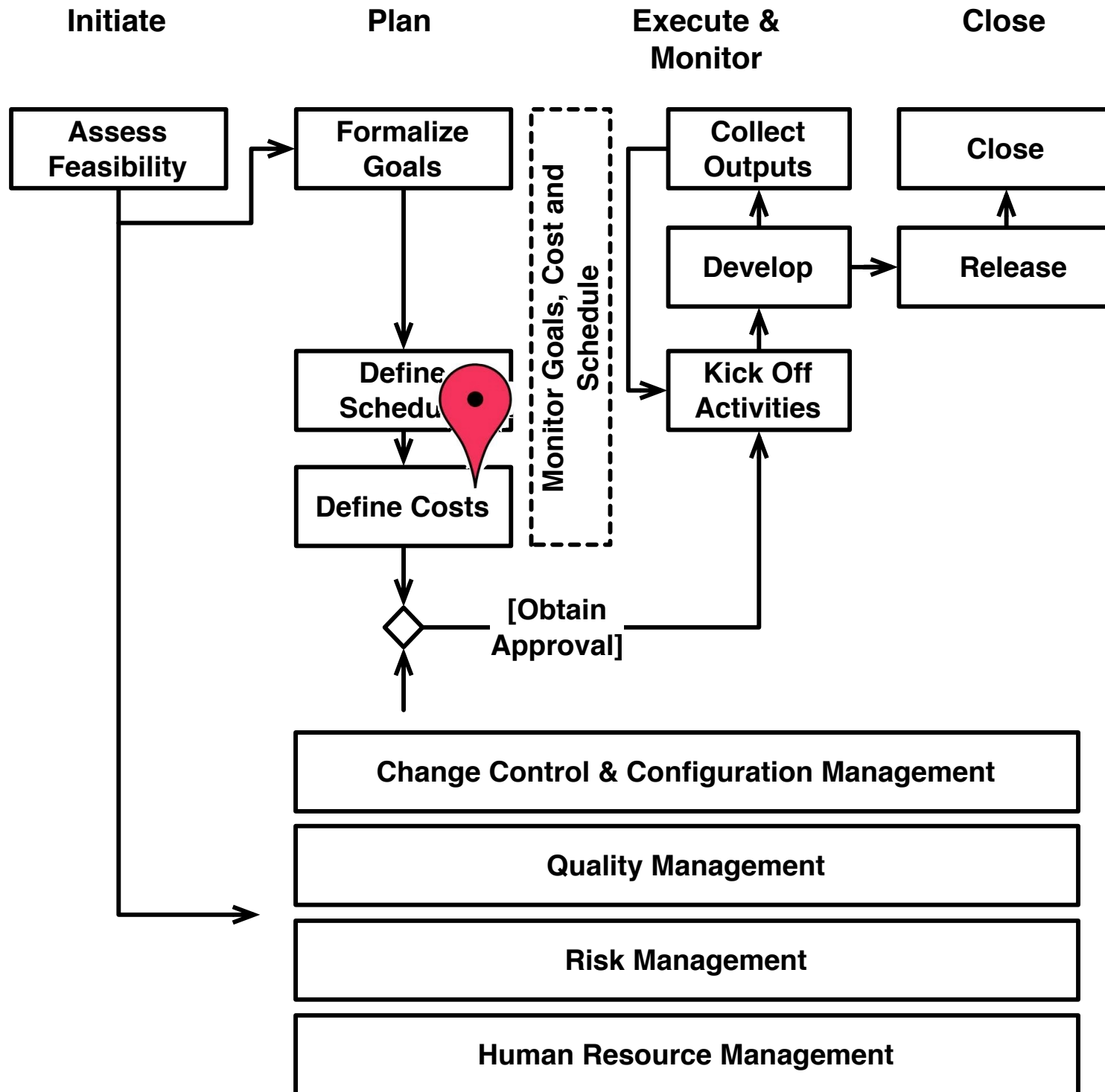


Costing and Budgeting

From cost to value: methods and techniques to
set the right cost to software

Goals of the Unit

- Questions you might face:
 - How much does the development of the software cost?
 - Is the project on budget?
- Goals of the Unit
 - Budgeting
 - Managing Project Costs



Some Definitions

- **Costing:** determining the bare costs to deliver a project
- **Budgeting (and cost control):** determining the financial needs of a project and preparing the books to monitor expenditures (and incomes)
- **Pricing:** determining how much you will charge for the project
- **Life Cycle Cost (LCC) (also called Total Cost of Ownership):** costs to be sustained to operate (use) a system throughout its lifecycle

(Software) Project Costing

(Software) Project Costing

- **Project cost:**
 - The expenses we will incur into to finish a project
 - It does not take into account profit
 - Made of direct and indirect costs (next slide)
- **Cost Element Structure:**
 - Hierarchical structure which defines the cost items which determine the project budget
 - It helps structure the costing and monitoring processes and it reduces the risk of double accounting the same expenses

Direct Costs

- **Direct costs:** costs related to the production of the project outputs
- Direct Costs for software projects
 - **Personnel:**
 - * The salaries of people directly involved in the project (gross, not net!)
 - **Materials and Supply**
 - * Costs of the material necessary to produce project outputs
 - * Usually accounted if the project has specific needs
 - **Hardware and software**
 - * Systems required for developing the system
 - * Usually accounted if the project has specific needs
 - **Travel, meetings and events**
 - **Other Costs**
 - * Books, Training, Renting equipment, ...

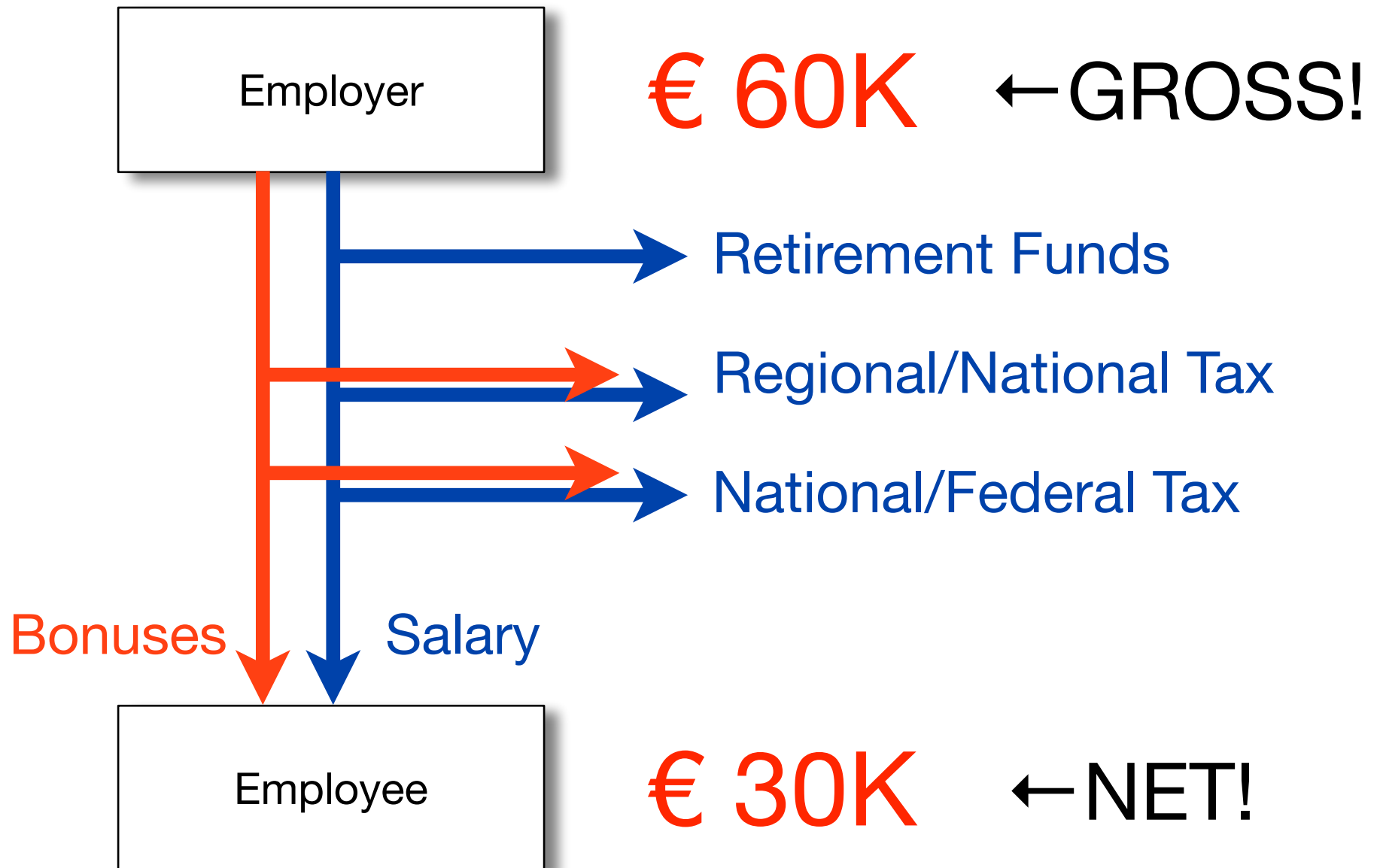
(Software) Project Costing

- **Indirect Costs:** expenses necessary to run the facility and make work actually doable
- Main cost elements for software development:
 - General Overheads
 - * Office space costs (rent, heating, ...)
 - * Consumables
 - * Standard equipment
 - * Administrative Staff
 - Project Overheads
 - * For larger projects, overheads directly accountable to a project

Indirect Costs Computation

- Identification of the expenses contributing to the indirect costs
- Identification of a strategy to allocate indirect costs to a project
 - According to the effort (more effort = more indirect expenses) - Flat or proportional rate
 - According to the project budget (as a percentage of the project budget)
- On a regular basis
 - Assessment of the expenses incurred into in the previous year(s)
 - Estimation of the indirect expenses for the year(s) to come
 - Estimation of the effort which can produced
 - Determination of the overhead rate

Personnel Costs: Gross vs. Net



Project Cost is...

$$\sum_{j=1}^n Hours_j * (PC_j + O_j) + \sum_{i=1}^n C_i$$

| | |
|----|-------------------------------------|
| H | Total number of hours for profile j |
| PC | Cost of profile j |
| O | Overhead of profile j |
| C | Cost Element i (e.g. hardware) |

Project Cost

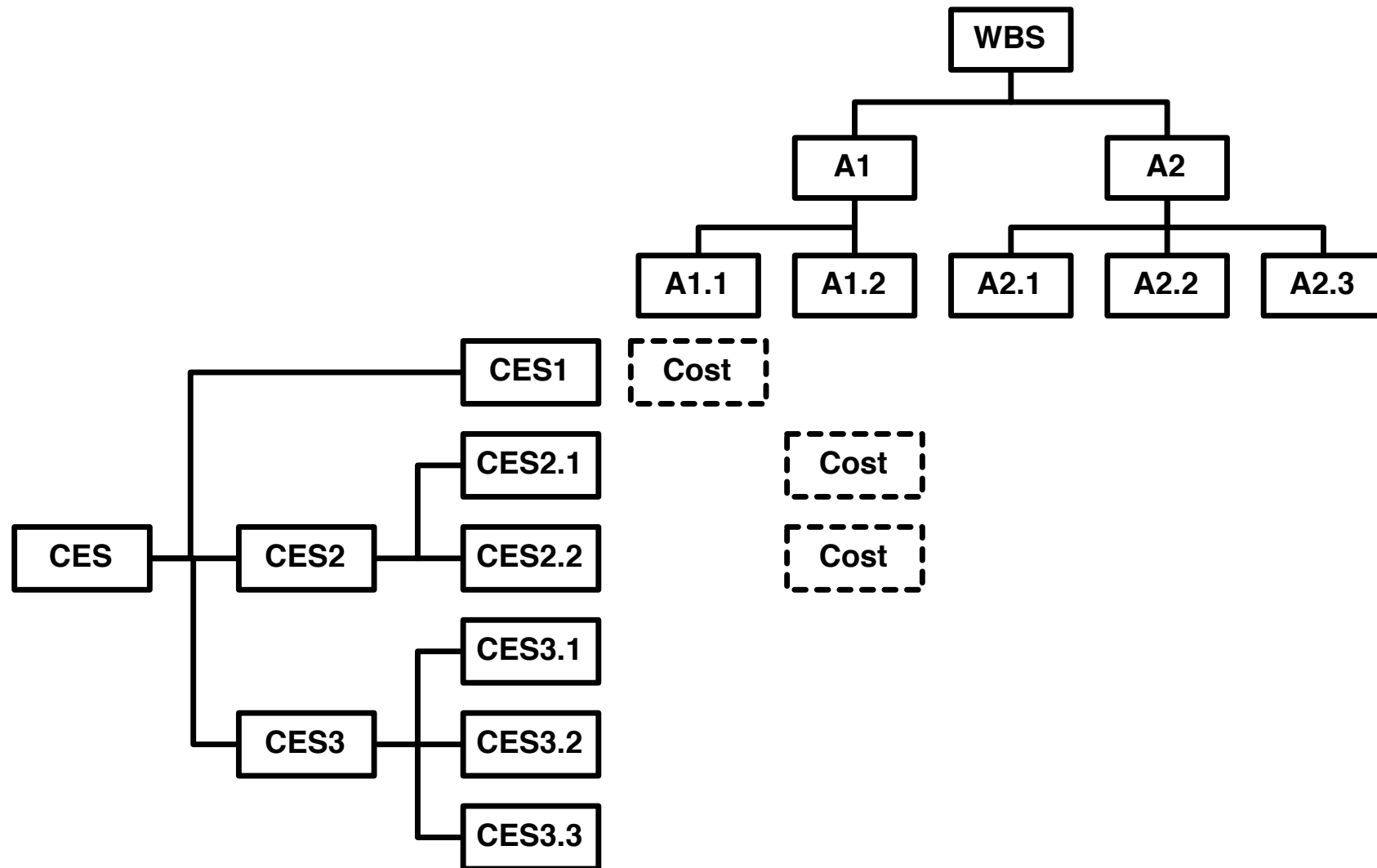
- Project costs can be looked at from different “points” of view:
 - Cost Element Structure (how much do I need for hardware?)
 - Project Structure (how much do I need for “Writing Requirements”?)
 - Expenditure over time (how much do I need in 2014?)

Managing Project Costs

Goals and Means

- Goals
 - Ensuring that the money is available when it needs to be spent
 - Monitoring project expenditures so that the project remains within budget, or the appropriate actions can be taken when this is not the case
- Means
 - Definition of a baseline/cash flow (see next slides)
 - Expense Authorization
 - Expense book keeping (double entry accounting is quite fine)

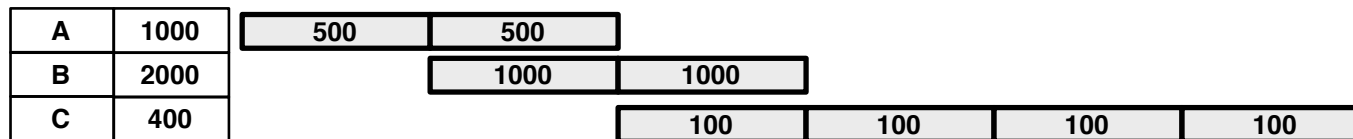
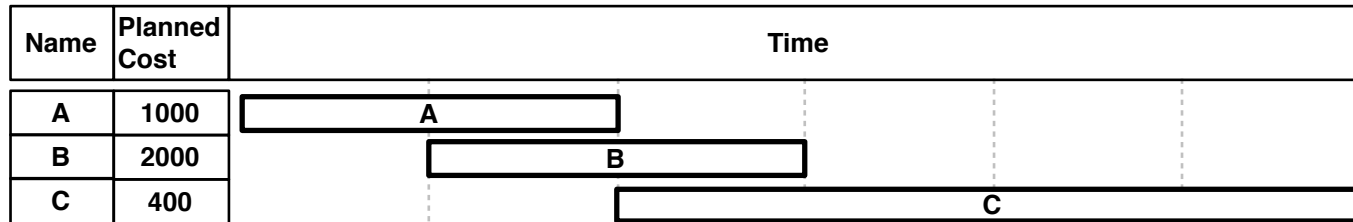
Project Costs and Project Structure



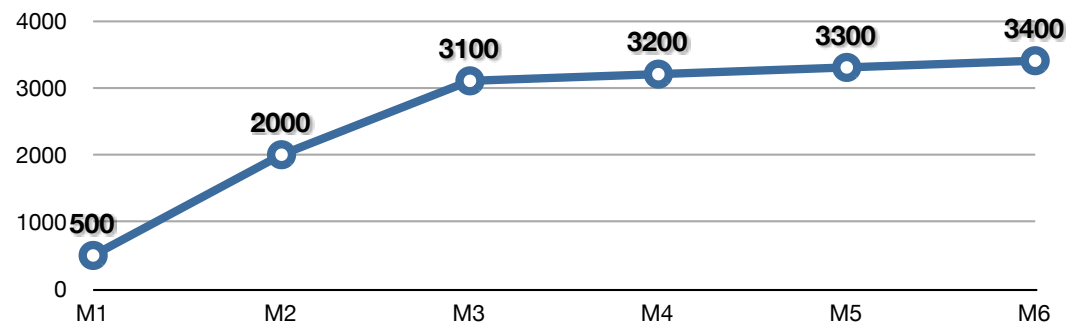
Project Costs and Time

| | Q1 | Q2 | Q3 | Q4 | Total |
|-----------------------|-----------------|-----------------|------------------|------------------|------------------|
| Expenses | | | | | |
| Expense 1 | € 10,000 | € 30,000 | € 50,000 | € 10,000 | € 100,000 |
| Expense 2 | € 20,000 | € 40,000 | € 60,000 | | € 120,000 |
| Total Expenses | € 30,000 | € 70,000 | € 110,000 | € 10,000 | € 220,000 |
| Incomes | | | | | |
| Payment | € 50,000 | | | € 200,000 | € 250,000 |
| Total Incomes | € 50,000 | € 0 | € 0 | € 200,000 | € 250,000 |
| Balance | € 20,000 | -€ 70,000 | -€ 110,000 | € 190,000 | € 30,000 |
| Financial Need | | -€ 50,000 | -€ 180,000 | | |

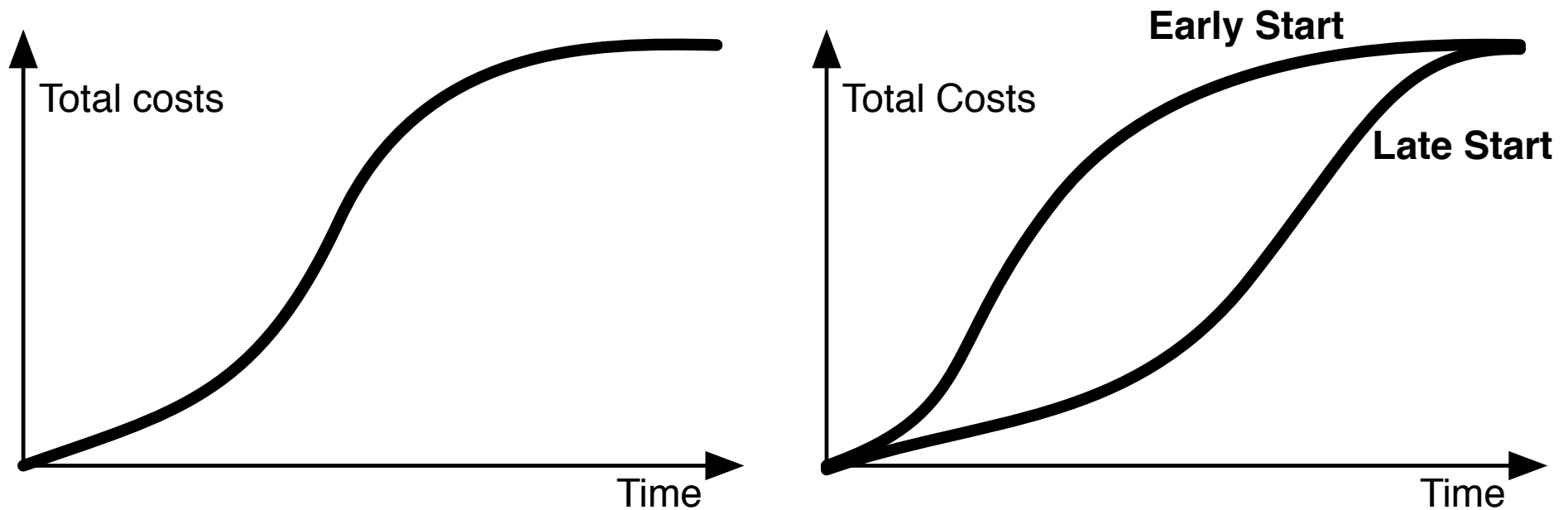
Project Costs and Time



| Total | 500 | 1500 | 1100 | 100 | 100 | 100 |
|-------------------|------------|-------------|-------------|-------------|-------------|-------------|
| Cumulative | 500 | 2000 | 3100 | 3200 | 3300 | 3400 |



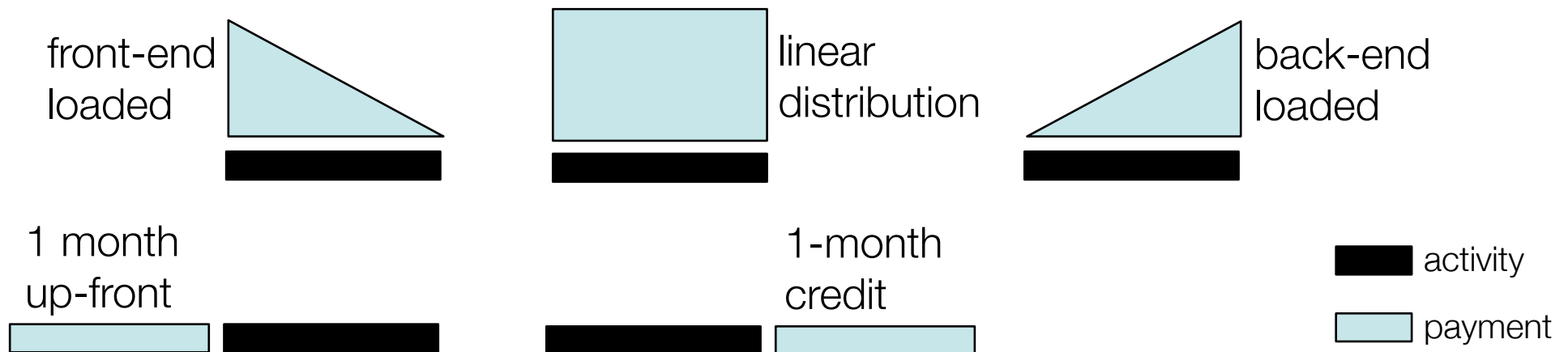
Project Costs and Time



Banana Shape

Expenditure/Load Profile

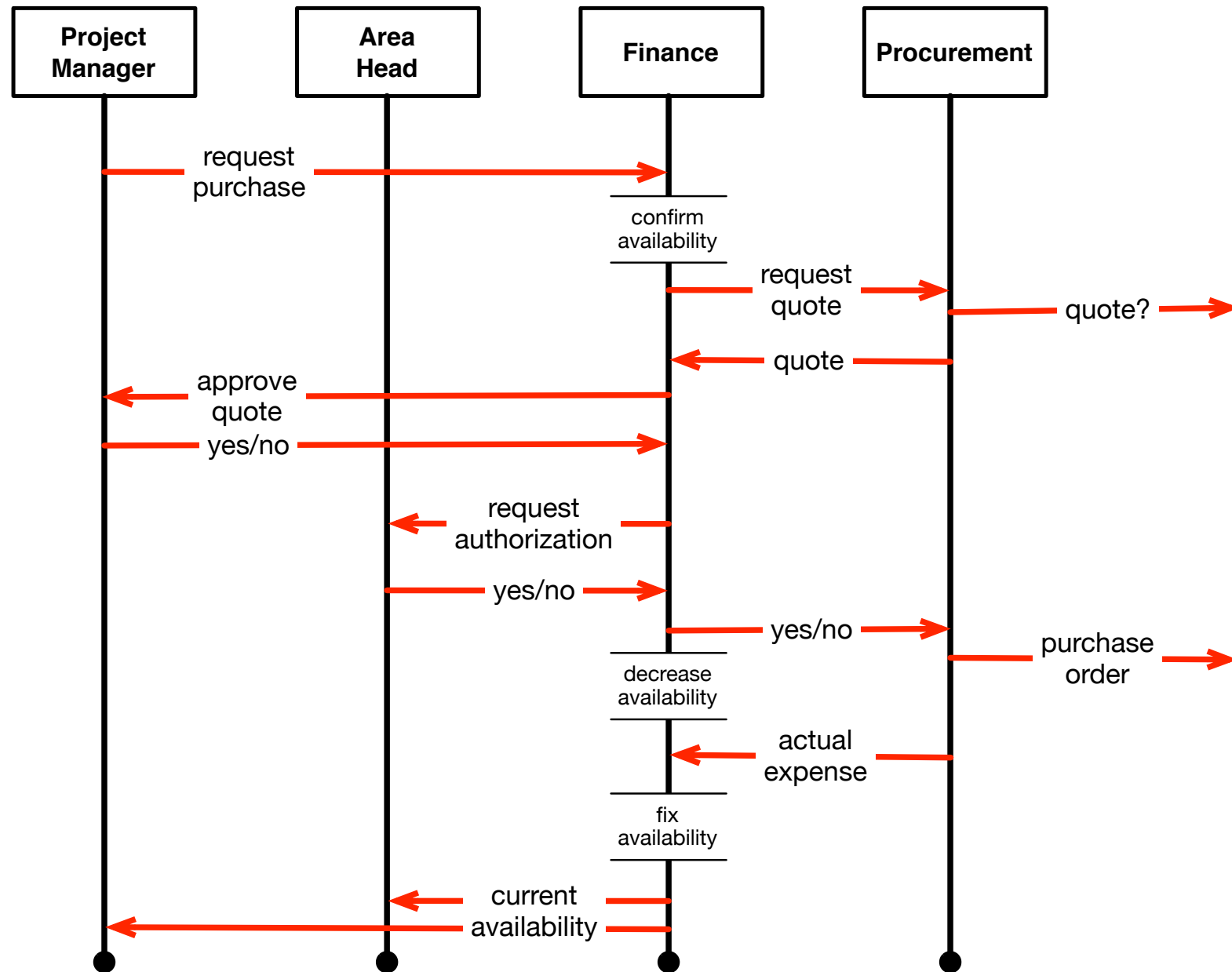
- In general we assume workload distributes uniformly during an activity:
 - A resource working in an activity requiring 40 hours of effort and 1 week of duration is assumed to work 8 hours per day.
- However, this is not necessarily the case, and different profiles can be defined for effort and expenditure:



Expense Authorization

- Project management and financial management are usually allocated to different structures
- According to the organizational structure, the power to authorize expenditures and payments might be solely on the project manager or require a more complex workflow.
- Rules take into account aspects such as:
 - funds availability
 - whether the required expense is budgeted or not
 - the amount of money (expenditures higher than a threshold might require a special authorization)

Expense Authorization: an Example



End of period Report

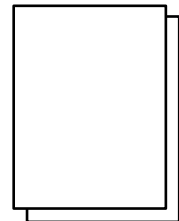
- At the end of each reporting period, documentation is produced about a project financial status
- Two information are available:
 - Budgeted expenditure vs. actual expenditure
 - Expenditure accounting
- The information is used in different ways:
 - To analyze **deviations** (what differences there have been)
 - To confirm/update **projections to end**
 - To evaluate project health and take appropriate actions

The Workflow

Expected
Expenditures

Actual
Expenditures

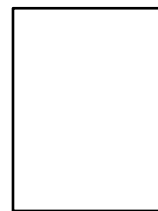
End of Period
Report & Revision



invoices



ledger



report

| Budget | Y1 | Y2 | Y3 |
|----------------|------|------|------|
| Personnel | 4000 | 5000 | 3000 |
| Hardware | 1000 | 2000 | |
| Subcontracting | | 1000 | 6000 |
| ... | | | |

| Budget | Y1 | Y2 | Y3 |
|----------------|-------------|------|------|
| Personnel | 3000 | 5000 | 3000 |
| Hardware | 500 | 2000 | |
| Subcontracting | | 1000 | 6000 |
| ... | | | |

| Budget | Y1 | Y2 | Y3 |
|----------------|------|------|------|
| Personnel | 5000 | 4000 | 3000 |
| Hardware | 500 | 1000 | |
| Subcontracting | | 1000 | 6000 |
| ... | | | |

What information you are interested in

- Budget: the amount initially budgeted
- Transfers: the variations performed on the budget
- Actual: the amount actually spent

| Budget | Budget | Variations | New | Spent | Available |
|----------------|---------------|-------------------|------------|--------------|------------------|
| Personnel | 4000 | +2000 | 6000 | 5000 | 1000 |
| Hardware | 3000 | -2000 | 1000 | 0 | 1000 |
| Subcontracting | 1000 | | 1000 | 400 | 600 |