies

Top-Down

- Start with the overall project as a level 1 (root level)
- Division into subprojects or main tasks of at level 2
- More gradual decomposition of the sub-projects and main tasks to work package level is reached

Bottom-Up

- Collection of tasks
  (by brainstorming, mind mapping, meta plan)
- Structuring of tasks according to a specific criterion (clusters)
- Structure of the project as a task hierarchy
- Adding missing tasks, removing duplicates

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Example: WBS NIMBUS (Bottom-Up)

Design principles for a work breakdown structure

▶ Phase oriented breakdown

▶ Object oriented breakdown

▶ Function oriented breakdown

▶ Mixed breakdown

Phase oriented breakdown (sequence oriented)

▶ Start with the phases of your project

▶ Each work package can be assigned to a phase

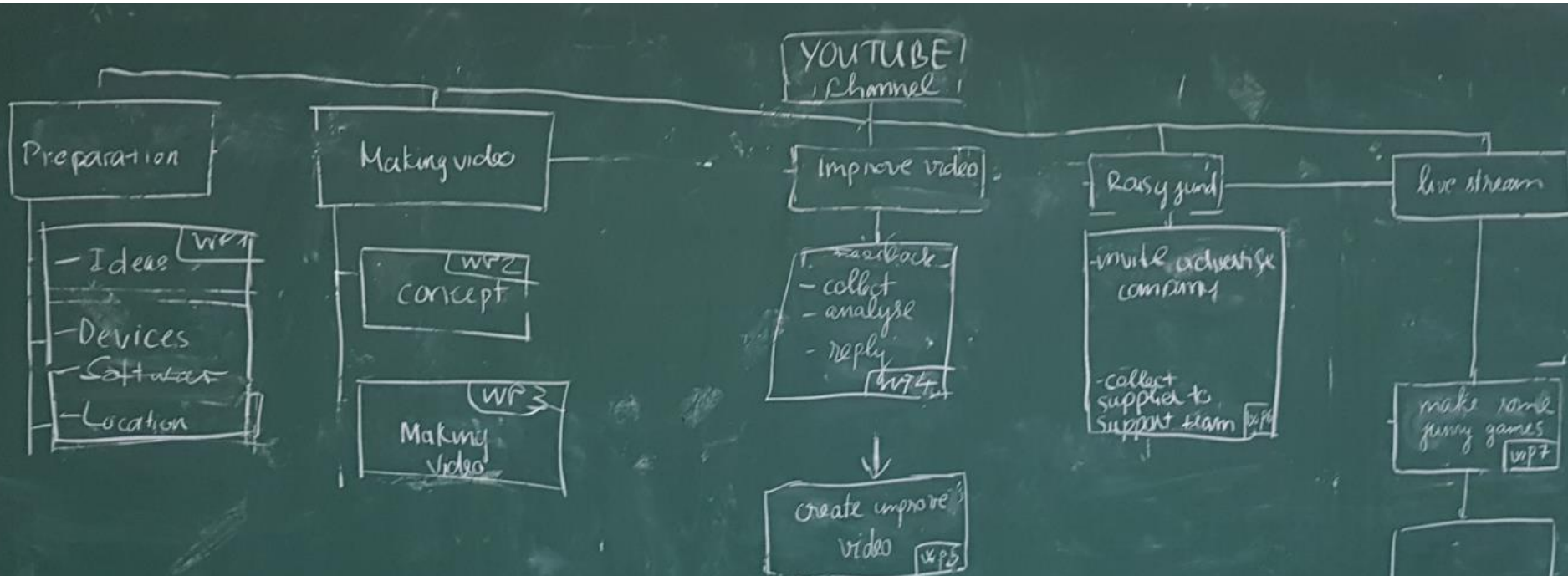▶ Exception: WP of Project Management

Example
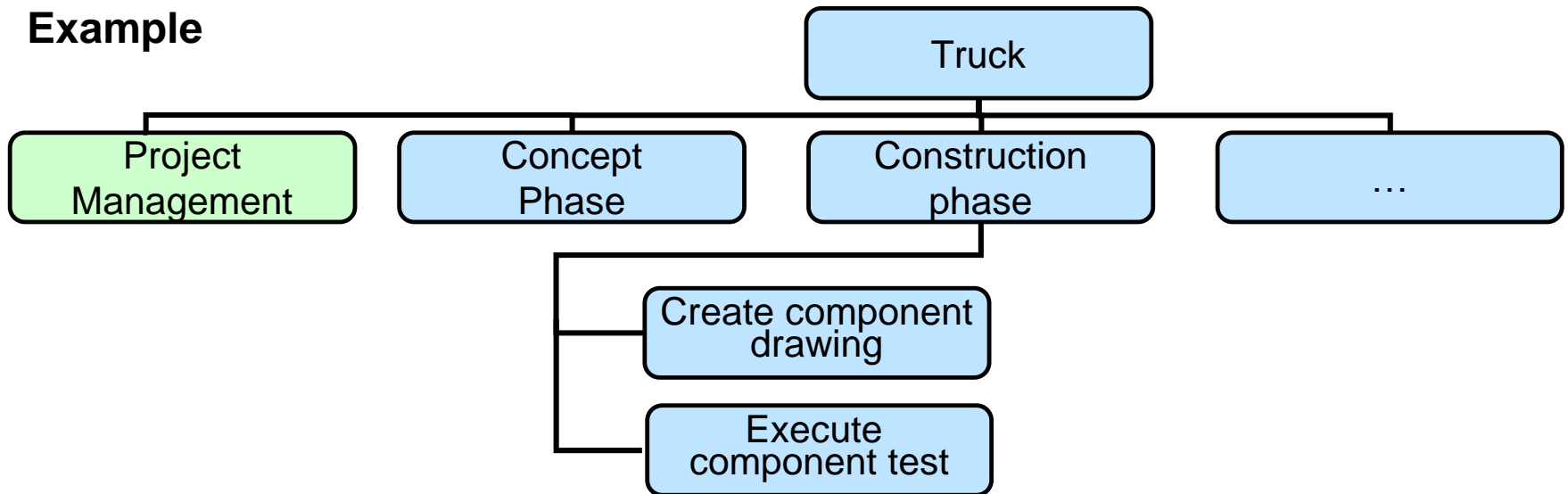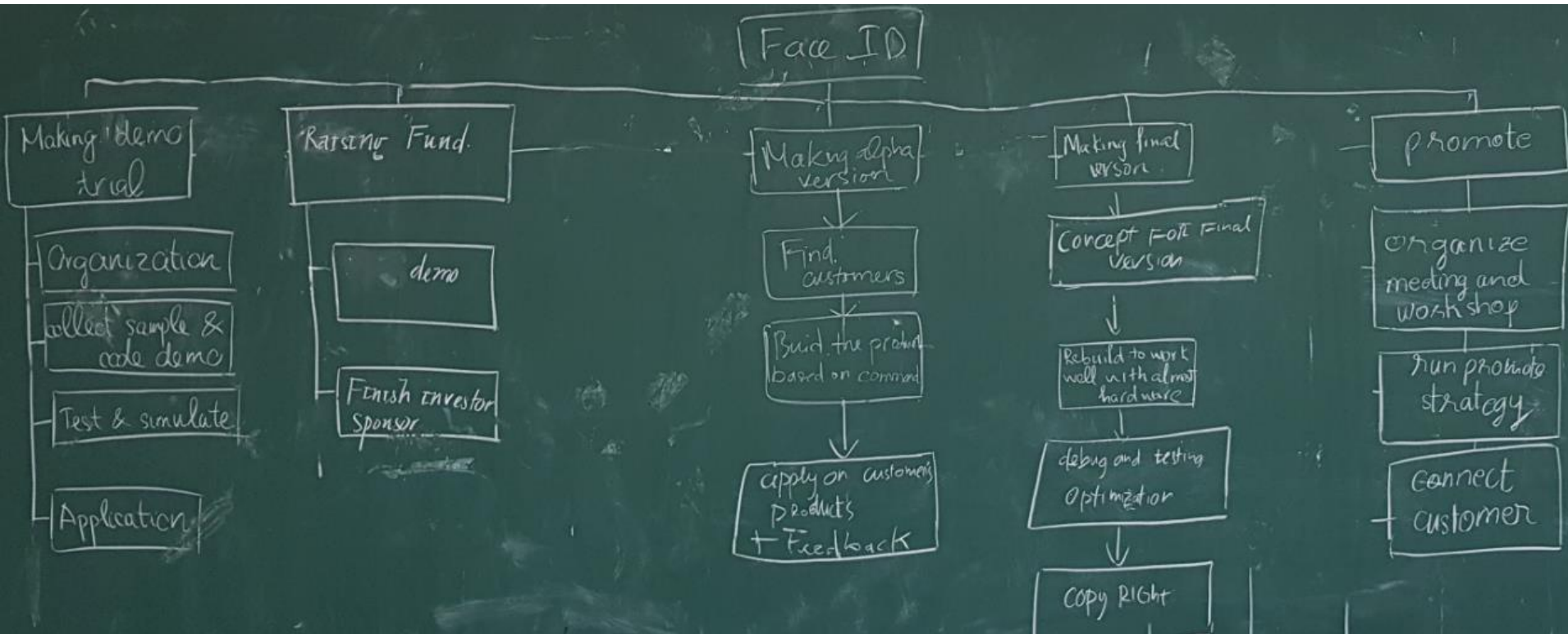
Workshop: Phase oriented breakdown

Create a phase oriented breakdown for your project

Time: 20 minutes

Workshop „Phase oriented breakdown": Result
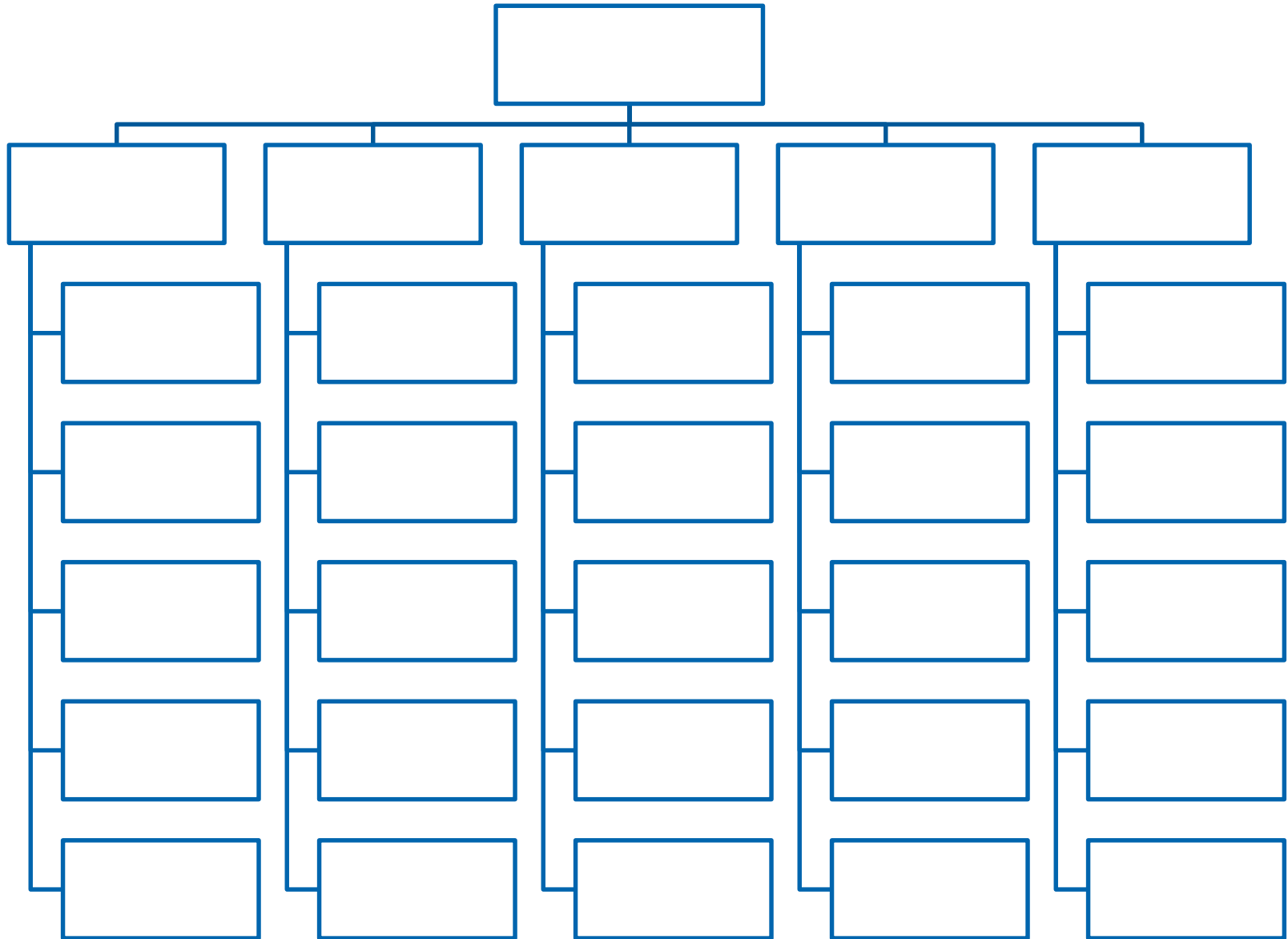
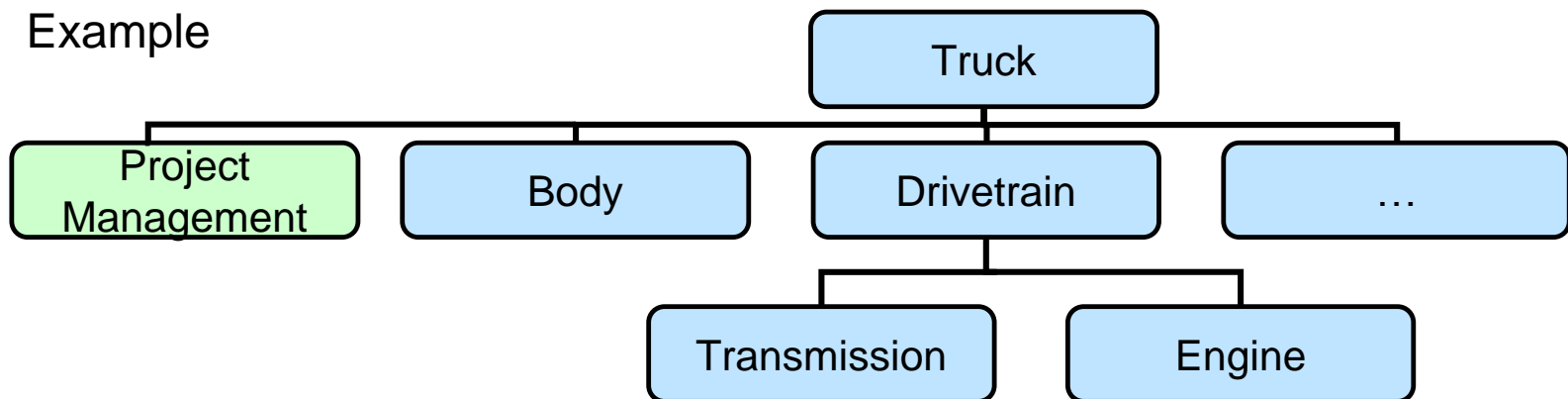# Workshop „Phase oriented breakdown": Result
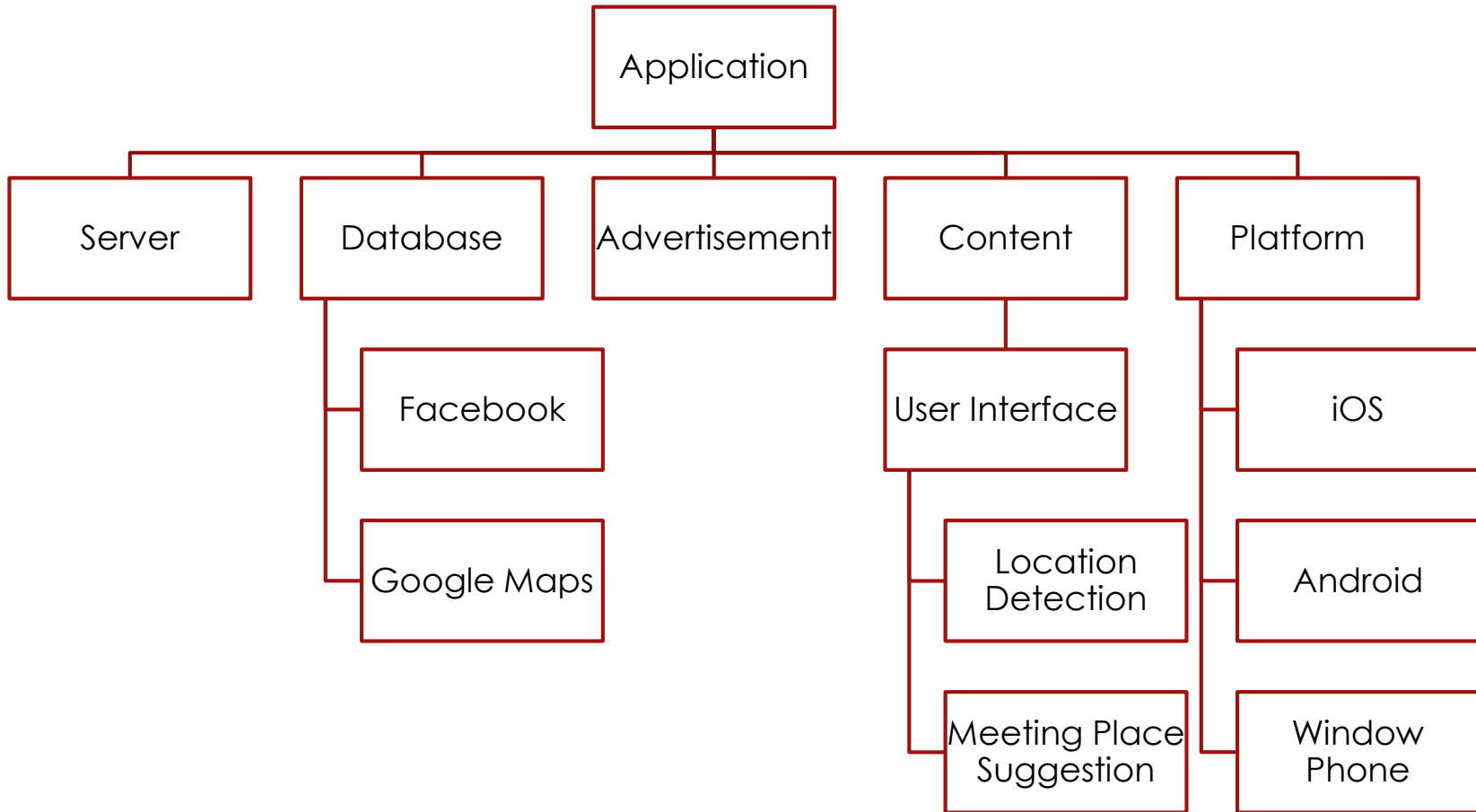
Work breakdown structure (WBS) – Template

Object oriented breakdown

▶ Divide the project objectives into its components, modules and any individual parts

▶ If the breakdown process is purely object-oriented, the product structure and the product structure plan are identical to WBS

Example

Example: Object oriented WBS

Function oriented breakdown (activity oriented)

The functions required in the project are in the focus:
analysis of customer requirements, system design, quality
management, marketing und sales, etc.

Example

```
                              ┌──────────────┐
                              │    Truck     │
                              └──────┬───────┘
        ┌────────────────┬──────────┼──────────────────┐
┌───────────────┐ ┌─────────────┐ ┌────────────┐ ┌──────────┐
│    Project    │ │             │ │            │ │          │
│  Management   │ │Construction │ │ Production │ │    …     │
└───────────────┘ └─────────────┘ └─────┬──────┘ └──────────┘
                               ┌─────────┴─────────┐
                         ┌───────────┐      ┌───────────────┐
                         │   Tool    │      │   Prototype   │
                         │  making   │      │ construction  │
                         └───────────┘      └───────────────┘
```
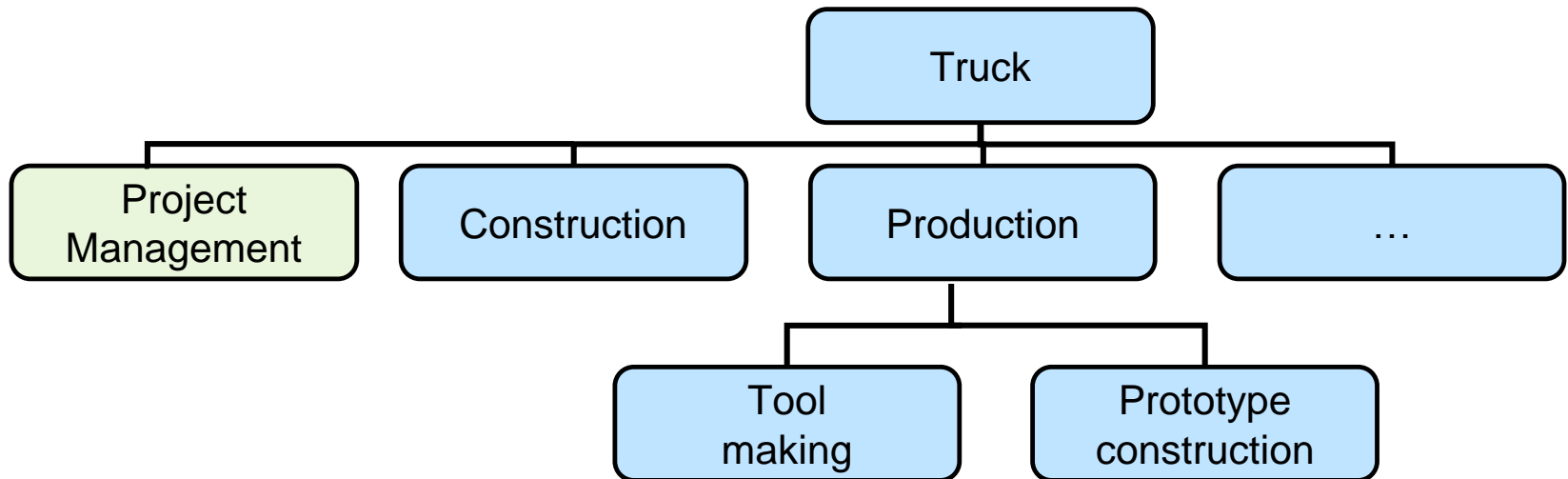
Source: Schelle a.o.: Project Manager, p. 162

Example: Function oriented breakdown

Application
- R&D
  - Technology
  - Coding
  - Build Demo
  - Testing
- Production
  - Design
  - Quality Management
- Marketing
  - Market Research
  - Promotion
- Advertising
  - Online Ads
  - Meeting Places
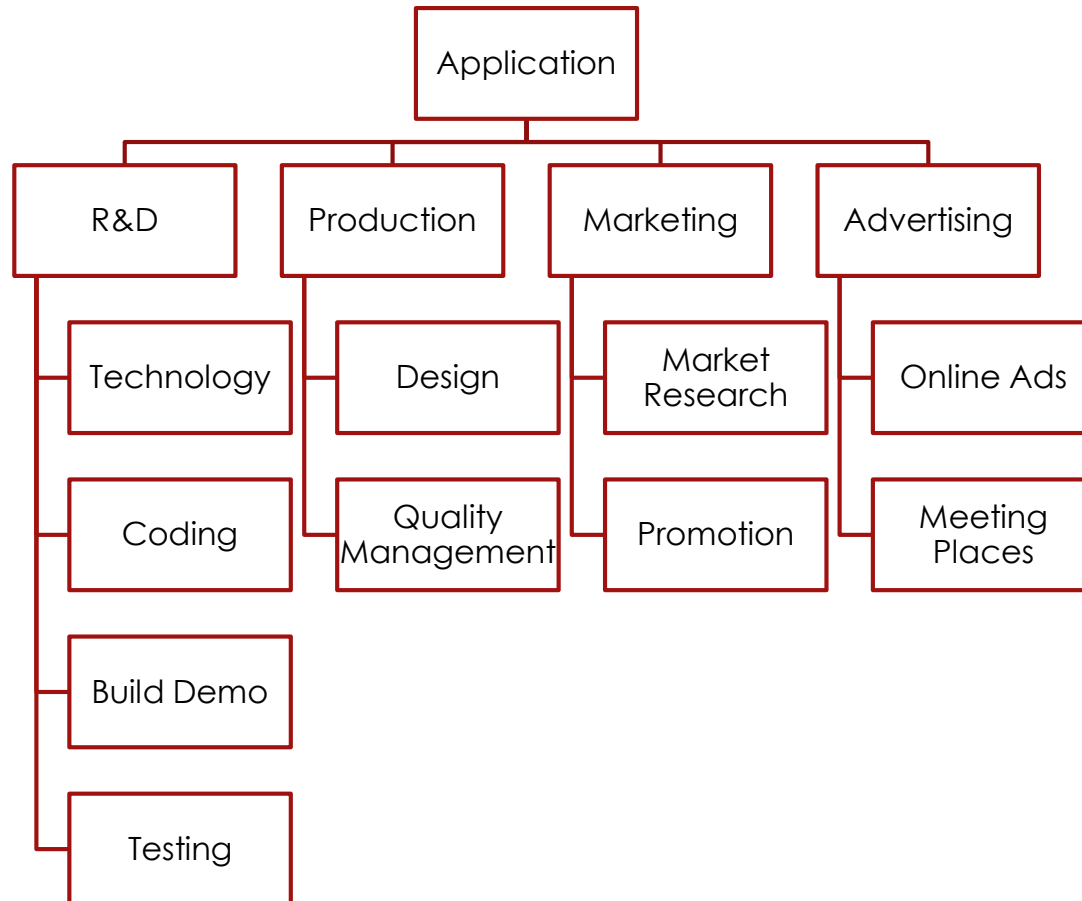
Mixed oriented breakdown

▶ To ensure an integrated view of the projects, phase, function and/or object oriented approaches are combined
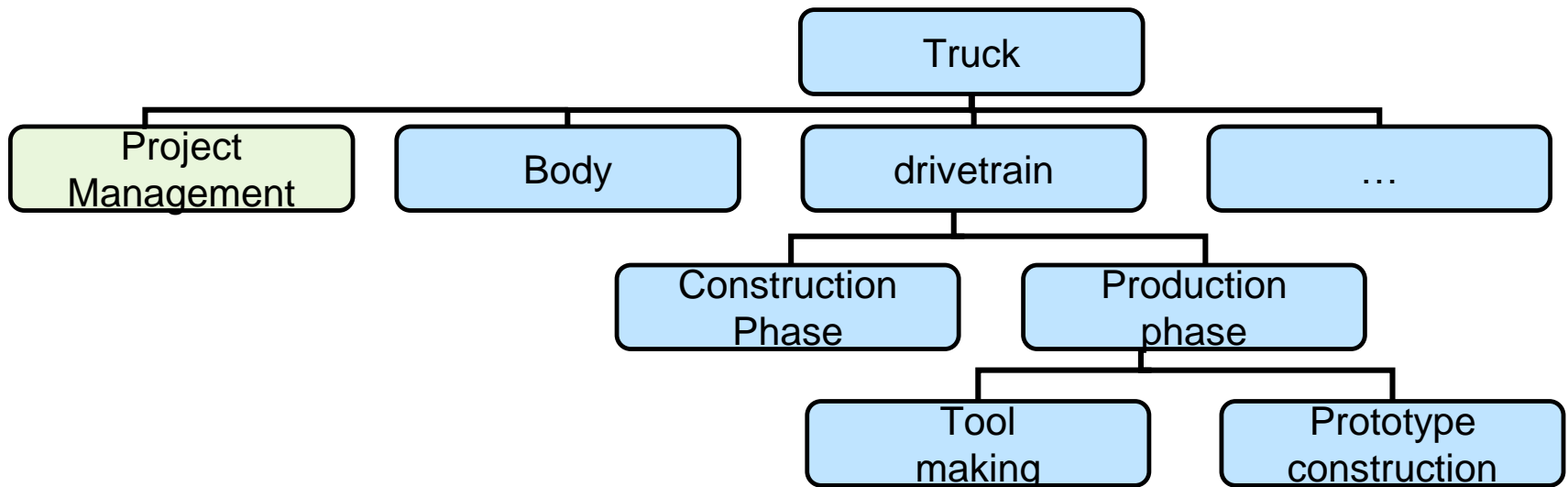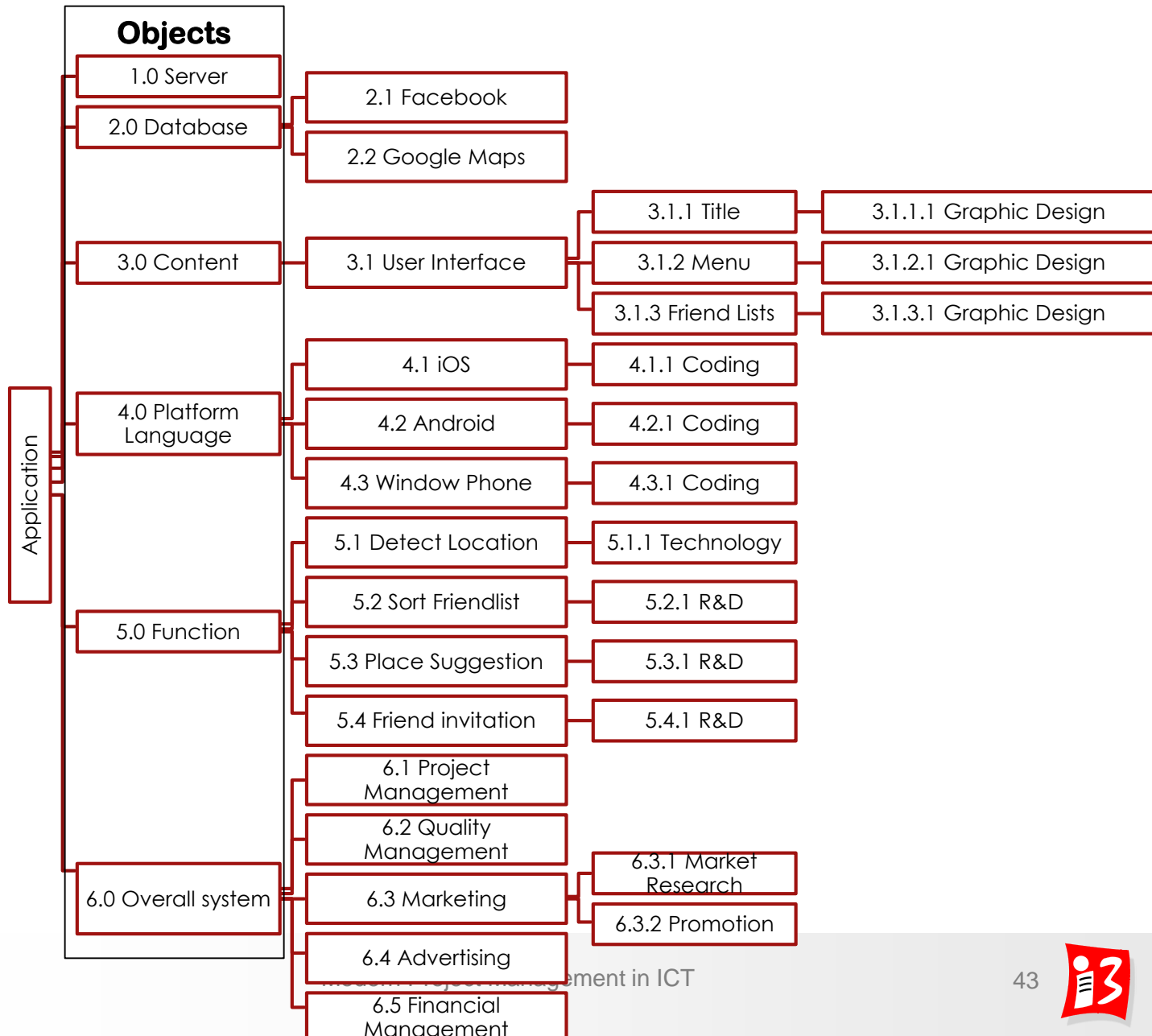
▶ It is common to start with object-oriented (components) in the higher levels and have functional elements in the lower levels

Example

Example: combined WBS

Standard WBS for software projects

Software WBS

- **Concept development**
  - Customer and contractor specification
  - System design

- **Programming**
  - Module file
  - Module reports
  - ----
  - System integration

- **Quality assurance**
  - Test scheduling
  - System/ acceptance test
  - Reviews

- **Implementation**
  - Organisation of task
  - Staff training
  - Hardware procurement
  - Installation acceptance

- **Documentation**
  - System description
  - Test reports
  - User manuals
  - Configuration management

- **Project management**
  - Project management structure
  - Project planning
  - Project controlling

Source: Schelle a.o.: Project Manager, p. 167

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Completeness test

Important check!

▶ Control question: "If all WPs have been completed, are all project objectives achieved?"

▶ If the answer is NO, than find the missing WPs and add them to your WBS

Workshop: Complete WBS

1. Check the completeness of your combined WBS
   (compare the objectives with your combined WBS)

2. If there are missing WPs, define them and add them to your WBS

Time: 20 minutes

Planning depth

▶ Plan as **much detailed as necessary**, since project planning ...

- reduces complexity
- creates transparency
- shows opportunities and risks
- reduces uncertainties

▶ Plan **as easy as possible**, because ...

- planning is time and cost consuming
- all planning elements must be controlled → additional costs

„The wise man does not push accuracy any further than it is the nature of the matter." Aristoteles

Recommendations for WBS

▶ Create the WBS with the team (WBS Workshop)

▶ Advantages

- Employee motivation is encouraged

- Uniform terminology and common understanding

- Increased security, nothing is forgotten

- Everyone knows which tasks in the project are to do

▶ Use **different** break-down principles

▶ There is one person responsible for each work package.

▶ Don't forget the WPs with the project management tasks

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Project management rap

https://www.youtube.com/watch?v=r22Ty_wZAuw

5.4 WORK PACKAGES; PROCESS AND TIME SCHEDULING

Project planning: Overview

Project charter

- results
- dates
- budget

Phase and milestone plan

| 07/10 | 08/10 | 09/10 | 10/10 | 11/10 |

02.10.10

23.10.10

Work breakdown structure (WBS)

WP   WP   WP
WP   WP

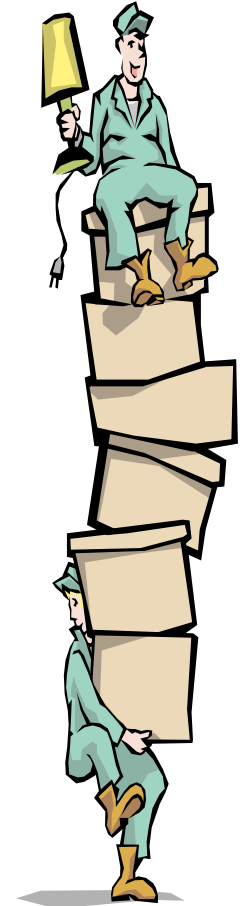Process schedule

Time schedule

Resource plan

Cost plan
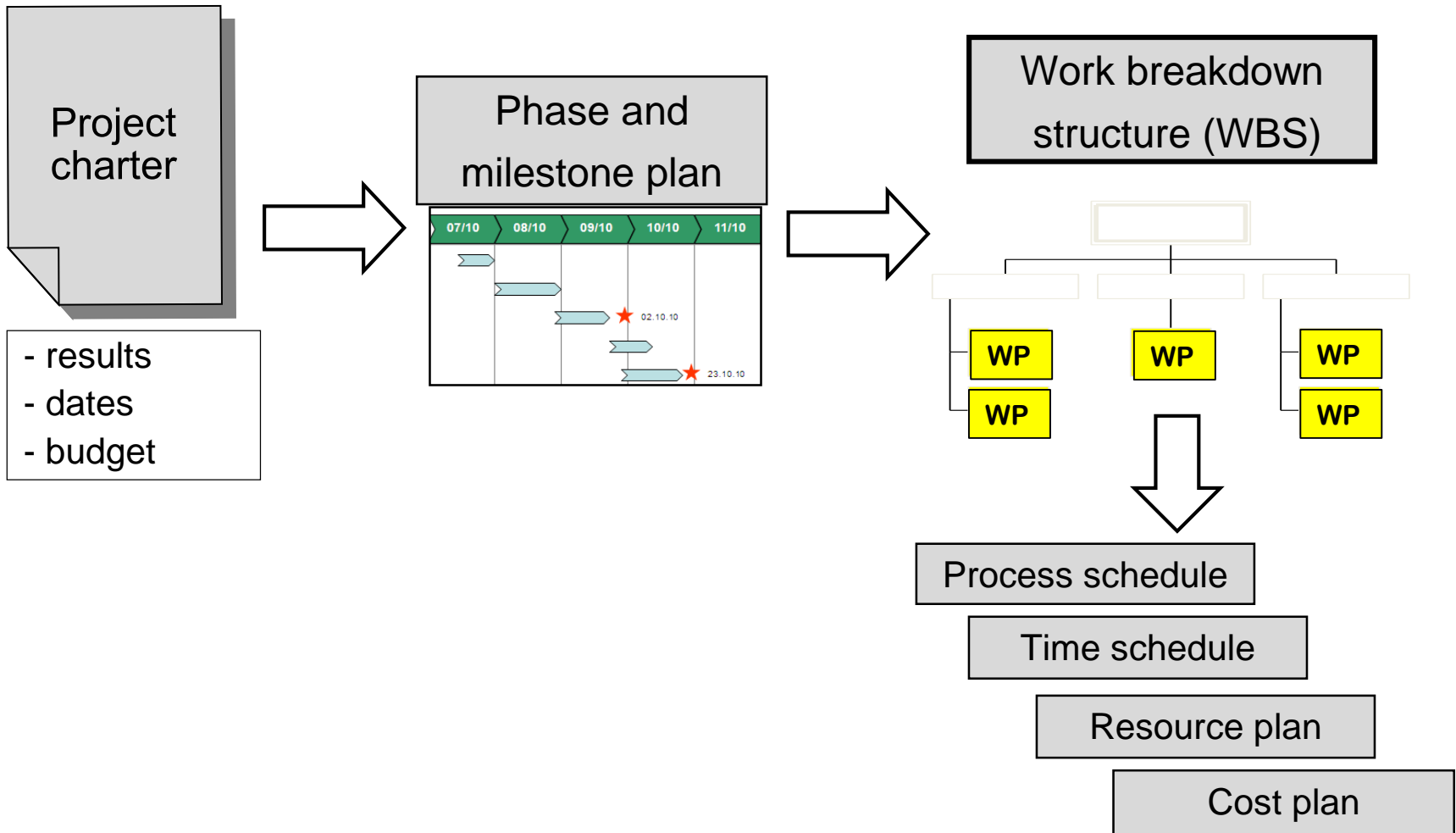
Work packages: The building blocks of the project

Work packages define and describe

- work objectives

- the work content

- work results: deliverables

- responsible person

- dates and duration

- resources

- presumptions and costs

Good planning is half of the project work

You may not
distribute the work
packages like this

Coding of work packages creates clarity

▶ Project structure code: numbering system, all components of the WBS be clearly marked with a code

▶ The numbering shows also, to what level the WBS element belongs :

1.0 Concept development
    1.1 WP 1
    1.2 WP 2
    1.3 WP 3
2.0 Programming
    2.1 WP 4
    2.2 WP 5
    2.3 WP 6
3.0 Quality assurance
    3.1 WP 7
    3.2 WP 8
    3.3 WP 9

Coding

	Level 1	->	Level 2	->	Level 3
Numeric	1	->	1.1, 1.2, ...	->	1.1.1, 1.1.2, 1.2.1, 1.2.2
Alphanumeric	A1	->	B1, B2, ...	->	C1.1, C1.2, C1.3
Decades	1000	->	1100, 1200, ...	->	1110, 1120, 1210, 1220

Work package sheet (Template WP.xls)

Project		Start date	
WP title		Finished date	
WP manager		Duration	
Date / version	WBS code	Status	

Results / deliverables

Prerequisites, deliveries required for the WP, dependencies

Dependent WPs and which results have to be passed

Tasks of the WP						
#	Task	Responsible	Date	Amount of work	Costs	Status
		Sum				

The WP manager is responsible for the prerequisites!

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Working package list (WP list)

Overview of all your WPs

| Code	Name	Deliverables	Duration (days)	Prede-cessores	WP manager

Example: Working package list

Code	Name	Deliverables	Duration (weeks)	Prede-cessores	WP manager
1	Preparation		5		
1.1	Market Research	Researching about existed similar apps & target group	1		Hiep
1.2	Complete Project Charter	Having an overview of the project	1	1.1	Huy
1.3	Define Specification	Listing details of the project	1	1.2	Ngoc Anh
1.4	Technical Project Planning	Listing technical objectives & planning resources for doing them	1	1.3	Ngoc Anh
1.5	Non Technical Project Planning	Completing the marketing & financial plans	1	1.3	Huy
2	Fund Raising	Raising money from investment funding	3	1.5	Hiep
3	App Development		20	2	
3.1	Build main function blocks	Building location detection & database management blocks	8	1.4	Long
3.2	Design user interface	Designing graphics & logo & items	4	3.1	Hoang
3.3	Build others blocks	Building meeting place suggestion, tap-to-invite function, friendlist arrangement, advertisement blocks	4	3.1	Hoang
3.4	Build the demo app	Connecting blocks & Releasing the demo apps	4	3.1 + 3.2 +3.3	Long
4	Testing app & perfection		24	3	
4.1	Test functions	Finding errors & Collecting feedbacks	16	3.4 + 4.3	Ngoc Anh
4.2	Correction	Fixing errors	4	4.1	Hiep
4.3	Improve & Complete app	Building extended functions & Completing the final application	4	4.2	Long
5	Publication	Releasing the final apps on stores & Closing the project	24	4.3	Long

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From the WBS to the process and time schedule

▶ **WBS**
- What is to do?
- Who is responsible for what?
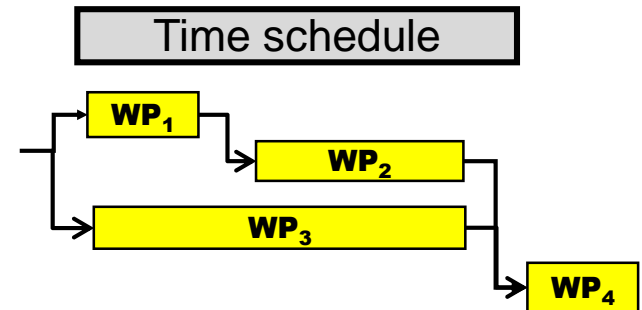- What costs arise?
- How long take the individual WPs?
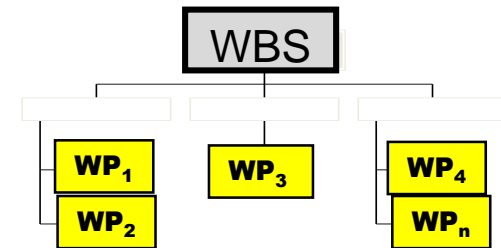
▶ **Process schedule**
- Logical and temporal order of processing of the work packages

▶ **Time schedule**
- By taking into account the duration of the WPs you generate the time schedule (time table, bar chart)

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Process and time scheduling at a glance

▶ **Process schedule:** The WBS elements (WP) are placed in a logical order of processing from project start to project end

▶ **Time schedule:** The duration of the WPs is added to the process schedule.

Steps:

1. Estimate duration and amount of work for each WP

2. Determine relationships (logical dependencies) to create process schedule

3. Transfer process schedule into time schedule

4. Optimise process and time schedule

Example: Process schedule
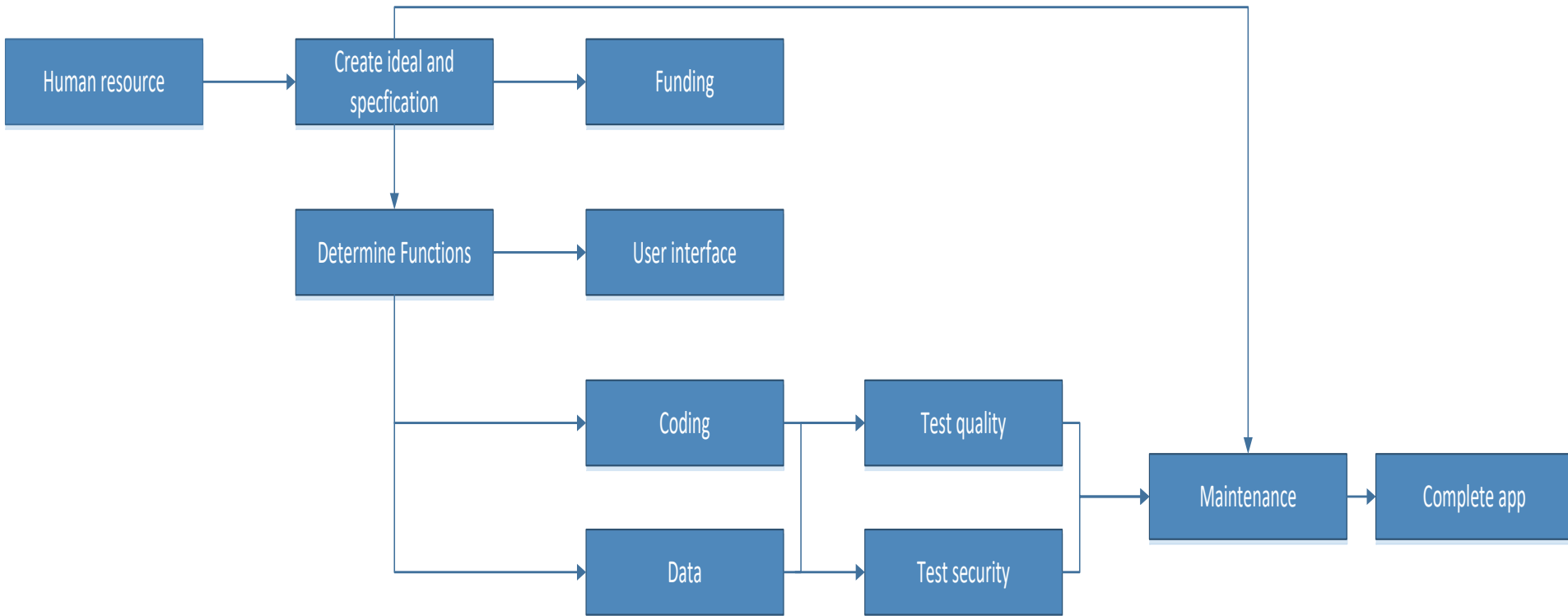
Common errors in estimation

estimate

actual time logged on task

▶ Efforts are estimated too optimistic, i.e. too low

▶ Costs for project management, meetings, reporting, reports, polls, travel, etc. are neglected

▶ Responsible employees are not (sufficiently) included in the estimation

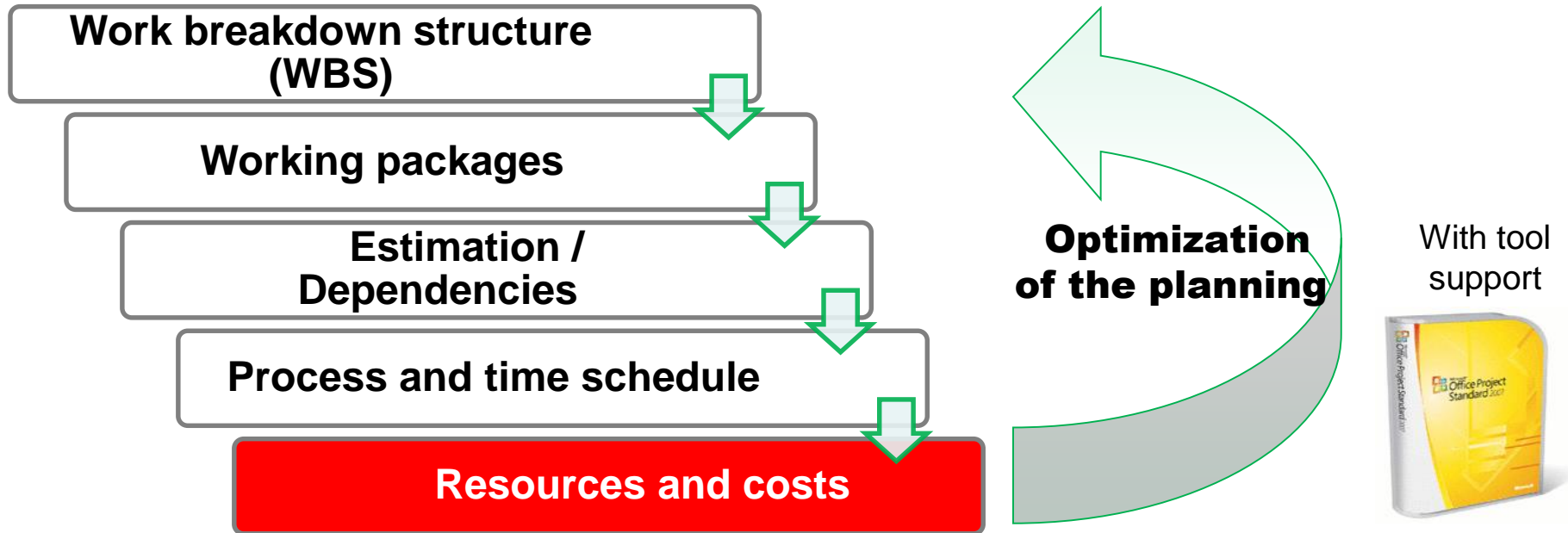No fear making estimates!
The more frequently you do estimates, they become better.

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5.5 RESOURCE AND COST PLANNING

Project planning is carried out in steps

Work breakdown structure (WBS)

Working packages

Estimation / Dependencies

Process and time schedule

Resources and costs

Optimization of the planning

With tool support

Additional plans, e.g.

- Communication (internal / external) and reporting
- Quality
- Risks and opportunities
- Tools

Resource planning

The success of the project is significantly dependent on the **availability of resources**

- **at the right time**
- **at the right place**
- **in the required type, quality and quantity**

Goals of the resource planning:

- Identify all resources necessary for the implementation of the project (qualitatively and quantitatively)
- Ensure the availability of those resources

It is a great sin to communicate schedules without having an agreed resource plan behind it!

Types of resources

▶ people

▶ materials

▶ equipment

▶ facilities

▶ services

▶ information technology

▶ information and documents

▶ knowledge

▶ funds

Process steps for personnel resources

1. **Identify what resources are required**, including the specific project management effort. The competences required of the personnel in the project team should also be made explicit

2. **Schedule the resources**

3. **Obtain agreement with line management for resource assignments** to the project

Source: ICB 3.0

Characteristics of the personnel resource planning

▶ Personnel scheduling is performed usually not purely quantitatively; restrictions:

- Available staff capacity
- Special knowledge, skills, experiences
- Local and temporal availability

▶ Role concept / mapping / optimization:

- by the Scheduler with the skills (skills and their level) defines roles first, which are important for the project.
- These roles are mapped in the next step with available persons; External may be used → costs

Personnel resource planning

Determination of the roles required for the project and qualifications for the roles
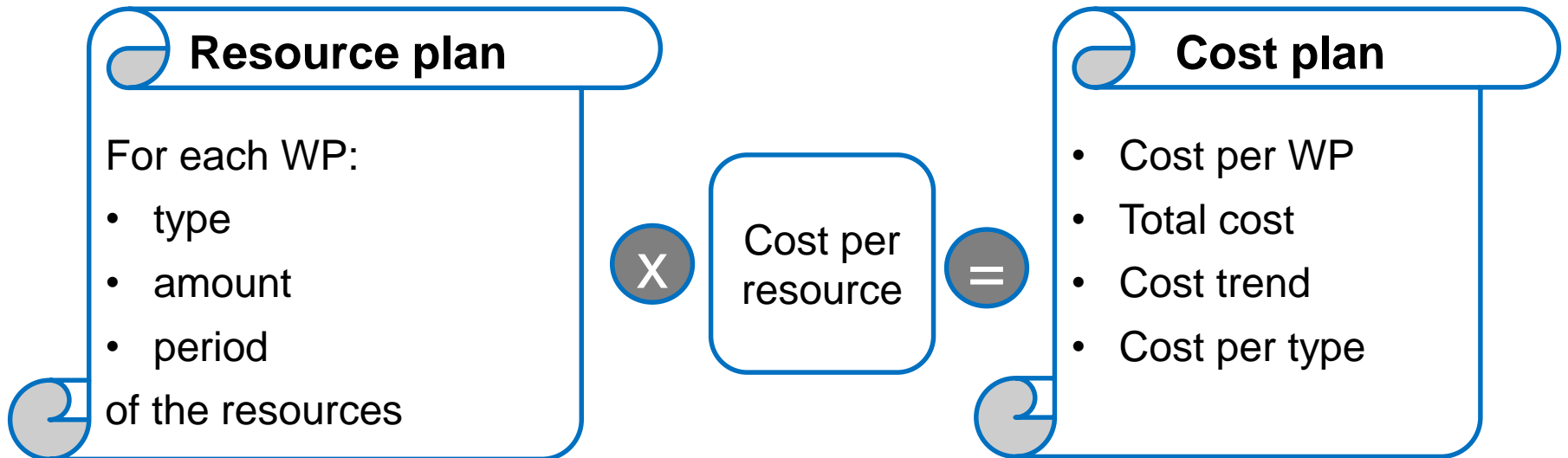
Role	Abbre-viation	Qualification (Skills)

Example

Role	Abbre-viation	Qualification (Skills)
Project manager	PM	Management experiences of projects overall overview of the business processes, …
Senior Software developer	SSD	Experience in the technical coordination of software developers; Organizational skills, …
Software-developer	SD	Experiences in development with ABAP; Expert knowledge of MS Office
External Software-developer	ESD	Several years of experience in the development with ABAP. Oracle DB specialist, reliability …

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Example: Personnel resource planning

Role	Abbreviation	Qualification (Skills)
Project Manager	PM	Experience management skill, leadership, social skill
Mobile Software Developer	MSD	Experiences in coding, hard-working, certificate (C, C#, Java,..)
Financial Manager	FM	Careful, financial certificate
Marketing Manager	MM	Marketing certificate, high social skill, active
HR Manager	HRM	2-years experience in HR management

Cost planning

Cost plan is defined as a
"representation of the expected costs for the project"

Resource plan

For each WP:

- type
- amount
- period

of the resources

X

Cost per resource

=

Cost plan

- Cost per WP
- Total cost
- Cost trend
- Cost per type

Project cost representation to WBS elements

The WBS is complemented by the cost per WP
- with summation on the associated higher levels