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Project Management

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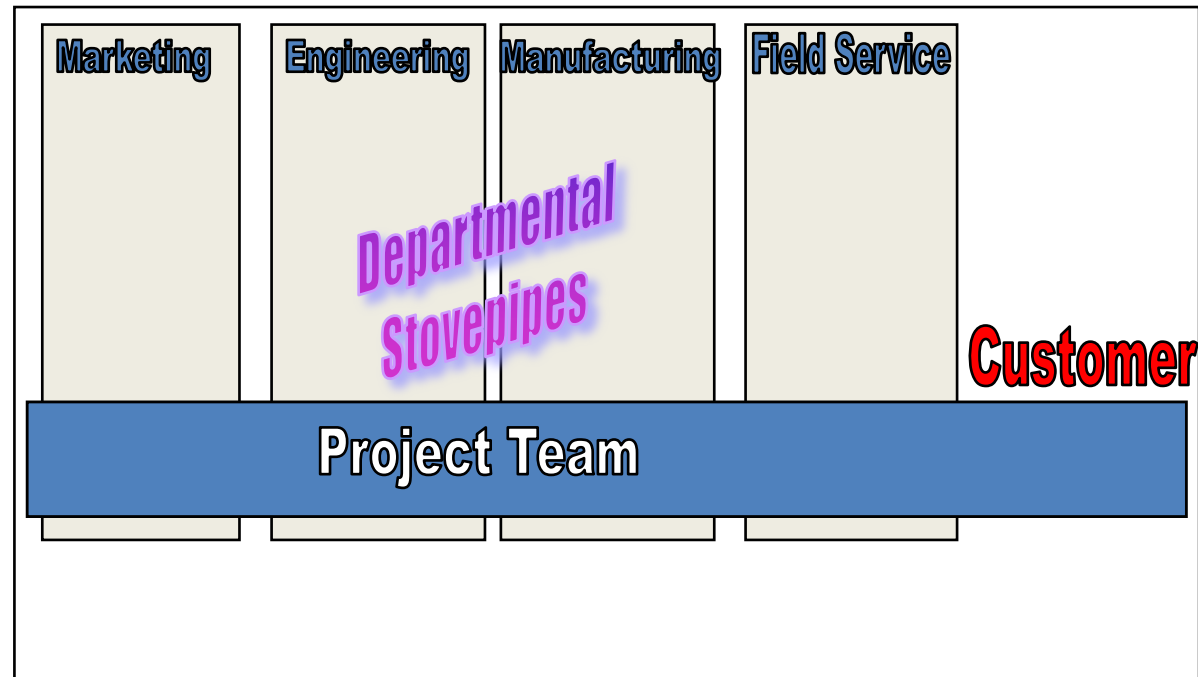Technology Arts Sciences
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What is a project?

- It's a definitive deliverable (objective and goal)
- It takes time
- It consumes resources
- Has definite starting and stopping dates
- It's broken up into tasks (activities, steps)
- Consists of processes
- Proceeds through milestones
- Utilizes teams
- Is based on personal integrity and trust

Has a CUSTOMER !

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Line Organization and Project

Marketing	Engineering	Manufacturing	Field Service

Departmental Stovepipes

Customer

Project Team

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Advantages of Project Management

- Better control of human resources
- Improved customer relations
- Shorter development times, lead times
- Lower costs
- Higher quality
- Higher profit margins
- Improved productivity

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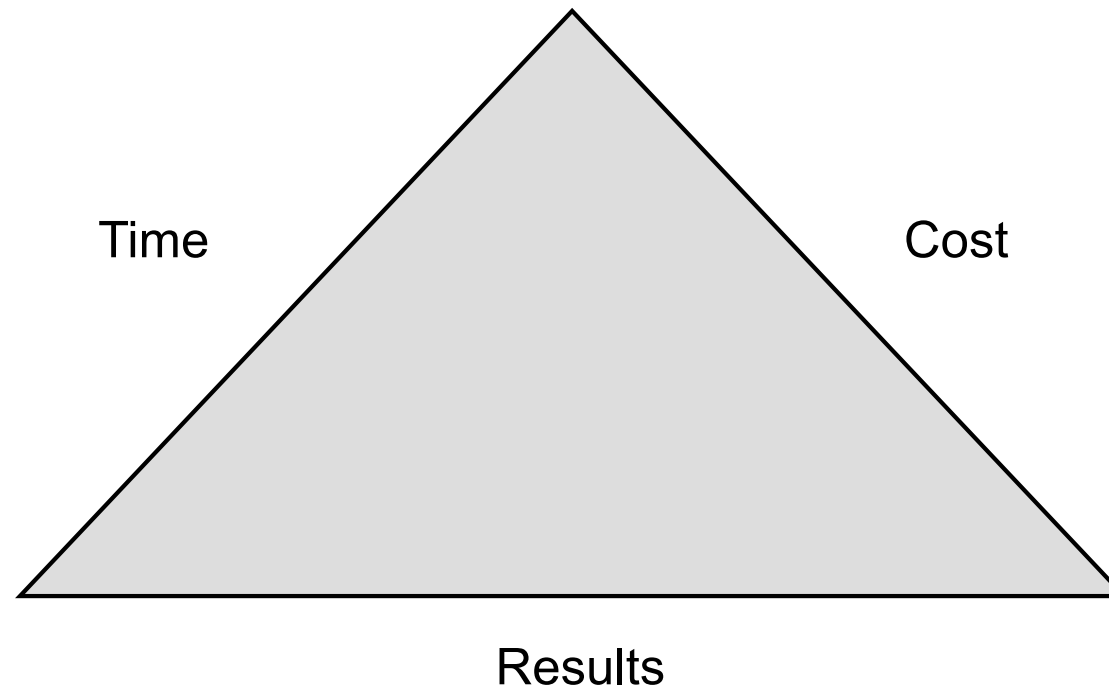Prof. Dr. Hermann Siebdrat

Which are Criteria for Success in Project Management?

- Completion on time

- Completion within budget

- Completion with full functionality (according to the plan)

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Common Project Management Process

- **Initiation**
  - Defines the project objectives and grants authority to the project manager.

- **Planning**
  - Refines the project objectives and scope and plans the steps which are necessary to meet the project's objectives.

- **Executing**
  - Puts the project plan into action and performs the work of the project.

- **Controlling**
  - Measures the performance of the project activities and compares the results with the project plan.

- **Closing**
  - Documents the formal acceptance of the project's product and brings all aspects of the project to a close.
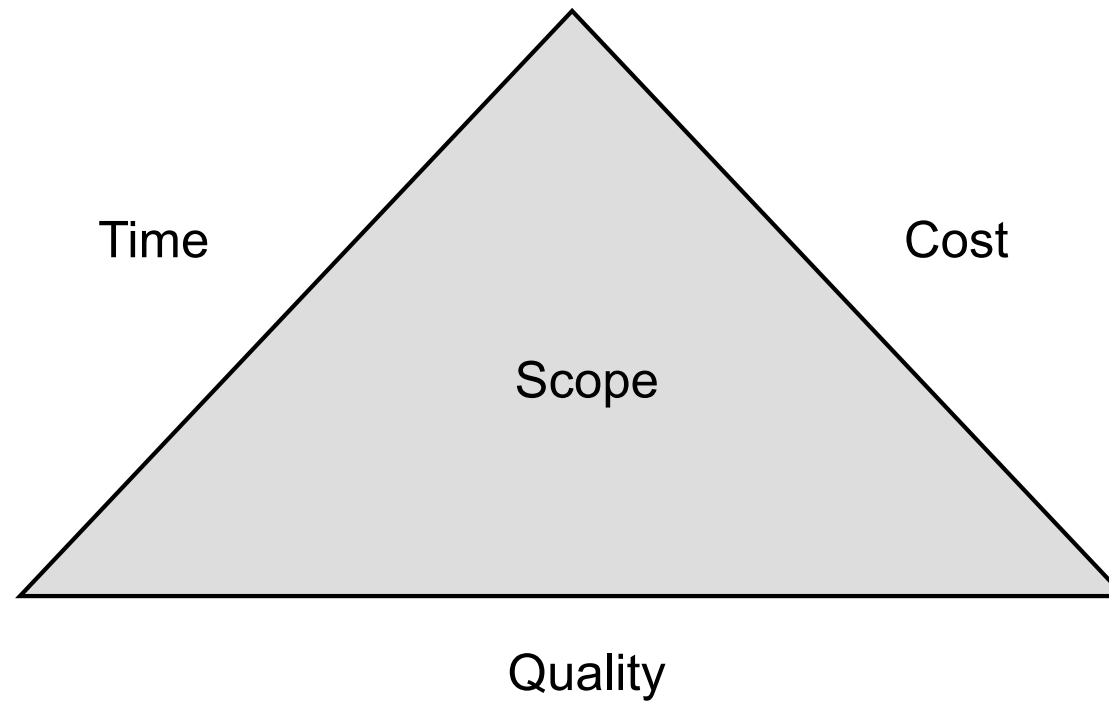
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"Magical" Triangle

Time

Cost

Results

Project Management

Managing the Triple Constraint

- **Project Scope**
  - How much work is to be done? Increasing the scope causes more work to be done, and vice versa.
- **Time**
  - The schedule of the project. Modifying the schedule alters the start and end dates for tasks in the project and can alter the project's overall end date.
- **Cost**
  - The cost required to accomplish the project's objectives. Modifying the cost of the project generally has an impact on the scope, time, or quality of the project.

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A Balanced Project

Time

Cost

Scope

Quality

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Contrast Projects and Operations

Projects

- Organizational structure and goals depend on the projects
- Catalyst for change
- Results are e.g. a unique product or service
- Mostly heterogeneous teams
- Fixed start and end date

Operations / Line Organization

- Organizational structure is more or less fixed, changes only from time to time.
- Semi-permanent goals, change rarely
- Maintains status quo
- Standard product or service
- Homogeneous teams
- Ongoing procedures

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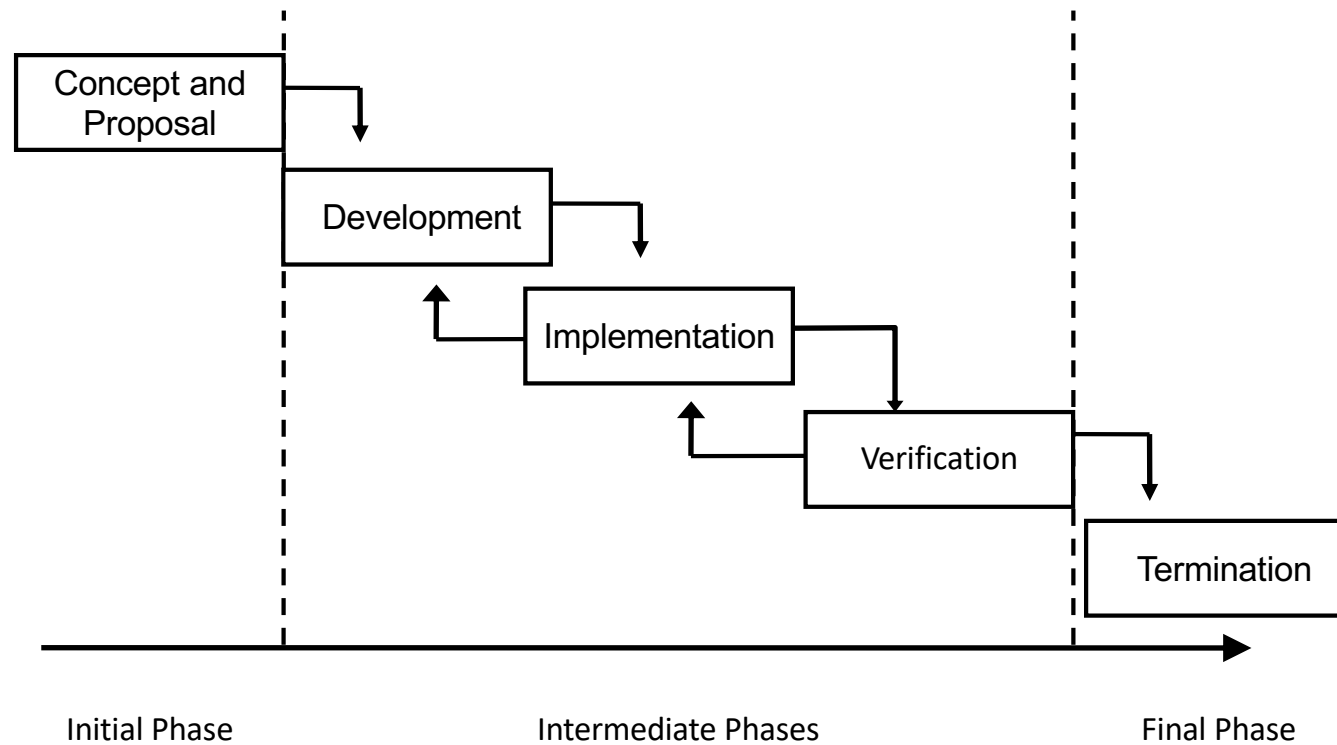
Common Pitfalls of Project Management

- Unclear objectives
- Changing requirements
- No or late involvement of later users or customers
- Lack of senior management support
- Lack of effective project integration
- Inadequate funding
- Change in business priorities
- Original assumptions become invalid
- Ineffective teams or team members
- Lack of effective communication processes
- etc.

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Factors Affecting Project Success

- Project uniqueness, importance, and public exposure
- Influence of certain stakeholders on the project
- Choice of involved business partners and team members
- Communication processes
- Adequacy of project structure and control
- Competitive pressure and budget restraints
- Initial over-optimism, conceptual difficulties
- Capabilities of internal resources (e.g. knowledge level of team)
- Management attention
- etc.

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Project Life Cycle
Example Phases

```
Concept and
Proposal
         →
            Development
                      →
                         Implementation
                                      →
                                         Verification
                                                    →
                                                       Termination
```

Initial Phase   Intermediate Phases   Final Phase

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Planning Projects

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Project Planning

- Inadequate planning leads to frustration towards the end of the project and poor project performance

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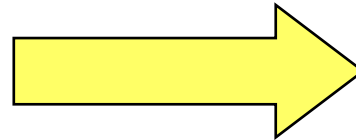
Project Planning Process

- The following tasks have to be performed:
  - Definition of the project's objectives
  - Definition of the project's scope
  - Creation of the Work Breakdown Structure (WBS)
  - Assignment of responsibilities
  - Definition of specific activities
  - Definition of the sequence of activities and dependencies
  - Estimation of activity resources
  - Estimation of activity durations
  - Development of a project schedule (timeframe)
  - Estimation of activity costs
  - Determination of the project budget

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WBS
Work Breakdown Structure

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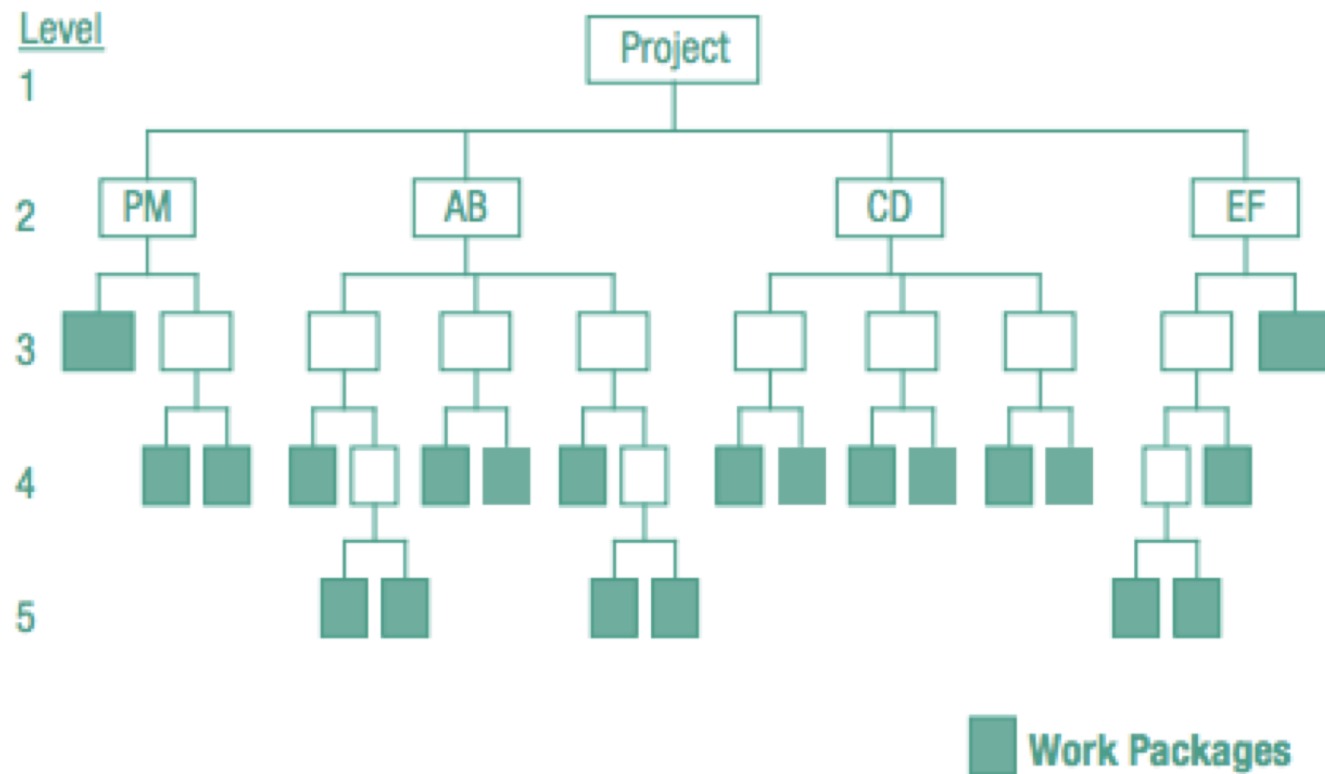TH Köln
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Work Breakdown Structure (WBS)

- Hierarchical decomposition (from general to specific) e.g. as a tree structure of deliverables and tasks that need to be performed to complete a project.

- Breakdown of the total scope of a project into smaller and manageable components.

- Grouping of activities and creation of a logical project structure.

- The WBS is the basis for the development of the planning scheduling (timeline), cost estimation, assignment of resources, check of quality and risk and control of completion of the projects or it's parts.

- Usually the WBS is realized with a graphic chart (see examples) which is helpful in project communication

- The WBS is the "masterplan" of the project.

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Work Breakdown Structure (WBS)

- The lowest Level of the Work Breakdown Structure (WBS) is the Work Package (WP), which is a deliverable at the lowest level of the WBS, for which cost and duration can be estimated and managed.

- Later to each WP costs, resources and responsibilities can be assigned

- WBS allows hierarchical order of WP's

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Example of WBS and WP's

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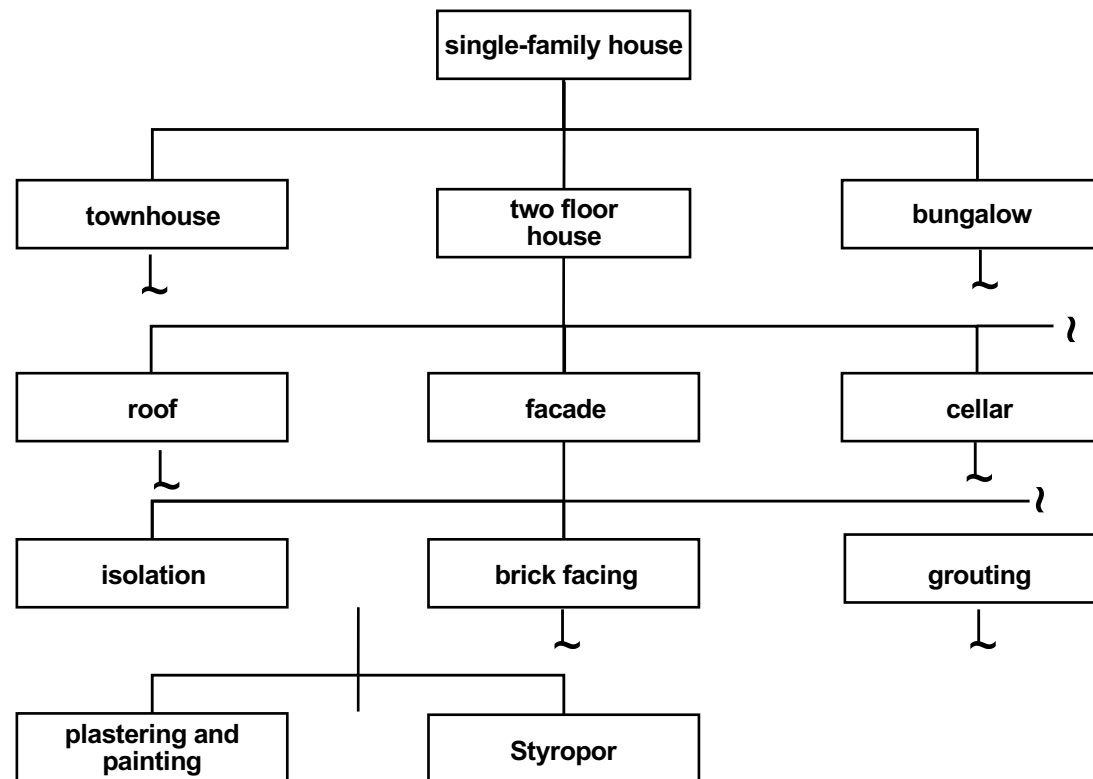TH Köln
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Why create a WBS?

- Definition of activities, distinction between different activities
- Ensures all parts of project are considered
- Assignment of work packages to team members (delegation of work)
- Cost Estimating
- Cost Budgeting
- Resource Planning
- Risk Management Planning

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Bsp. Object-oriented WBS

Example: Building a house
The criteria for defining the work packages are objects (real things to handle)

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Functional-oriented WSB

Example: Building a house
The criteria for defining the work packages are functions (processes)

```
                          single-family house

     architecture              statics              interior design

       design                 planning            building inspection

   tender evaluation      schedule monitoring        quality check

     earthwork             building jobs              woodworks
```

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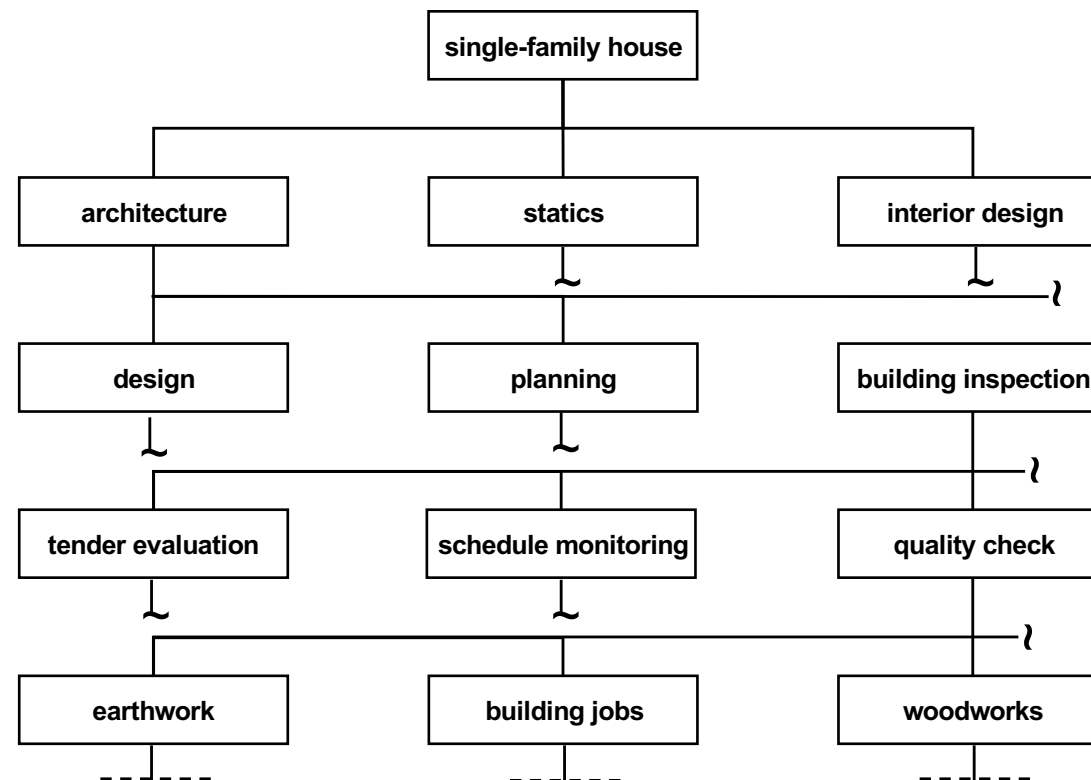
Validation of the WBS

- Have all major elements been identified at the top level?
- Has the project been decomposed into measurable components (work packages)?
- Are all tasks included?
- Are all items on the lower level necessary? Would stakeholders agree WBS is satisfactory?
- Can elements be scheduled, budgeted, and assigned to a unit that will accept responsibility?
- Too much or too little visibility and control ?
- Can status reports be generated at all levels?

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Scheduling

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Development of the Project Schedule

- Prior activities for schedule development
  - Estimation of the duration of each activity
  - Establishishing an overall window of time for the whole project
- Develop the schedule timetable
  - Earliest start and finish times based on estimated start date
  - Latest start and finish times based on required completion date
- Scheduling forces:
  - Quantification of certain tasks
  - Placement of tasks in proper order, figure out relationships
- Two most common scheduling methodologies
  - Bar Charts (aka Gantt Charts)
  - Critical Path Method (CPM) using Precedence Diagramming Method (PDM)

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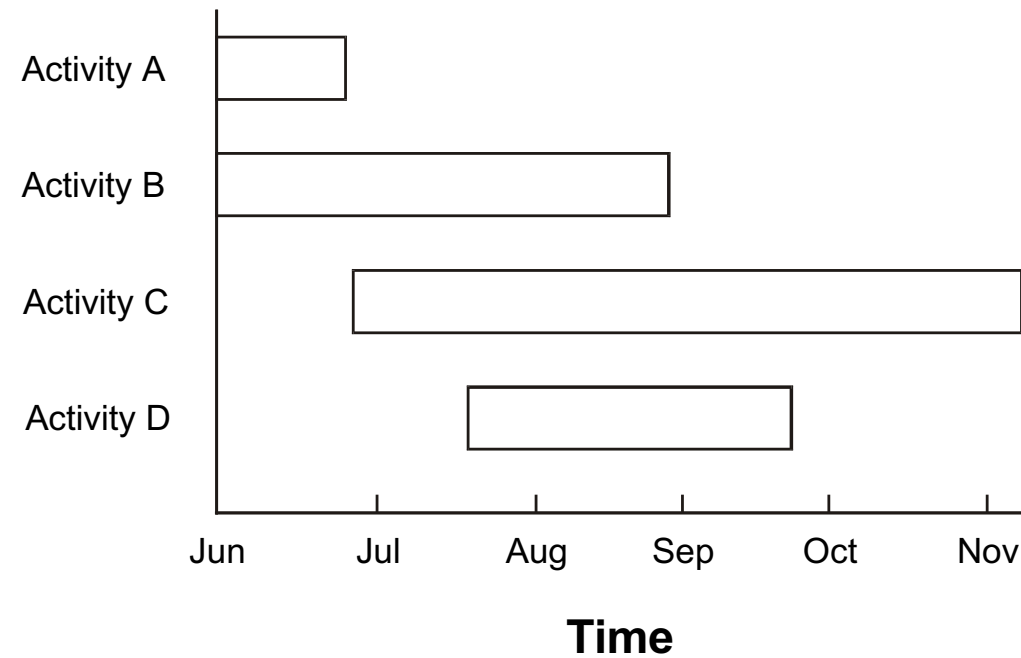Prof. Dr. Hermann Siebdrat

Benefits of a Realistic Schedule

- Framework for managing critical project activities
- Determines planned start and completion dates
- Identifies activity and task precedence relationships
- Aids project team in defining critical communication content
- Specifies times when staff must be available
- No surprises

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Bar / Gantt Chart

- Analyze and specify the basic approach in execution
- Activities on side
- Time scale on top or bottom
- Segment into reasonable number of activities
- Estimated duration of each activity represented by bars
- Show relationships between activities
  - Sequential performed tasks
  - Parallel performed tasks
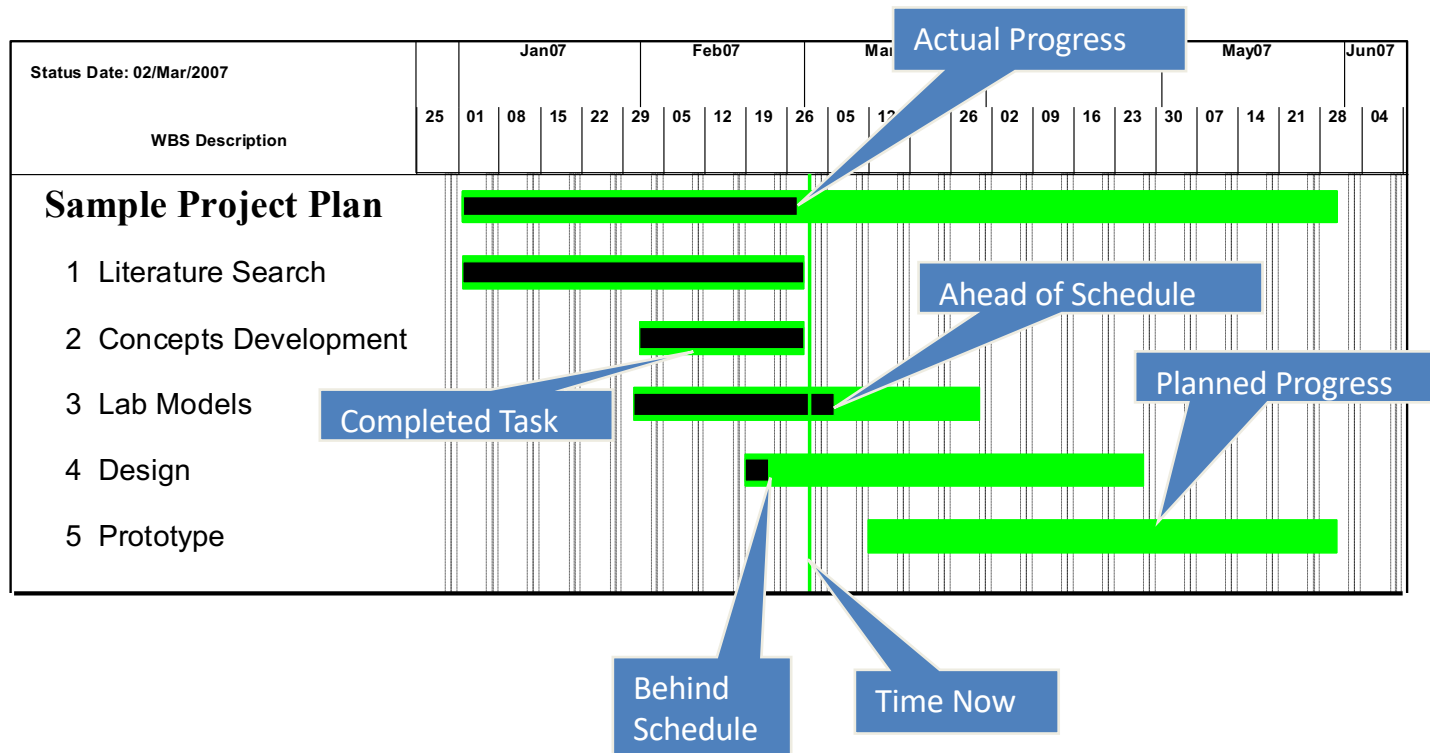- Adjust to specified completion time

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Scheduling Techniques
Bar/Gantt Chart

There are many other acceptable ways to display project information on a bar chart.

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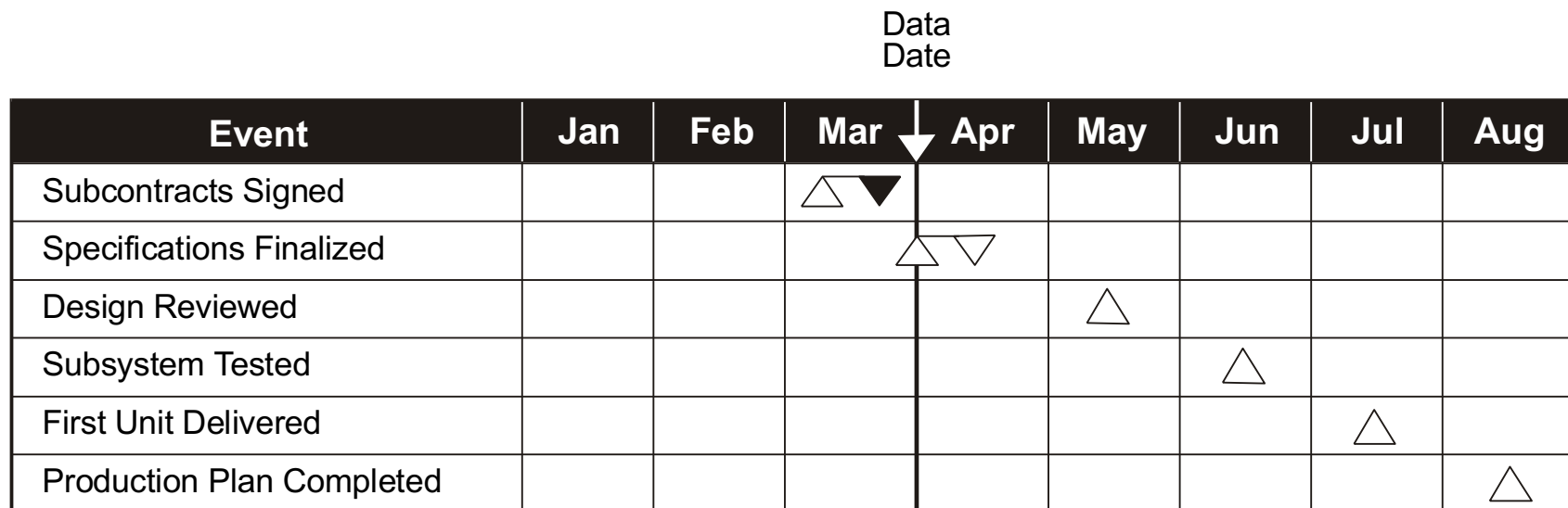TH Köln
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Bar / Gantt Charts Advantages

- Plan, schedule and progress are all shown graphically on a single chart
- Easy understanding of the timeline and dependencies
- Provides a simple way to schedule small tasks
- Provides summary display of more detailed plans and schedules
- Very suitable for status meetings and management briefings

Bar / Gantt Chart Sample

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Example of a Milestone Chart

Data
Date

Event	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Subcontracts Signed			△▼					
Specifications Finalized				△▽				
Design Reviewed					△			
Subsystem Tested						△		
First Unit Delivered							△	
Production Plan Completed								△

There are many other acceptable ways to display project information on a milestone chart.

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