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Advantages / Disadvantages
Most-widely used process model
Controls schedules, budgets & documentation
Tends to favor well-understood system aspects over poorly understood system components, (no risk analysis)
Does not detect development areas behind schedule early in the lifecycle stages.

Document-driven process
Deliverables: documents produced at the end of each phase, usually in accordance to contract deadlines
Waterfall Model: Phases

Requirements
- A statement of the functions and behavior of the system required by its users & operators
- General Requirements
  - Defines broad & detailed objectives of the system
  - e.g., reliable, correct, efficient, user-friendly, expandable
- Gives relationship of Qualitative & Quantitative System Goals

Specification
- Listing of specific, measurable behavioral system constraints that satisfy system requirements
- Clearly communicates system operations with end user(s)
  - complete, unambiguous, minimal, understandable, testable
- Cross-reference indexed to requirement items
- Defines the design validation & final system testing criteria
- Provides chief mechanism for estimating the project’s progress

Design: Representation or model of a system

Coding and Debugging (implementation)
- Translation of design into a programming language
- Indispensable Programmer Phenomena

Program Unit Notebooks
1. Documents programmer’s work activities
2. Maintains current unit (module) documentation
3. Passed from programmer to programmer during development

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RELEASE APPROVAL: ________________________ DATE: ________________________
Waterfall Model: Phases (cont)

Integration and Testing
- Unit testing: individual modules (functions) are tested separate from other modules
- Integration testing: system modules are tested together

Deployment & Maintenance
- Requires previous phases to be repeated
- Makes up 70%-90% of total system cost
- Majority of maintenance time (50%) spent on system understanding -> system documentation
- Maintenance Tasks
  † collection, analysis and prioritization of user trouble reports
  † new system release installations
  † documentation (user’s manuals) changes
  † configuration control issues

Spiral Model

The Spiral Software Process Model Diagram


Development phases reiterates through four cycles:
† Set goals and determine constraints for the phase
† Evaluate and resolve risks for the phase
† Develop the prototype for the phase
† Plan the next stage activities

Step 2 involves a Risk Analysis that identifies:
less understood system areas
systems areas that pose the greatest jeopardy to development
### Spiral Model (cont)

**Prototype Based**
- Prototype: a limited, semi-functional, task restricted, partially operational system
  - Analogous to a model or mockup that allows evaluation of development alternatives before commitment
- Rapid Prototyping Systems
  - Authoring/scripting (multimedia) systems used to quickly develop multiple interfaces for user evaluation, cannot serve as a kernel for future iterative system prototype development
  - Users tend to view prototypes as final versions of the system

**Mimic**
- Risk analysis produces a risk-resolution strategy
  - Feasibility Study: determination of a strategy achieving set goals and requirements within stated constraints.
    - Address development factors of expertise, experience, resources and motivation
  - Extension of cost/benefit analysis
    - Cost & benefits are estimated for best & worst case outcomes which are multiplied by their probability of occurrence giving an expected value.
    - Decisions on strategies are made to minimize cost and maximize benefits
- Cycles are modified to concentrate on different areas of system development driven by the risk-resolution plan
- Spiral model tends to behave like other process models due to differing cycles