Project Costs and Estimation

Eduardo Figueiredo

http://www.dcc.ufmg.br/~figueiredo

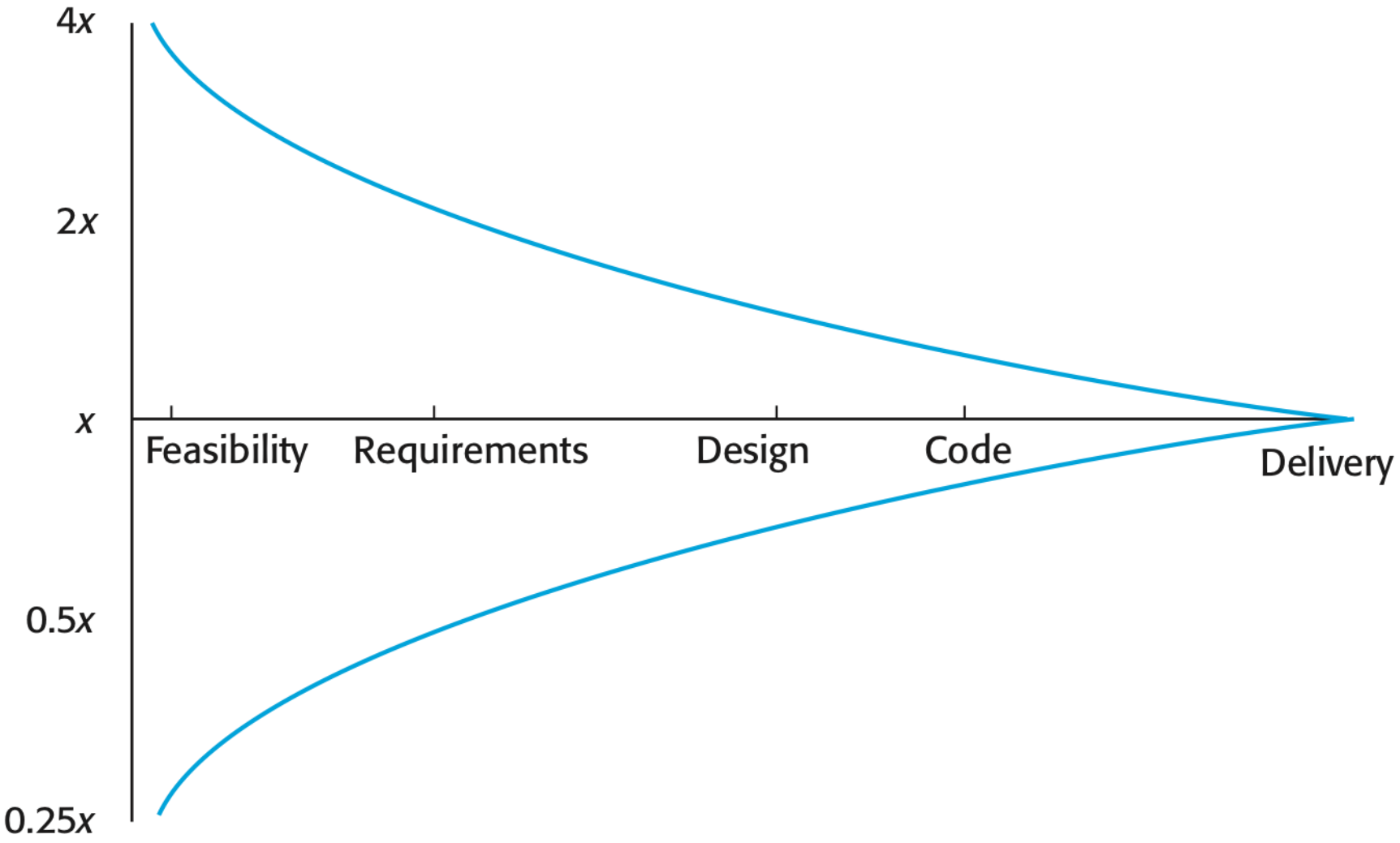
Software Project Costs

- Three main parameters impact on software costs
  - Effort costs (paying software staff)
  - Hardware and software costs
  - Travel and training costs
- For most projects, the biggest cost is related to the effort cost

Project Estimation

- Project planning requires an estimation of costs
  - But, estimating project costs is very difficult
- In fact, it is almost impossible to accurately estimate software costs in early stages of development
  - Due to many uncertainties

Estimate Uncertainty (Boehm)



Estimation Techniques

- Although estimation is hard, it is necessary in most real projects

- Two techniques are commonly used to estimate the software costs
  - Experience-based techniques
  - Algorithmic cost modelling

Experience-based Techniques

- In experience-based techniques, estimation is based on the manager's experience on past projects
- A group of people involved in the estimation is usually helpful
  - Each member explains their estimation
  - Then, a member may reveal factors that other members have not considered

Algorithmic Cost Modelling

- Algorithmic cost modelling relies on a mathematical formula to predict costs
- It computes the project effort based on estimates of project attributes
  - Project size
  - Type of software
  - Team experience
  - Other process and product factors

Example of Formula

- Algorithmic Cost Modelling can be expressed as a simple formula:

$$\textbf{Effort} = \textbf{A} * \textbf{Size}^{\textbf{B}} * \textbf{M}$$

A : constant based on organizational practices

Size : usually in function points

B : complexity, usually between 1 and 1.5

M : process, product and development factors, such as dependability and team experience

How to use this technique

- Challenges
  - It is hart do estimate Size accurately
  - The estimation of B and M is also highly subjective
- Effort does not increase linearly with size
  - Therefore, you need an exponential component (B)
- It is usually required to develop a range of estimates (worst, expected, and best)

Bibliography

- Ian Sommerville. **Software Engineering**, 10th Edition. Pearson Education, 2016.
  - Chapter 22: Project Management (Section 23.5)