Inf2-SEPP Lecture 22 Part 2: Different Plan-driven Software Development Processes

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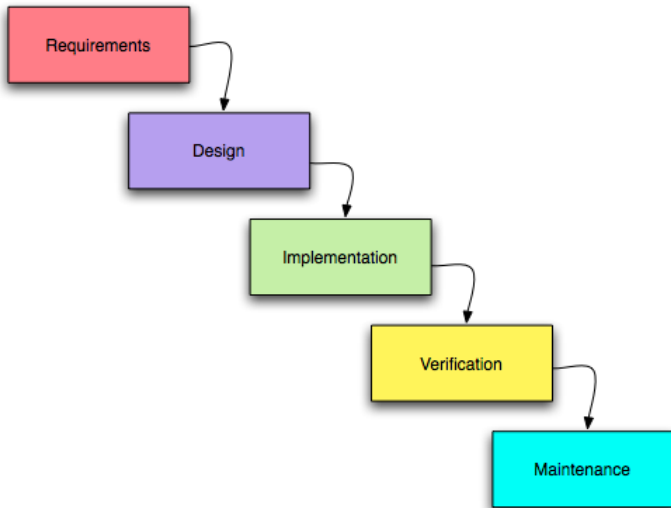
This lecture

Plan-driven processes:

- ▶ Reminder
- ▶ The Waterfall Model
- ▶ The Spiral Model

Plan-driven processes- Reminder

"**Plan-driven processes** *are processes where all the process activities are planned in advance and progress is measured against this plan*" (Ian Sommerville)

The Waterfall Model

Introduced by Winston W. Royce in 1970

Image from Wikipedia

The Waterfall Model: Pros and cons

$+$ better than no process at all – makes clear that requirements engineering, verification etc. important.

$+$ time spent early can reduce higher costs later.

$+$ emphasis on documentation ensures that knowledge is not lost when team members leave.

$+$ easily understandable, explainable, to manage.

$-$ inflexible and unrealistic in many domains in practice: e.g., verification could show up problems with requirements.

$-$ slow and expensive – in an attempt to avoid problems later, end up "gold plating" early phases, e.g., designing something elaborate enough to support the requirements you suspect you've missed, so that functionality for them can be added in coding.

$-$ high amounts of risk and uncertainty

The Spiral Model

Barry Boehm. 1986.
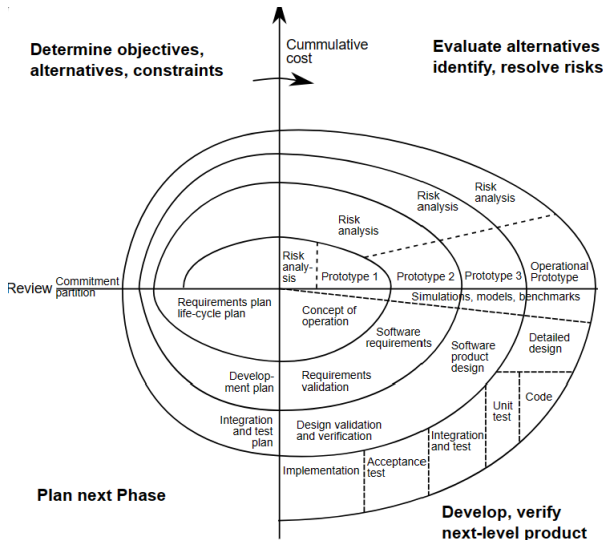
The Spiral Model

Phases of a single cycle:

1. **Determine objectives, alternative means of addressing them, constraints**: involving key stakeholders
2. **Evaluate alternatives, identify, resolve risks**: results in identification of cost-effective strategy to resolve the risks which may involve risk-resolution techniques like prototyping, simulation, benchmarking.
3. **Develop, verify next-level product**: decide on approach based on remaining risk; Can incorporate other processes like Waterfall, which is why Spiral is also called a *process model generator*. It requires good management.
4. **Plan next phase**: Work reviewed, plans decided for next cycle.

The cycle ends with key stakeholders reviewing outcomes and plans to ensure commitment for the next cycle.

A key innovation is prominent role of *risk*.

The Spiral Model: Pros and cons

+ risks considered and addressed early
+ flexible, generic: objectives of next iteration informed by outputs of current iteration; what is developed in each iteration depends on the objectives and identified risks.
+ effort and level of detail informed by risk considerations
+ early involvement of key stakeholders in planning and evaluation
+ control over costs, resources and quality, due to mix of planning including risk consideration and evaluation per iteration
− high management effort required to make decisions on what will be done in each iteration
− know-how in risk analysis and risk management essential, but often not available
− unsuitable for smaller systems with manageable risk

Reading

Essential: Sommerville SE Chapter 2 only introduction and section 2.1

Recommended Browse the web to learn more about the:

- ▶ Waterfall model
- ▶ Spiral model (e.g. browse its phases and invariants from
  `https://ieeexplore.ieee.org/document/59`,
  `https://insights.sei.cmu.edu/documents/5439/`
  `2000_003_001_13655.pdf`)