CISC/CMPE 327 Software Quality Assurance

Queen's University, 2019-fall

Lecture #3-1
Spiral Model
Software Process Models - 2

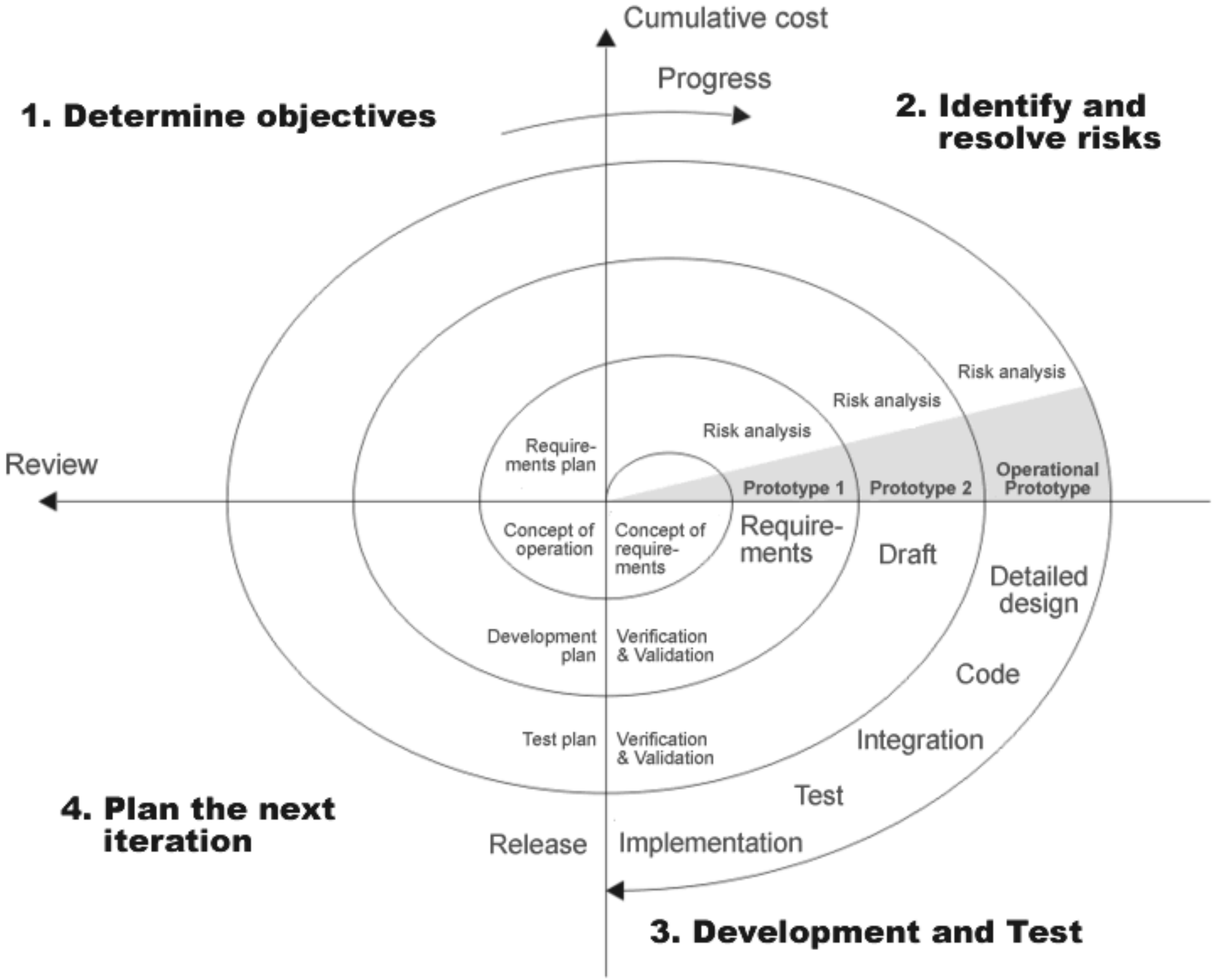
Software Process Models

- More Process Models
  - We continue today with more models of software process
  - Recall that our objective is to understand how quality control fits into software processes

The Spiral Model

- Boehm's Spiral Model
  - The Spiral Model is a refinement of the waterfall model designed around continuous documentation and evaluation of risk
  - Based on experience applying the waterfall model to large (U.S.) government software projects
  - Now a standard used by many government agencies and software providers

The Spiral Model



http://en.wikipedia.org/wiki/File:Spiral_model_%28Boehm,_1988%29.png

The Spiral Model

- Spiral Layers
  - Roughly, each layer of the spiral corresponds to one phase of the waterfall (although there are no fixed phases)
  - For example, the first layer could be the requirements phase, second layer the design phase, etc.

The Spiral Model

- Four Step Cycle
  - In each layer, the same four step cycle is used, consisting of:
    - Determine Objectives: determine objectives, constraints, risks for next phase
    - Assess and Reduce Risks: analyze and reduce identified risks
    - Develop and Validate: choose development model, develop and test
    - Review and Plan: review status, plan next layer

The Spiral Model

For each layer (phase) of the project:

- 1) Determine Objectives
  - Specific objectives (aims) for the phase of the project are defined
  - Constraints on the process and product are identified
  - Alternatives for achieving the objectives are identified
  - Potential risks associated with each alternative are identified

The Spiral Model

- 2) Assess and Reduce Risks
  - For each potential risk, a detailed analysis is carried out
  - Steps are taken to reduce risk (e.g., create prototype to check)
  - Alternatives are chosen to minimize risk

The Spiral Model

- 3) Develop and Validate
  - Based on risk analysis, choose or modify development model
  - For example, to implement and validate,
    - if user interface risks dominate, use evolutionary prototyping
    - if safety risks are the major issue, use formal methods

The Spiral Model

- 4) Review and Plan
  - Review and evaluate results of this phase (layer)
  - Decide whether another layer of the spiral is needed
  - If so, draw up plans for next phase

Drawbacks of the Spiral Model

- Heavyweight Process
  - The spiral model requires a large amount of overhead
    - Every layer requires a lot of documentation and many meetings, progress can therefore be slow
- Not really a development model
  - The spiral model is really more of a "meta-model" since it describes the way to carry out stages, not what the stages are
  - But focuses on identifying potential problems early at every stage, so very good at producing high quality results

Drawbacks of the Spiral Model

- Depends on Risk Analysis
  - Needs a very experienced team to recognize and analyze risks accurately
  - High dependency on quality of people (itself a risk!)
- Not for Novices
  - Layers of process are flexible and not explicitly laid out
  - Each layer's goals and plan must be decided by team itself, requires experienced people!