Université de Paris

# Génie Logiciel
## Elements of a software project

Sylvain Lobry

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Elements of a software project

# Before we start…

Planning a project

# Critical Path

- Critical path: the set of tasks that allow to obtain the shortest time to finish the project
- Consequence: if one of the tasks from the critical path takes longer to be performed, the project will take longer to finish

- Algorithm for critical path:
  1) Select the taks with the latest finish date
  2) Put the selected task in the critical path
  3) Select the predecessor(s) of the selected task with the latest finishing date
  4) Repeat 2-3 until reaching starting node(s)

## Planning a project

# PERT

1) Select the taks with the latest finish date
2) Put the selected task in the critical path
3) Select the predecessor(s) of the selected task with the latest finishing date
4) Repeat 2-3 until reaching starting node(s)

| Task name | Time allocated | Predecessor(s) |
|---|---|---|
| A | 8 | |
| B | 5 | |
| C | 6 | B |
| D | 7 | A, B |
| E | 5 | C, D |
| F | 4 | E |
| G | 3 | E |
| H | 7 | G |

| Task name | Start date | End date | Critical path |
|---|---|---|---|
| A | 0 | 8 | |
| B | 0 | 5 | |
| C | 5 | 11 | |
| D | 8 | 15 | |
| E | 15 | 20 | |
| F | 20 | 24 | |
| G | 20 | 23 | |
| H | 23 | 30 | |

## Planning a project

# PERT

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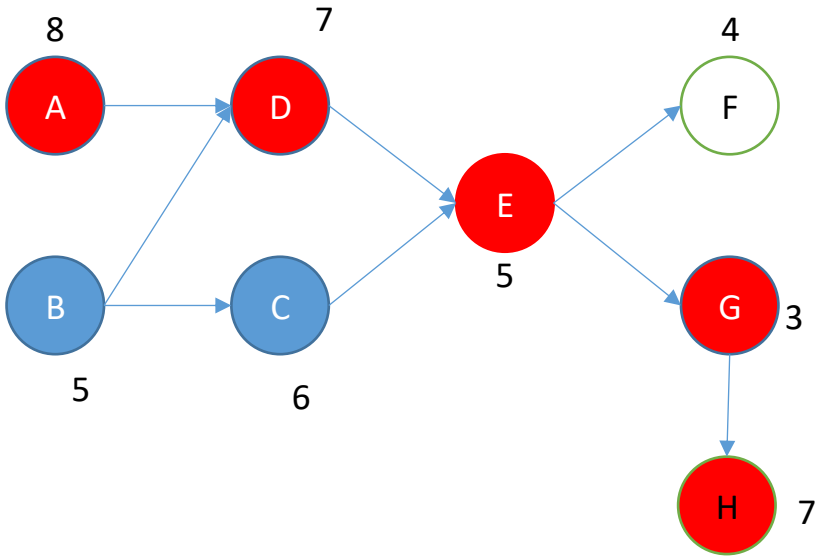
## Planning a project

# PERT

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Elements of a software project

# Wooclap

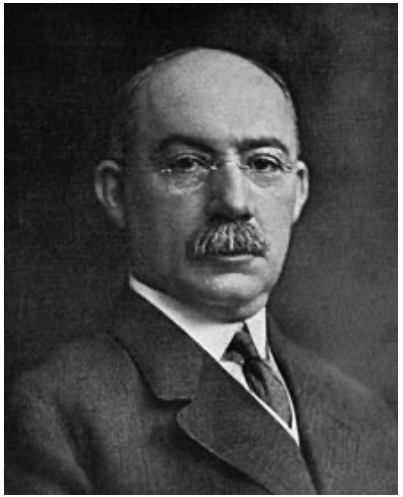
https://www.wooclap.com/L3GL234

Planning a project

# Gantt chart

- PERT: statistical tool
- Gantt: Better vizualisation, better communication

- Introduced by Henry Gantt around 1910



## Planning a project

# Gantt chart

- Basic principles:
  - y-axis: list of tasks
  - x-axis: time
  - Each task is represented by a rectangle

| Task name | Start date | End date | Critical path |
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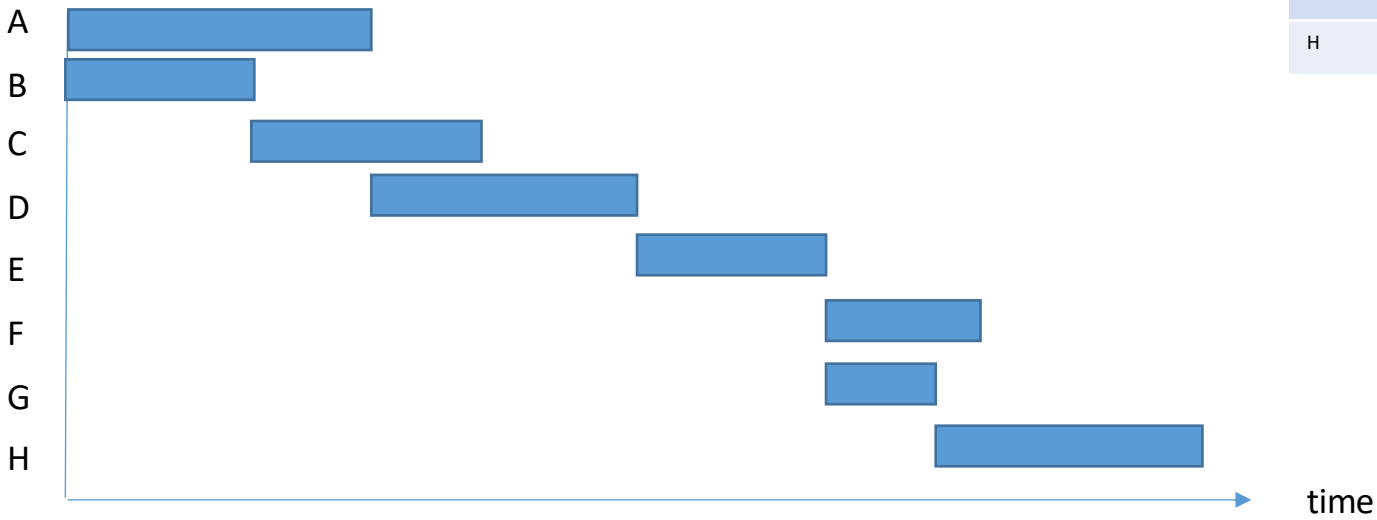

Estimating the costs

# Cost estimation

- Gantt chart: good base for bottom-up estimation
- Method 1, by lines of codes (LOC): Cost = $\alpha \times KLOC^{\beta} + \gamma$ with
  - $\alpha$: marginal cost per 1000 LOC (KLOC)
  - $\gamma$: fixed cost of a project
  - $\beta$: scale factor
- To be noted: parameters proposed by Boehm in the COCOMO (COnstructive COst MOdel) method (1981)
- Estimation of the number of LOC: beta distribution
- Method 2, by person hours

Risk management

# Risk

- Needs to be taken into account in a software project
- Risk: what is the probability that a negative event will happen AND what will be the impact of this negative event on the project
- Different from uncertainty

Risk management

# Types of risk

- Classification 1 : Human/Management/Technical
- Classification 2:  Process/Quality/Viability
- Classification 3: Impact only a given project or all projects

Risk management

# Potential causes of risk

- Human risks

- Plan or budget misestimated
- Requirements not well estimated

Management risks

- External causes
- Underwhelming performances

Technical risks

- Other risks?
- Potential solutions?

Risk management

# Cost of a risk

- Expected value = probability of a risk x cost
- Possibility to represent the risks as a decision tree
- Example: should I do a prototype ?

If you do the prototype, it will cost you $100,000; and, of course, if you don't pursue it, there will be no cost. If you do the prototype, there is 30 percent chance that the prototype might fail, and for that the cost impact will be $50,000. However, if the prototype succeeds, the project will make $500,000. If you do not do any prototype, you're already taking a risk, the chance of which is 80 percent with a failure impact of $250,000. But, again, without a prototype, should you succeed, the project will make the same money as mentioned before. What should you do?

MPUG

Risk management

# Cost of a risk

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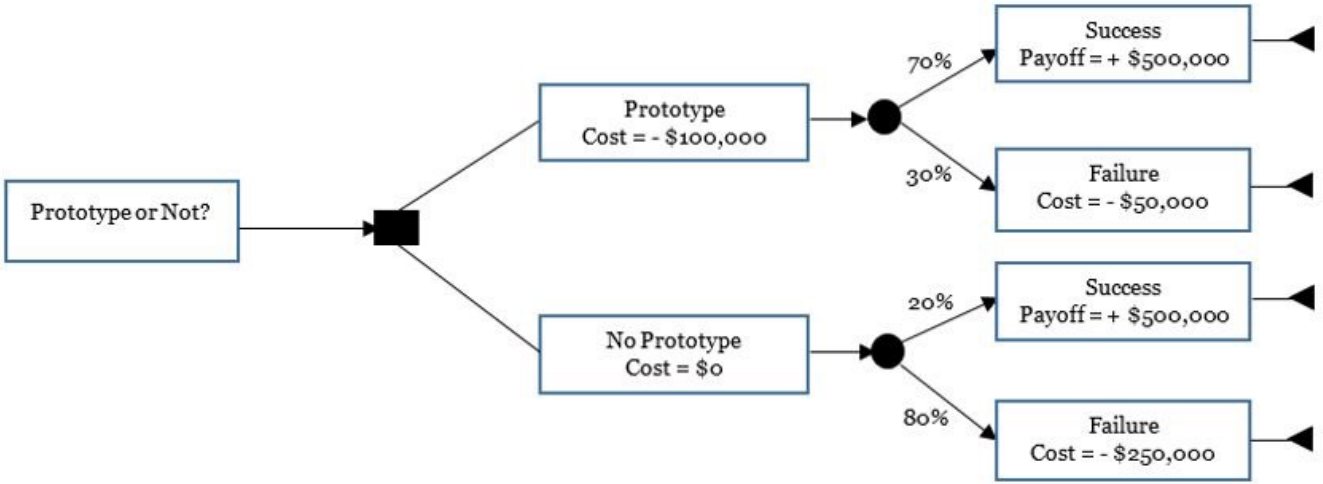
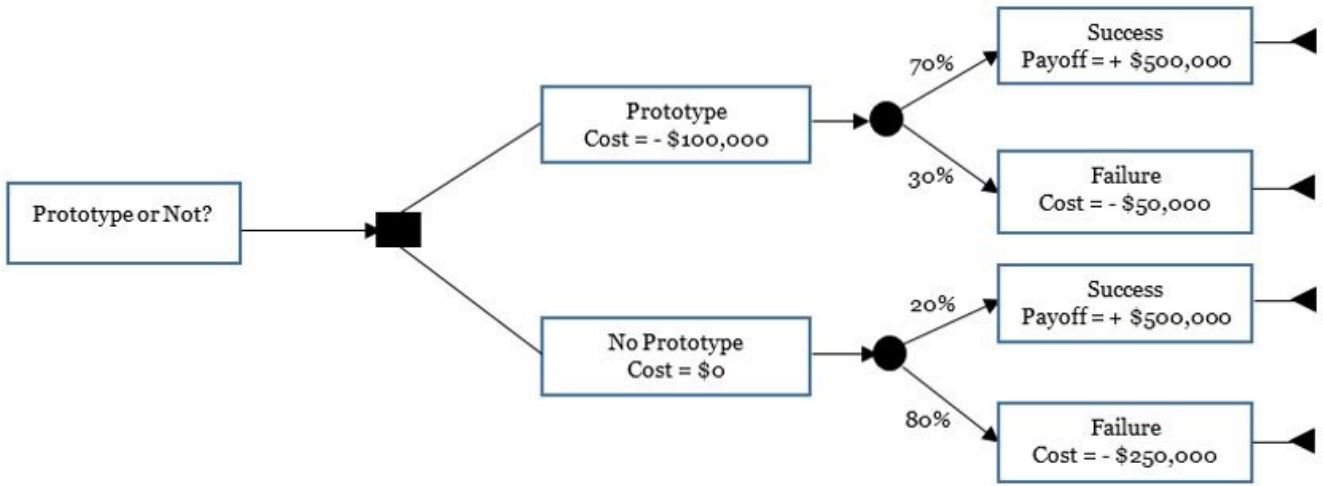


Risk management

# Cost of a risk

1) Compute Net cost of each path



Risk management

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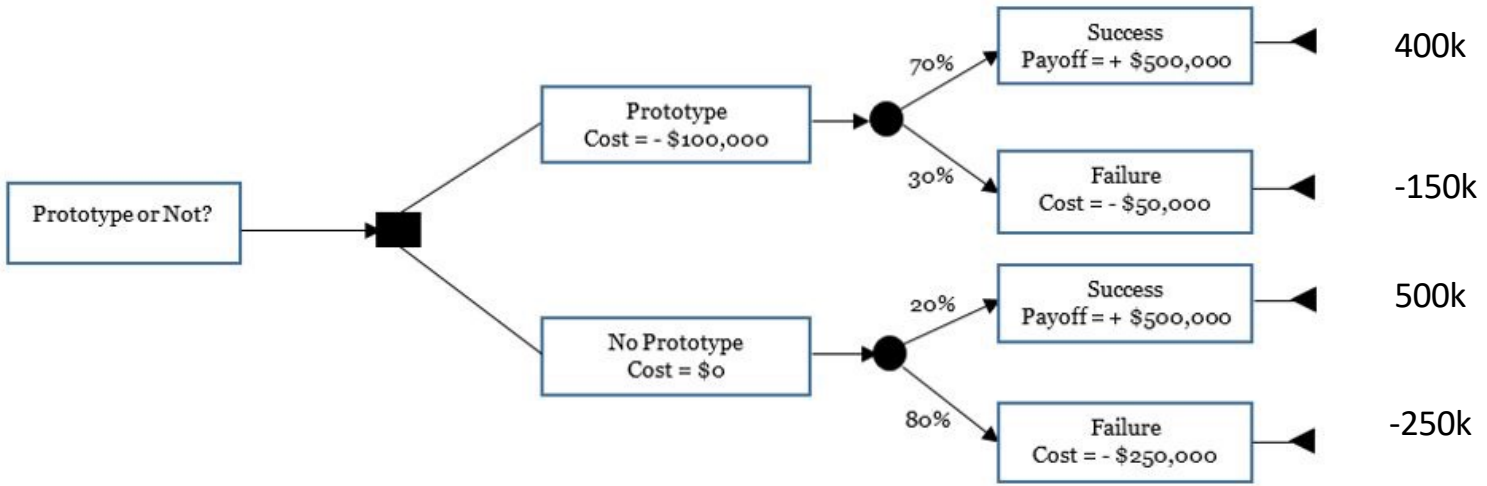
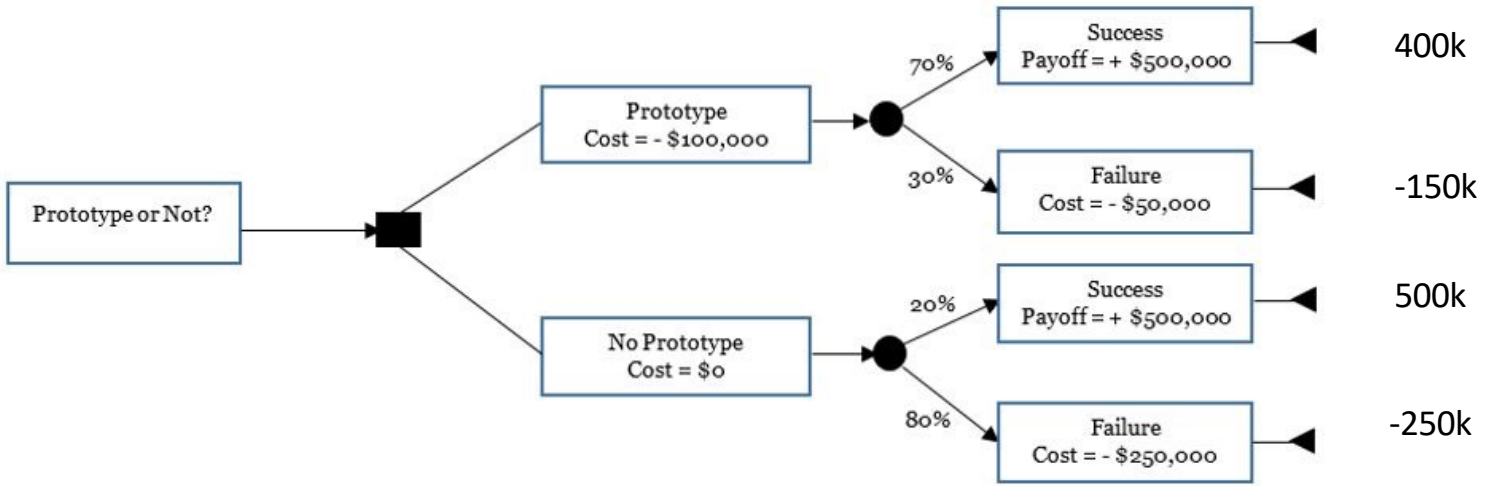


Risk management

# Cost of a risk

1) Compute Net cost of each path
2) Compute expected value for each path



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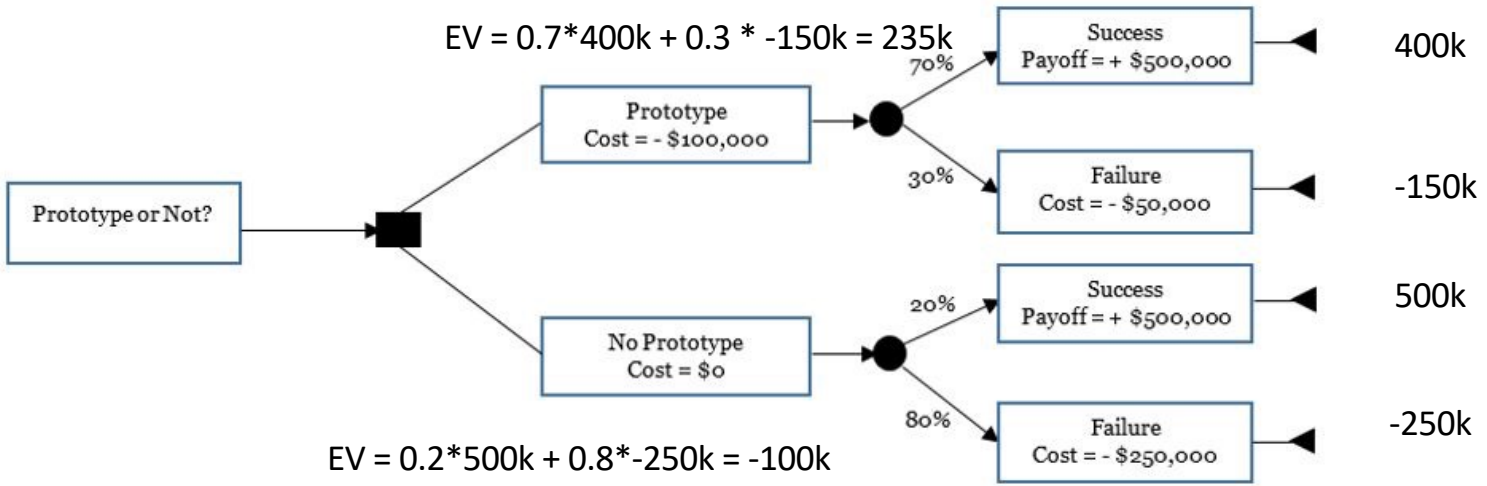

# Elements of a software project

- Numerous activities for a software project
- Planning should be one of the first things to do
- Should correspond to the scope of the project