CS 5704: Software Engineering

Lifecycles

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Most important aspects

risk

complexity

people

communication

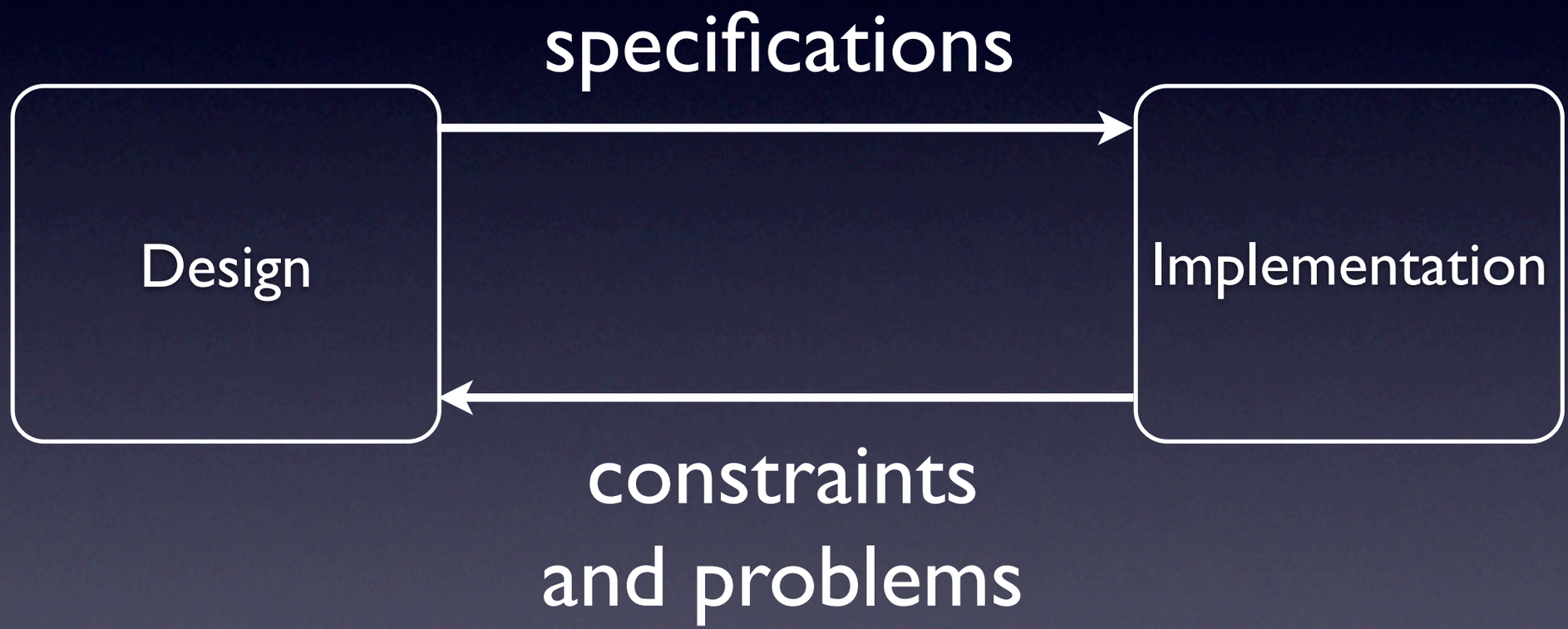
technology

change

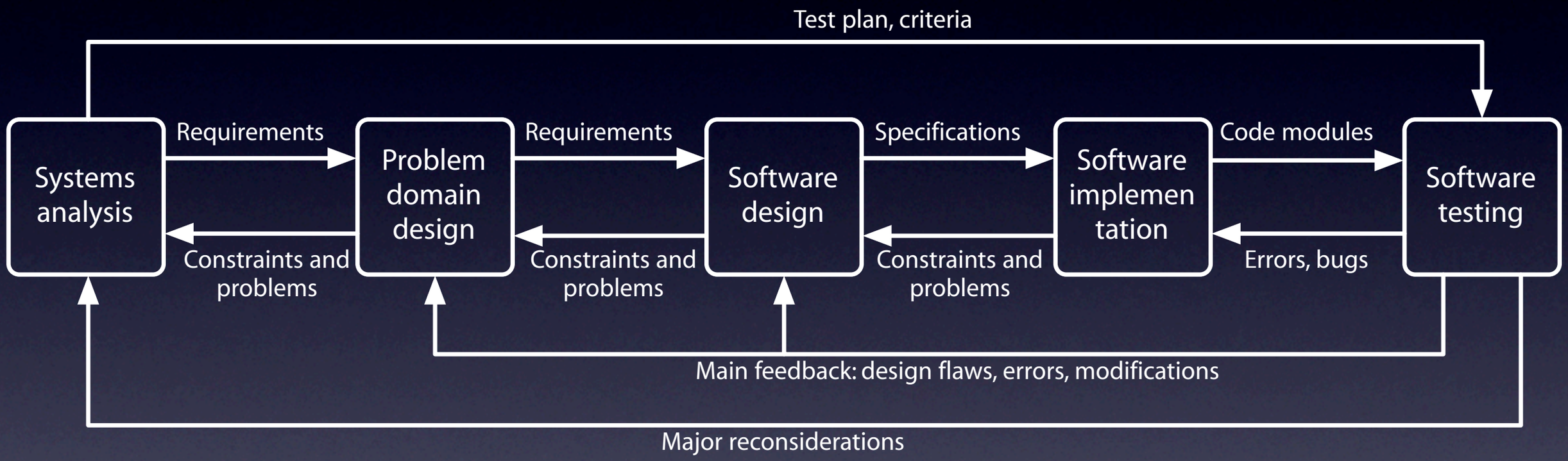
A scenario

- Walk through of the steps for
  - Remodeling your kitchen
  - Remodeling your house
  - Remodeling someone else's house
  - Building a whole housing colony

Two fundamental activities



As complexity increases...



One view: time

- Doing one activity at a time
- Doing part of each activity at a time
- Doing multiple activities simultaneously
- “Faking” upfront activities before committing resources

Another view: deliverables

- Standard, iron-clad deliverables for each activity
- Informal, loosely defined deliverables throughout
- Everything in between ...

Process and product

- "A *Software Process* is a framework for tasks that are required to produce high-quality software"
  - Defines the approach to engineer software
    - Includes technologies and tools (instances)
- *Products* are deliverables resulting due to the instantiation of the process
  - Work products
  - Software code

Possible to indirectly measure

- Process
  - CMMI *
    - Process metrics (cost, time, etc.)
- Product
  - Product metrics (LOC, function points, etc.)

* Open topic for presentation

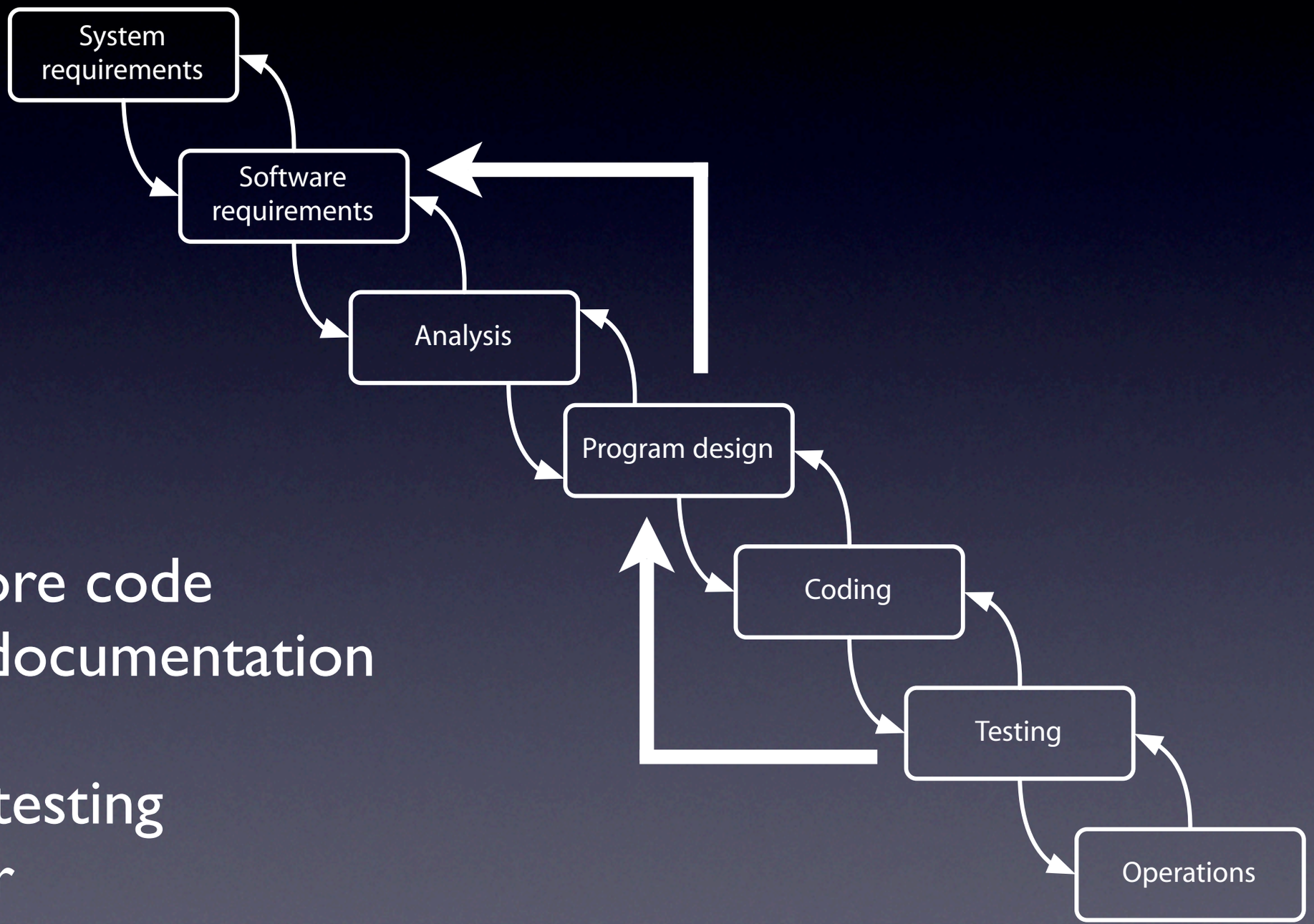
Myths

- “SE is about creating unnecessary work products”
- “If we get behind schedule, we can add more programmers”
- “Let’s start coding, we can fill in details later”
- “Software is flexible, we can make changes anytime”
- “We have always done it that way”

Prescriptive Process Models

- Describe basic activities (analysis, design, etc.)
- Provides scaffolding to novices
- Incorporates control management mechanisms
- Emphasizes different key aspects we discussed
- Affords an engineering approach

The Waterfall Model

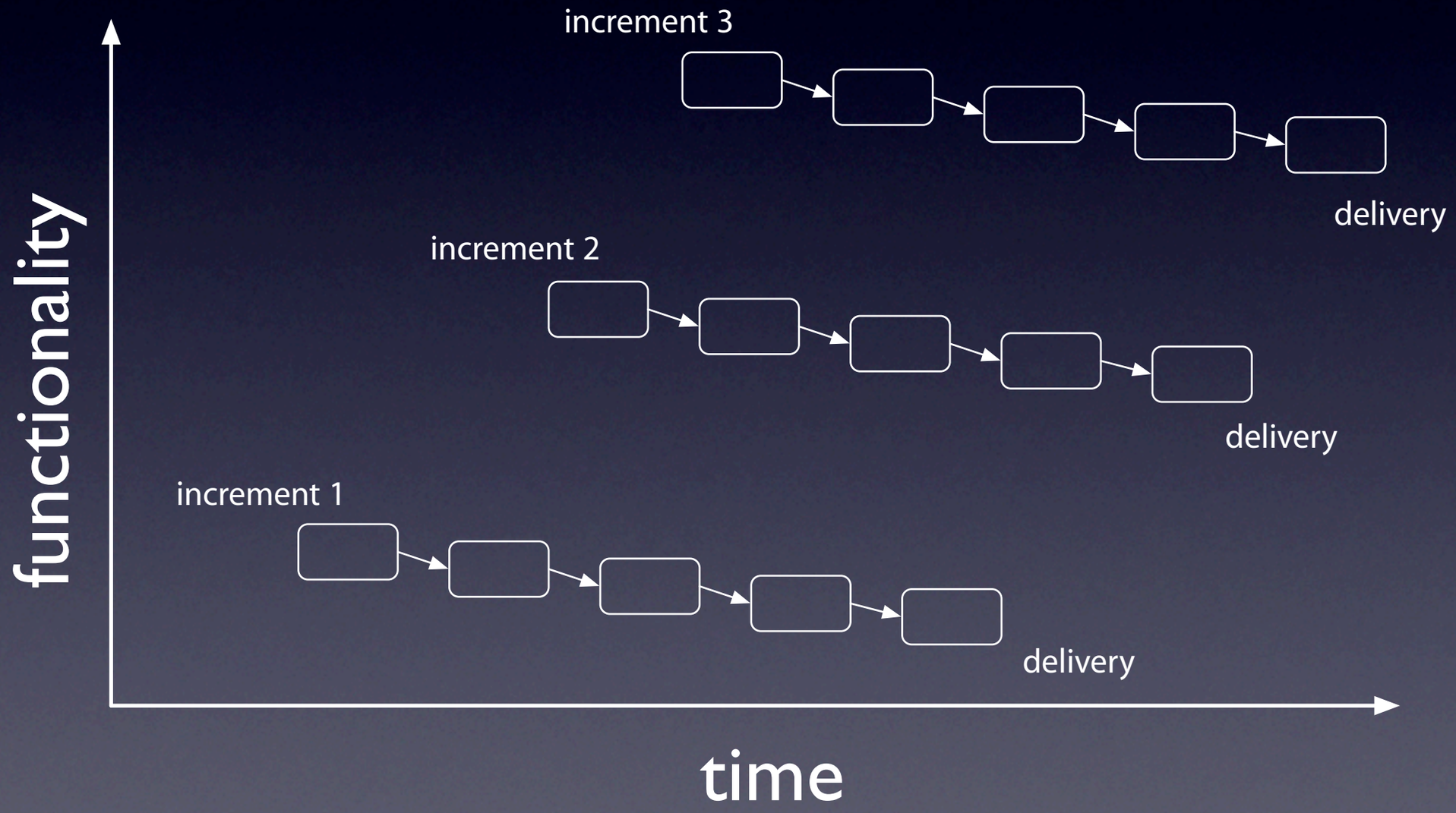


1. Design before code
2. Complete documentation
3. Prototype
4. Emphasize testing
5. Involve user

Waterfall Model discussion

- (Royce, 1970)
  - Context: chaos in the industry
  - What was actually proposed
  - Criticism (fair?)
  - What key concepts were identified?
  - What impact did the model have?
    - Whole organizational structures were defined!

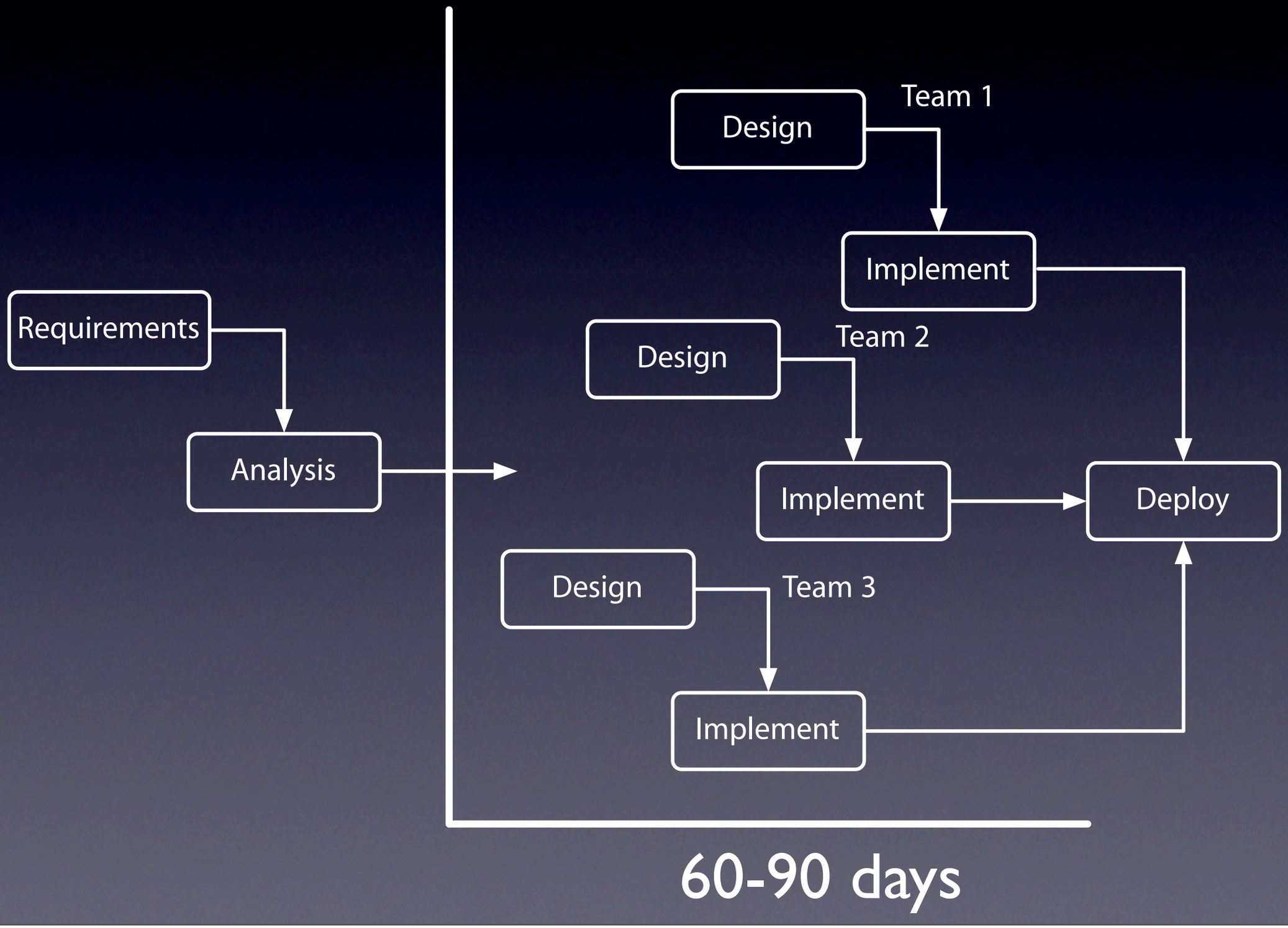
Incremental process models



Incremental Model discussion

- In some ways, precursor to the Agile methods
- What does this mean w.r.t. risk?
  - Importance of getting first increment right
  - Constraints down the road
- How does it impact users?
- Examples: OmniFocus on the Mac

The RAD Model



RAD Model discussion

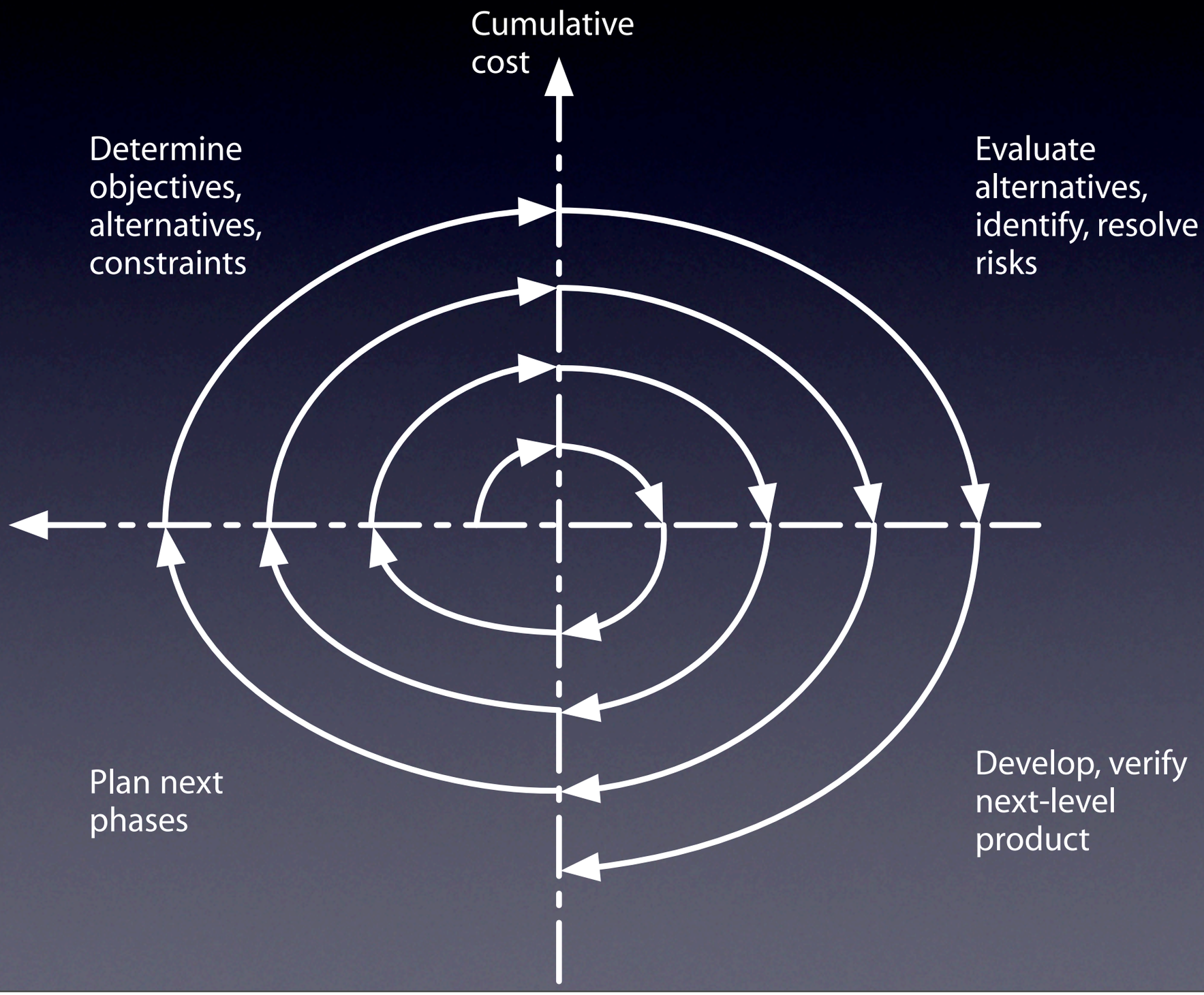
- Emphasis on short development cycle
- Component based, parallel development

- What does it mean for communication?
- What does it mean for risk?
- Examples?

Evolutionary process models

- Prototyping
- What are they suitable for?
- What are the risks?
- How does this impact the users?

The Spiral Model



Spiral Model discussion

- Biggest contribution: formalization of risk
  - Specifications ~ risk ~ prototype ~ risk ~ ....
- What type of development efforts need this?
- Not many case studies on instantiating this model

Other models

- Concurrent Development Model
  - Controlled chaos?
  - State-based, triggers in the development space
- Component-based Development Model
  - Holy grail of SE
- Formal Methods Model
  - Extremely accurate and mostly impractical

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