Research And Design

Not your fathers Oldsmobile

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Why the difference?

- End is not clearly defined
- Requires definition of success and failure
  - Specify – test – evaluate
- Dependency on future technology
- Integration with existing technology
- Education of masses falls on the innovator
FWHA Testing Program
Spiral Design Model

"A model of the software development process in which the constituent activities, typically requirements analysis, preliminary and detailed design, coding, integration, and testing, are performed iteratively until the software is complete." Source: IEEE Std. 610.12-1990.
Spiral Design Model

- The new system requirements are defined in as much detail as possible. This usually involves interviewing a number of users representing all the external or internal users and other aspects of the existing system.
- A preliminary design is created for the new system.
- A first prototype of the new system is constructed from the preliminary design. This is usually a scaled-down system, and represents an approximation of the characteristics of the final product.
Spiral Design Model

- A second prototype is evolved by a fourfold procedure:
  - (1) evaluating the first prototype in terms of its strengths, weaknesses, and risks;
  - (2) defining the requirements of the second prototype;
  - (3) planning and designing the second prototype;
  - (4) constructing and testing the second prototype.
At the customer's option, the entire project can be aborted if the risk is deemed too great. Risk factors might involve development cost overruns, operating-cost miscalculation, or any other factor that could, in the customer's judgment, result in a less-than-satisfactory final product.
Spiral Design Model

- The existing prototype is evaluated in the same manner as was the previous prototype, and, if necessary, another prototype is developed from it according to the fourfold procedure outlined above.

- The preceding steps are iterated until the customer is satisfied that the refined prototype represents the final product desired.
Spiral Design Model

- The final system is constructed, based on the refined prototype.
- The final system is thoroughly evaluated and tested. Routine maintenance is carried out on a continuing basis to prevent large-scale failures and to minimize downtime.
Spiral Design Model

- Determine objectives, alternatives and constraints
- Commit to an approach for the next iteration
- Review
- Partition
- Plan the next iteration
- Requirements plan, lifecycle plan
- Development plan
- Integration and test plan
- Concept of operation
- Simulations, models, benchmarks
- Detailed design
- Code
- Integration and test
- Unit test
- Acceptance test
- Release
- Develop the deliverables for the iteration and verify that they are correct
- Risk analyses
- Operational prototype
- Prototype 1
- Prototype 2
- Prototype 3
- Identify and resolve risks
- Evaluate alternatives
- Cumulative cost
First Step

- What is needed?
- What can we do?
- What can’t we do?
- How will it be assessed (evaluated)?
  - Functionality
  - Cost
  - Usability