Lifecycle

CSE 403, Spring 2003

Software Engineering

http://www.cs.washington.edu/education/courses/403/03sp/

Readings and References

- Reading
  - » *The Mythical Man-Month*, Brooks
    - Chapters 6-10
  - » *Rapid Development*, Steve McConnell
    - Chapter 7, Lifecycle Planning
- Other References
  - » *Anchoring the Software Process*, Barry Boehm, USC, 1995
    - http://citeseer.nj.nec.com/boehm95anchoring.html

The dreams of yesterday

- Boehm [1995]
  - » "For a few golden moments in the mid-1970's, it appeared that the software field had found a sequence of common anchor points"
  - » "a sequence of milestones around which people could plan, organize, monitor, and control their projects"

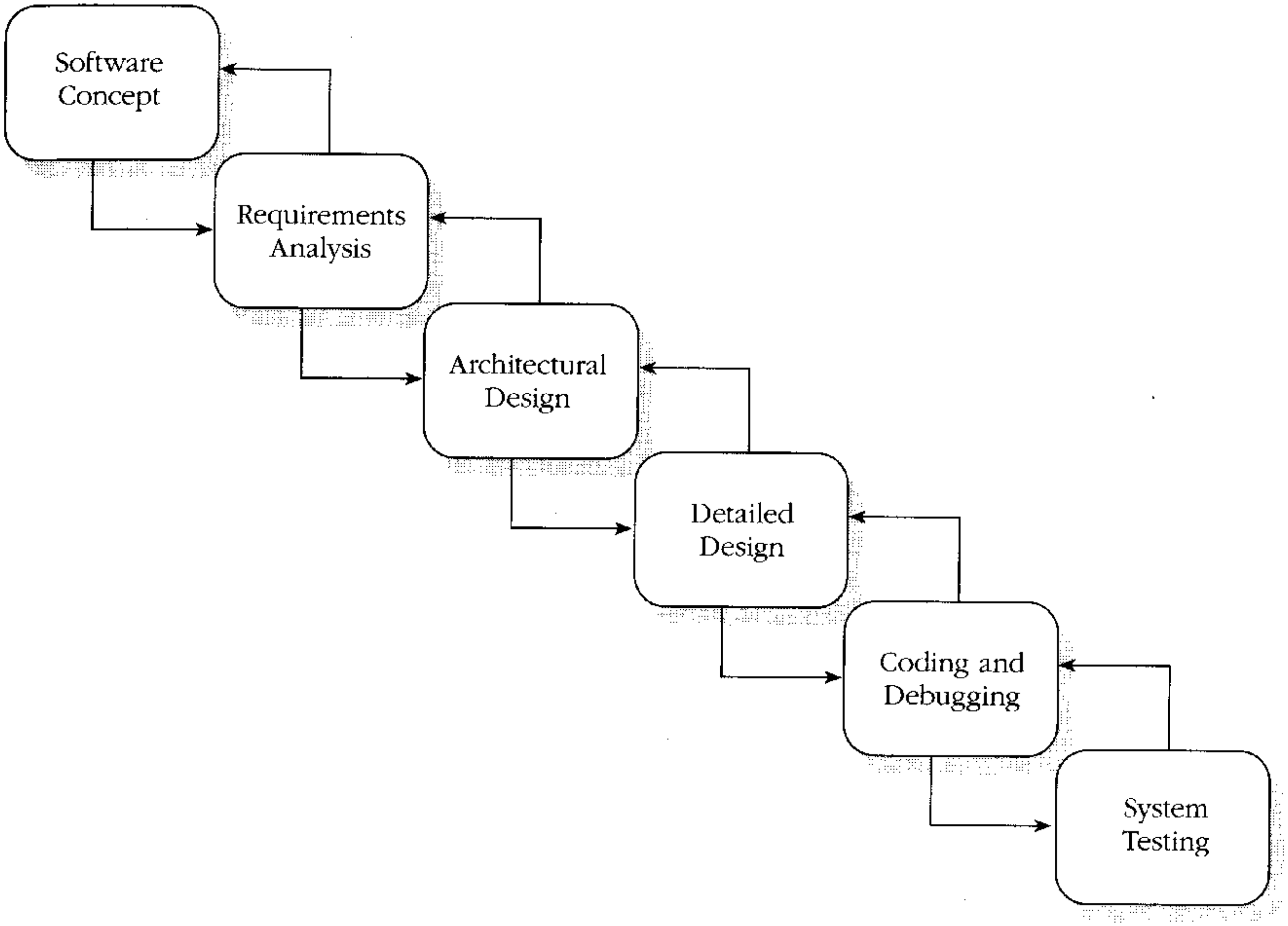
A Lifecycle

- The main function of a lifecycle model is to establish order in which project events occur
- Typical events include
  - » specification, prototype, design, implementation, test, deliver, and do it again
- But they usually don't happen in nice clean little stages like this
  - » so we develop various models and tweaks to try to maintain the benefits and still be realistic

"good enough" now vs "perfect" later

- The goal is often
  - not to achieve what you said you would at the beginning of the project
  - but to achieve the maximum possible within the time and resources available
  - Sherman 1995, reference in McConnell
- Do deliver a small and useful tool on time
- Don't deliver a monster way too late
  - Fancy doodads have a tendency to be junk anyway

Classic Waterfall



Characteristics

- Orderly sequential model
- Stages are disjoint
  - » they don't overlap and you can't go forward until you've completed the current stage
  - » you can't go back except with extreme difficulty
- Reviews at each stage to determine if ready to advance to next stage
- Document driven
  - » specific documents *will be complete* at each stage
    - yeah, right

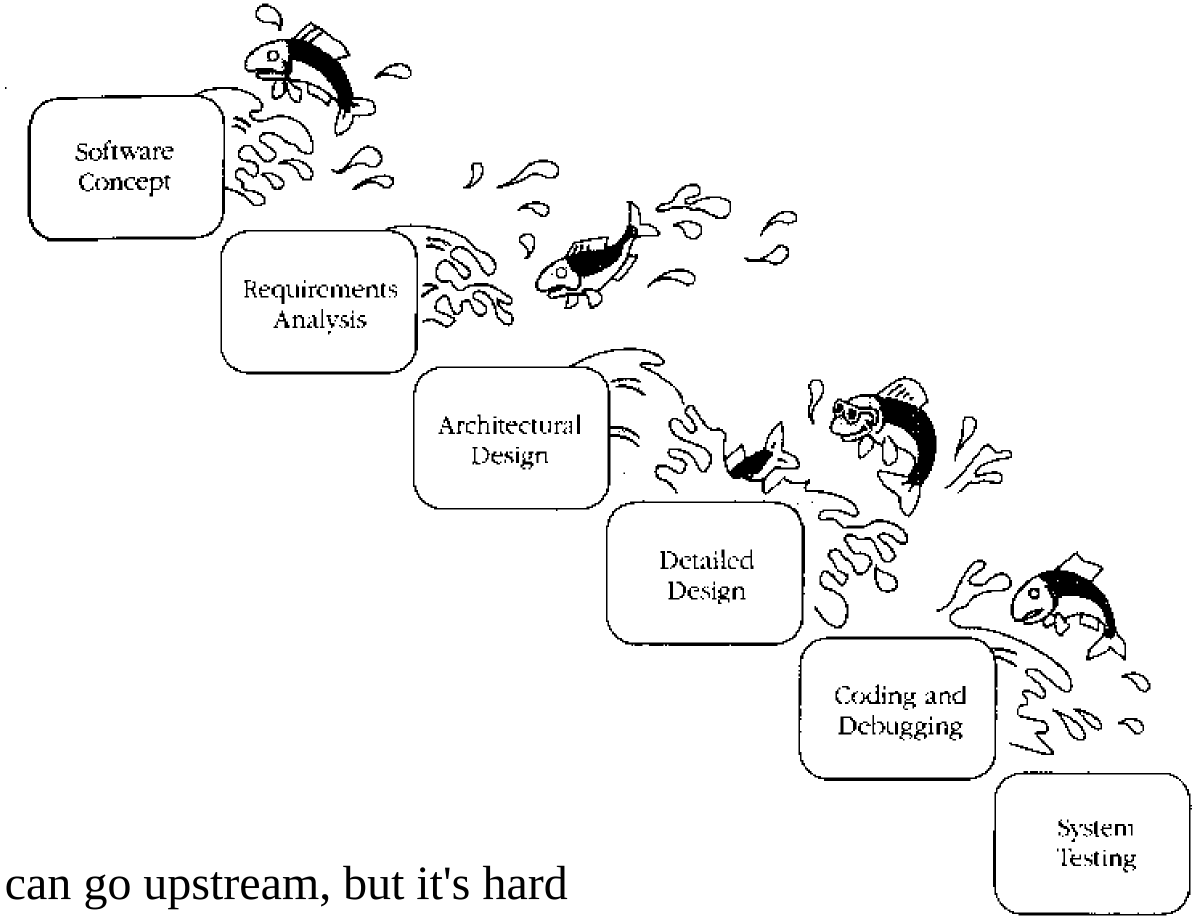
Some issues

- Very difficult to specify all requirements completely and correctly all at once
    - » completely → lots and lots of detail
    - » correctly → every single detail is correct
    - » produces masses and masses of detail that will be irrelevant if some early decision changes
- Difficult to accurately say everything at once
- Gold plating requirements is tempting
- Inflexible solutions based on invalid detail

More issues

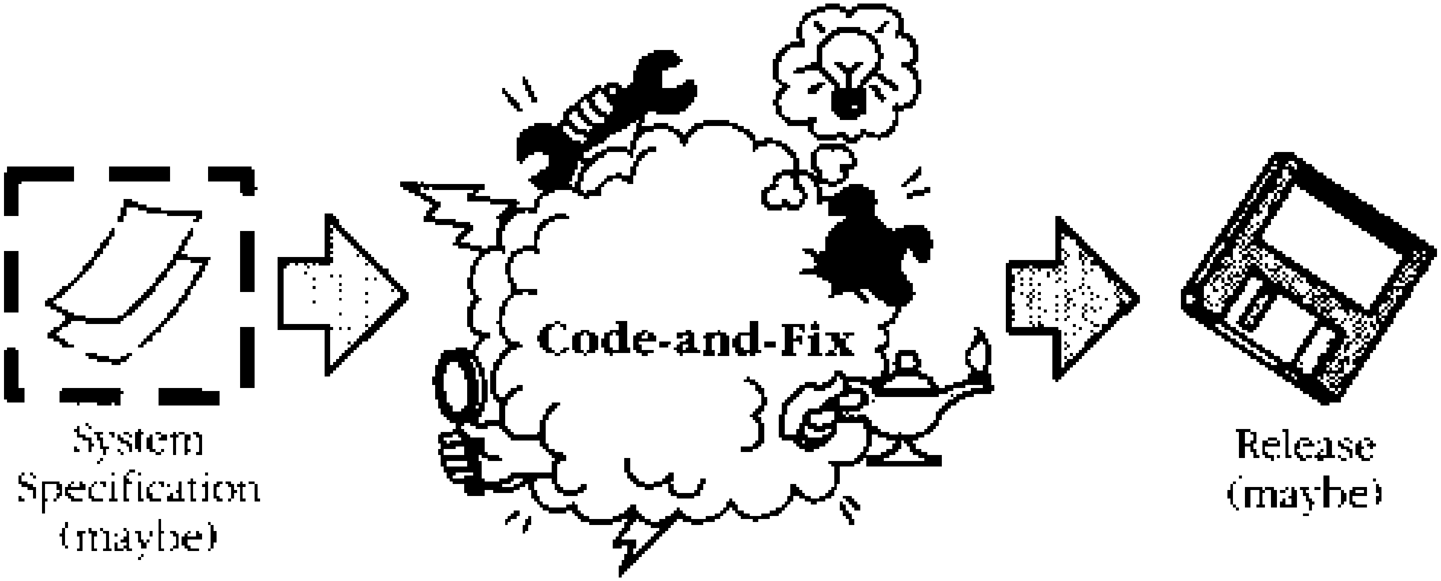
- Since so much is resting on getting it right before leaving each stage, the reviews tend to be massive affairs
  - » a lot of work goes into preparing for each review
  - » that makes it even more expensive to change direction if a review shows problems
  - » if a review is delayed or problems are found, the entire project sits in a loop while the problems are resolved - $$$

Salmon lifecycle model



You can go upstream, but it's hard

Code and fix



Code and fix is dangerous

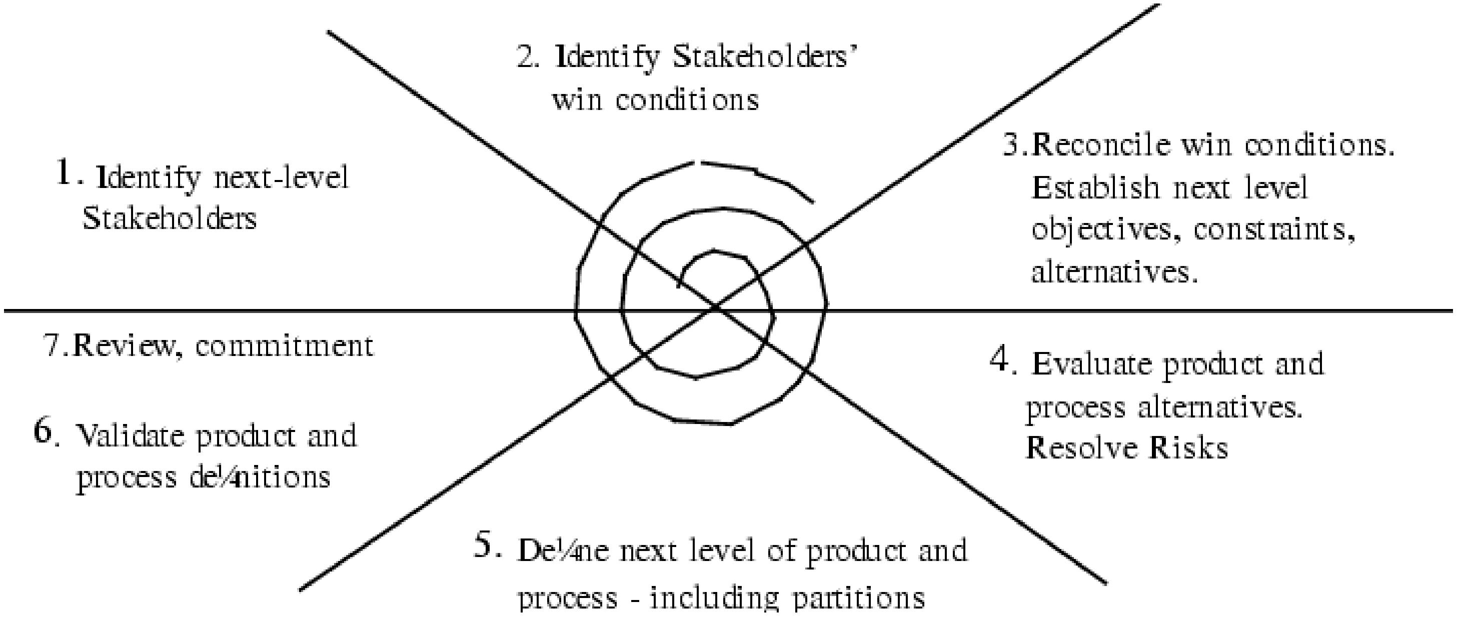
- No means of assessing progress
  - » nasty surprises are not a good thing for your career
  - » Yes: "I'm not worried, I know where they are in the project and they always deliver a useful product on time."
  - » No: "I don't know. You remember the project when they were 95% complete for three months and then cancelled?"
- Risk of complete project failure right up to delivery

Spiral Model

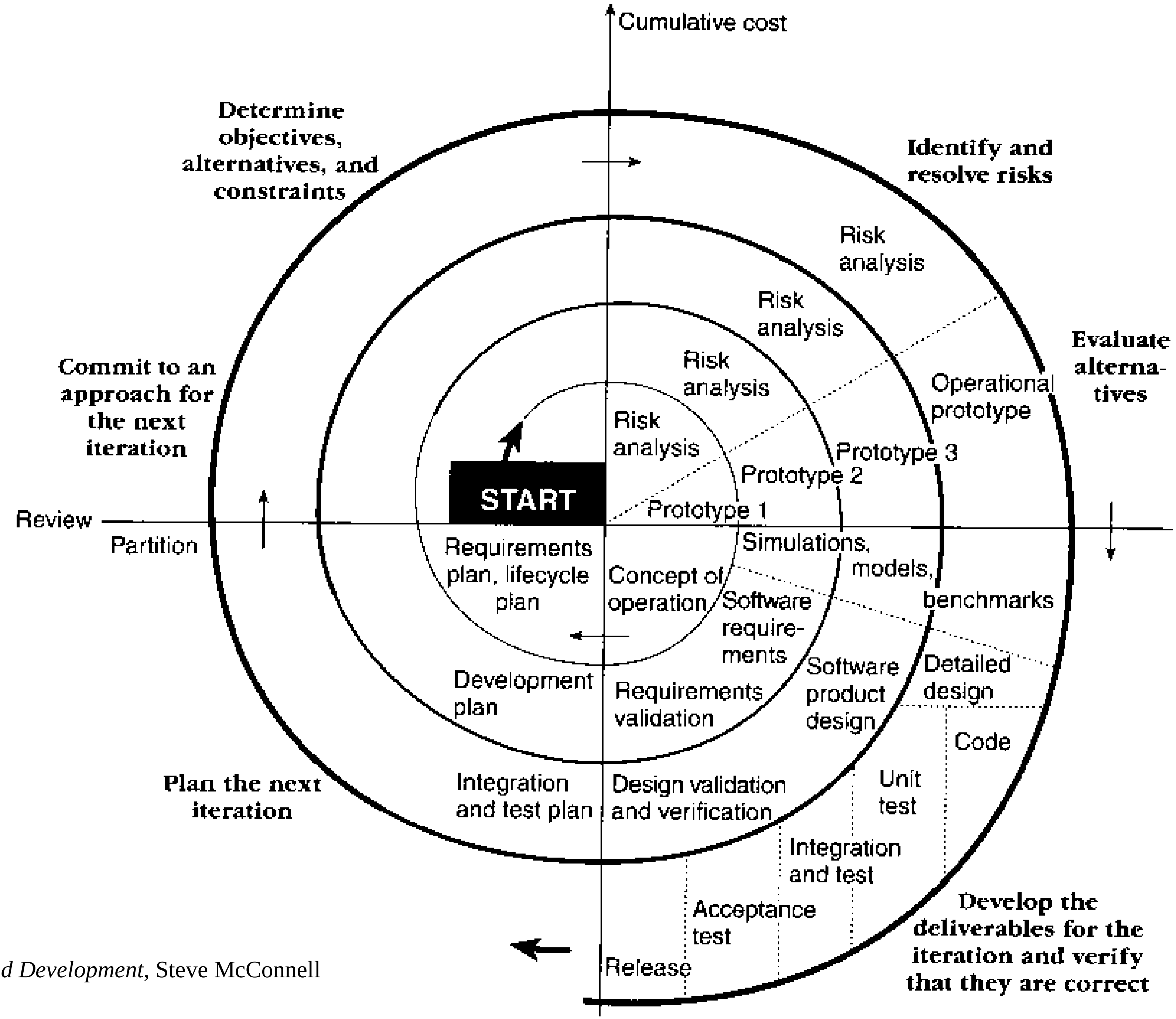
- Oriented towards phased reduction of risk
- Take on the big risks early and make some decisions
  - » are we building the right product?
  - » do we have any customers for this product?
  - » is it possible to implement the product with the technology that exists today? tomorrow?
  - » does the company want to be in this business?
    - should the company be in this business?

Spiral Model

FIGURE 1. The Win-Win Spiral Model


1. Identify next-level Stakeholders
2. Identify Stakeholders' win conditions
3.Reconcile win conditions. Establish next level objectives, constraints, alternatives.
4. Evaluate product and process alternatives. Resolve Risks
5. De¼ne next level of product and process - including partitions
6. Validate product and process de¼nitions
7.Review, commitment

Anchoring the Software Process, Barry Boehm, USC, 1995



Rapid Development, Steve McConnell

Spiral steps

- Determine objectives, alternatives, constraints
- Identify and resolve risks
- Evaluate alternatives
- Develop the deliverables for the iteration and verify that they are correct
- Plan the next iteration
- Commit to an approach for accomplishing the next iteration or cancel the project

Spiral early and often

- The spiral model is especially appropriate at the beginning of the project when the requirements are still fluid
- Risk reduction is the key element
  - » early cancellation of bad projects is a major benefit
  - » confidence that you're building the right product is a major benefit

Milestones

- Key elements of project milestones
  - » stakeholder concurrence on the system's objectives
  - » determination and validation of system architecture
- Traditional
  - » Requirements review, preliminary design review, final design review, acceptance test
- Boehm Spiral
  - » Lifecycle Objectives, Lifecycle Architecture, Initial Operating Capability

Elements of Lifecycle Objectives (LCO)

- Operational Concepts - What is it?
  - » Top level system objectives and scope
- System Requirements - What does it do for us?
  - » essential system features at an appropriate level
- System and software architecture - How?
  - » support analysis of feasibility at this level
- Lifecycle plan - Who wants it? Who'll support it?
  - » identification of the major stakeholders now, future
- Feasibility Rationale - Is this really true?
  - » Evaluate conceptual integrity and compatibility

Elements of Lifecycle Architecture (LCA)

- Operational Concepts - What is it?
  - » Elaboration of objectives and concepts
- System Requirements - What does it do for us?
  - » Functions and interfaces, identify TBDs
- System and software architecture - How?
  - » What is the actual design selection. Any risks?
- Lifecycle plan - Who wants it? Who'll support it?
  - » Elaboration of who does what over the lifecycle
- Feasibility Rationale - Is this really true?
  - » Evaluate conceptual integrity and compatibility

Initial Operational Capability (IOC)

- Software preparation
  - » Are we really ready to go live?
  - » Good release, support software, docs, data, ...
- Site preparation
  - » Facilities, equipment, supplies, commercial off-the-shelf software (COTS) in place, …
- User, operator, maintainer preparation
  - » training, team building, for everyone who will be actually working with the darn thing