Software Development Overview

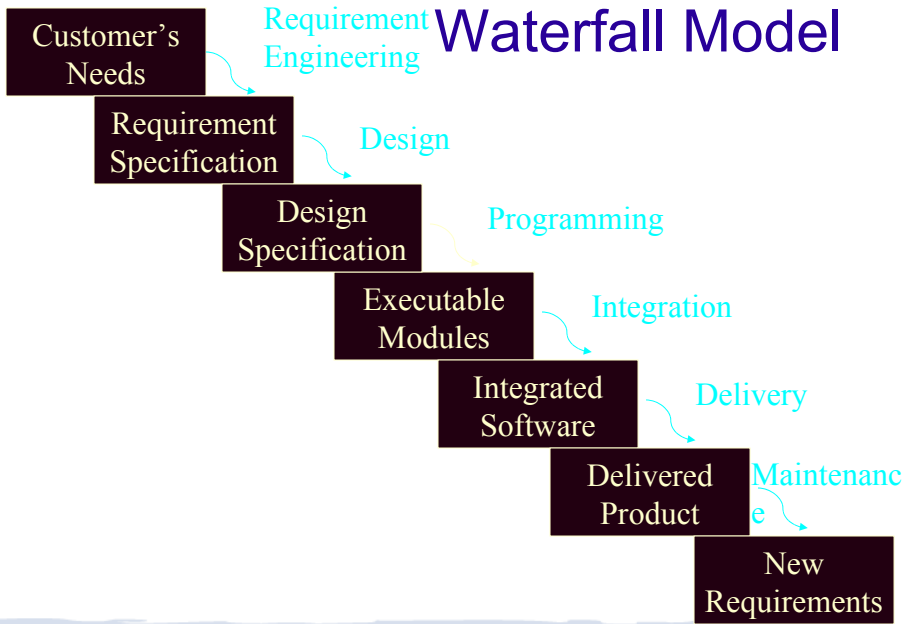
CPSC 315 – Programming Studio

Variety of Software Development Processes

- Traditionally covered in Software Engineering
  - We'll only give a very brief overview of most
- Many are not "clear cut" ideas
  - Often modified to incorporate ideas from other models; seldom used in "pure" form

Waterfall Model of Development

- It is the "traditional" software engineering approach
- Involves series of stages, each a *process* that converts one *product* to another
- The development "flows" from the top (early processes) through to the bottom



Waterfall Model

- It can get more complex
  - Feedback from later stages to earlier ones
  - Verification and Validation testing in each stage
  - Or, a separate testing stage after integration
  - Can extend to incorporate iterative approaches

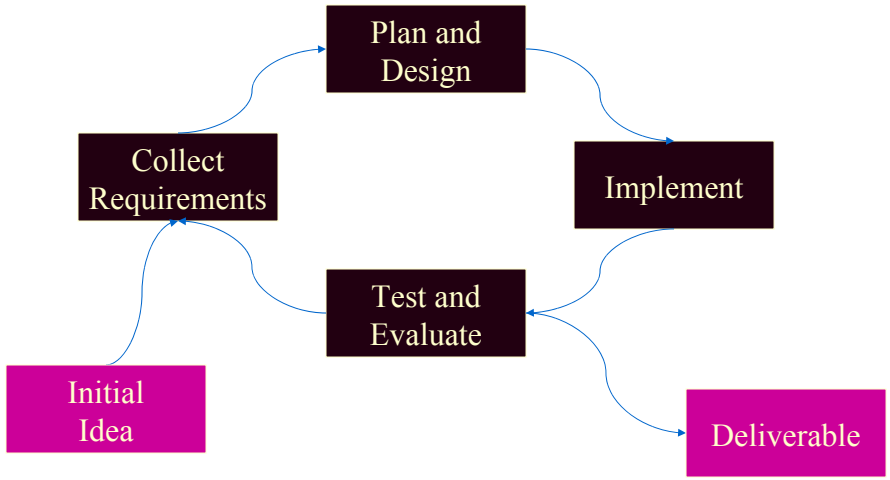
Waterfall Model

- Good Points
  - Provides clear structured process, especially useful on large projects
  - Clear requirements, design at beginning can make things much easier and better later on
  - Tend to have good documentation throughout
- Bad Points
  - Can be tough to know requirements ahead of time
  - Difficult to evaluate how later parts of system will really work in practice
  - Requires more discipline by programmers to implement

Iterative Software Development

- Rather than produce a single product "all at once", provide incremental improvements
  - Deliver pieces of the product at various times
- Time is planned to iterate on the design and implementation of the system
- Includes user analysis, feedback to improve

Iterative Approach



Prototyping

- Fits into iterative approach
- Deliver early prototypes of the software
  - Not fully functional, or with poor functionality
- Prototypes should allow one to get user feedback
  - Allows revision of requirements, design
- Possible problems:
  - Can hide difficulties underlying the prototype
  - Can set expectations too high
  - Provides early design anchoring (less flexible)

Spiral Model

- Combines iterative and prototype approaches
- Starting from center, (basic requirements), a prototype is created in the first iteration
- Each successive iterative cycle produces a newer, better prototype (spiraling out)
- When good prototype is found, fix system

Cleanroom Development

- Couple iterative process with very detailed evaluation
- Every iteration gets tested on a very large test data set
  - Provides “hard” statistical data on how reliable the method is
- Measure whether iteration has introduced or reduced defects
  - Introducing defects indicates problem – go back to previous stage and start over

Formal Processes

- Some of these techniques have been collected into more formal descriptions
  - The Rational Unified Process – incorporates much of this, plus more; suite of software products to support the process
- Standards developed for specifying many stages, such as requirements, processes, assessments

Agile Software Methods

- Newer trend in software development
- Meant to contrast vs. “heavyweight” methods of software development
  - Heavyweight – Highly regimented methods, typified by the waterfall model
  - Designed to respond/change quickly, but involves much less long-term planning
- Many methods fall under the “Agile” heading
  - Extreme programming
  - Scrum
  - Plus, it overlaps with some ideas of iterative development

Agile Methods

- Tend to involve lots of collaboration
- Seem to work best with smaller, co-located teams
- Tend to be good for projects where requirements will shift during development
- Will be the focus of the next lecture