CURTISS WRIGHT
Flow Control Company
SCIENTECH

Optimizing The Software Development Process

Scientech Symposium 2013

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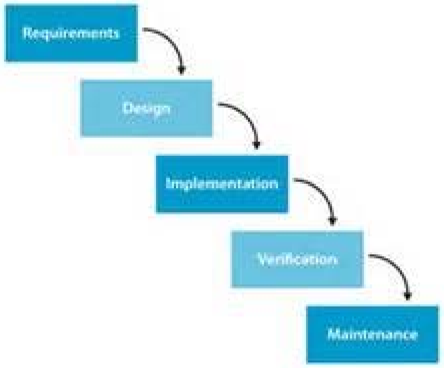
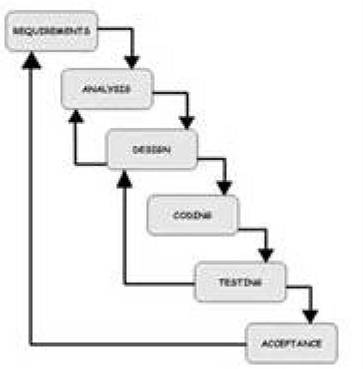
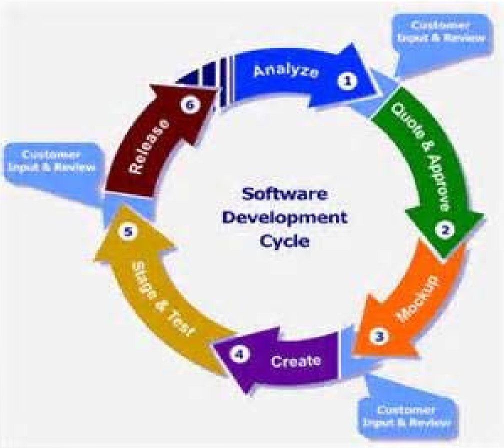
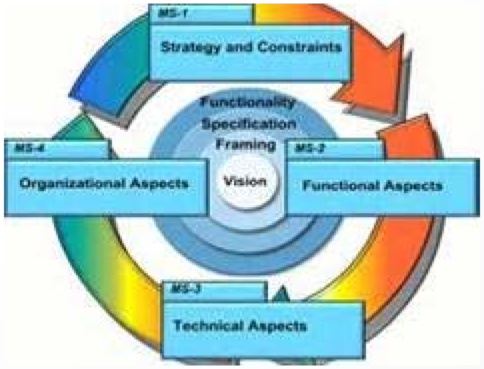
Overview – Inspired by NITSL

- Since the beginning of SW development, the development process has been debated.
  - Waterfall?
  - Agile?
  - Hybrid?
  - Others?



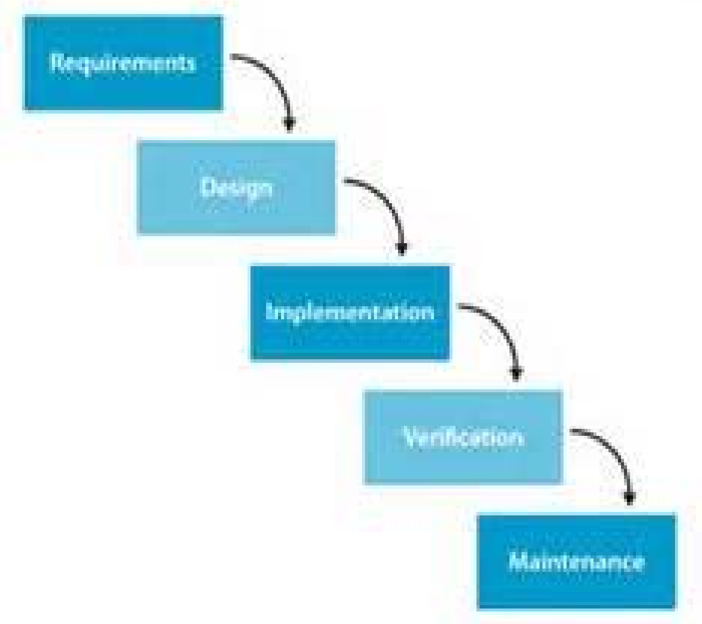




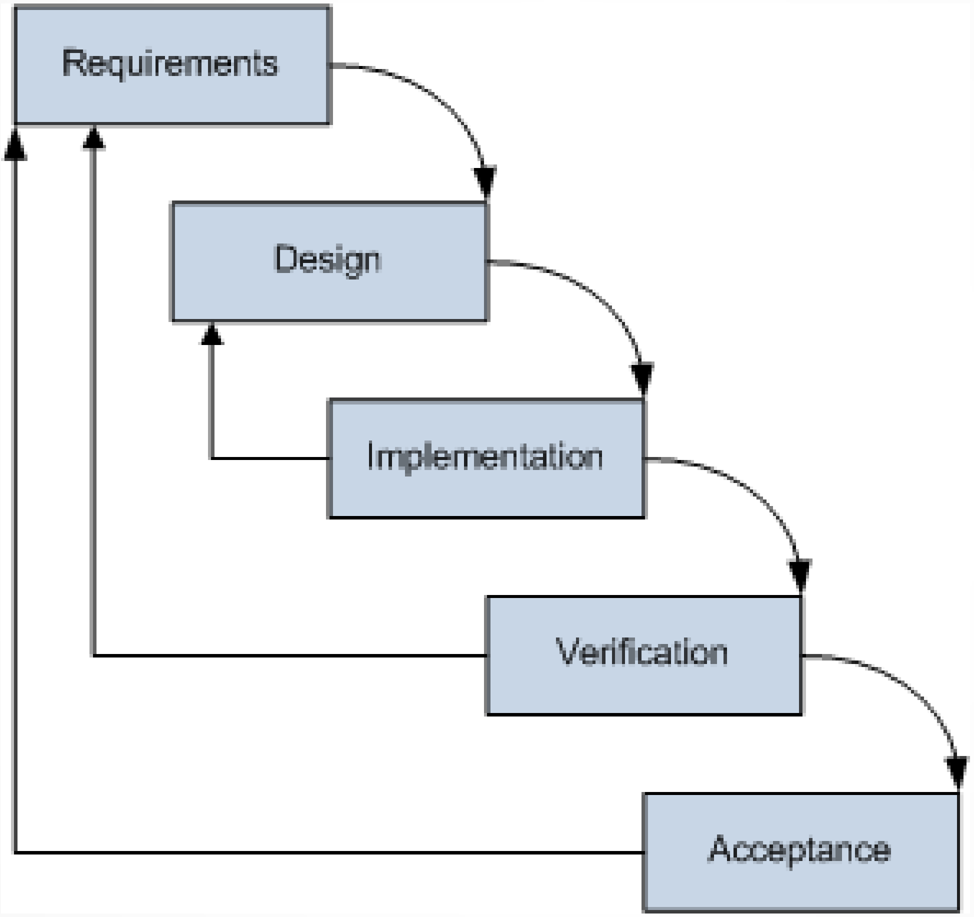


Waterfall?

- Waterfall
  - Based on hardware design practices
  - Structured
  - Easy to understand
  - Predictable?
  - Minimize “Rework”?
- Pros
  - Easy to understand
  - Structure
  - Rigid
  - Cost
- Cons
  - Structure
  - Rigid
  - Cost

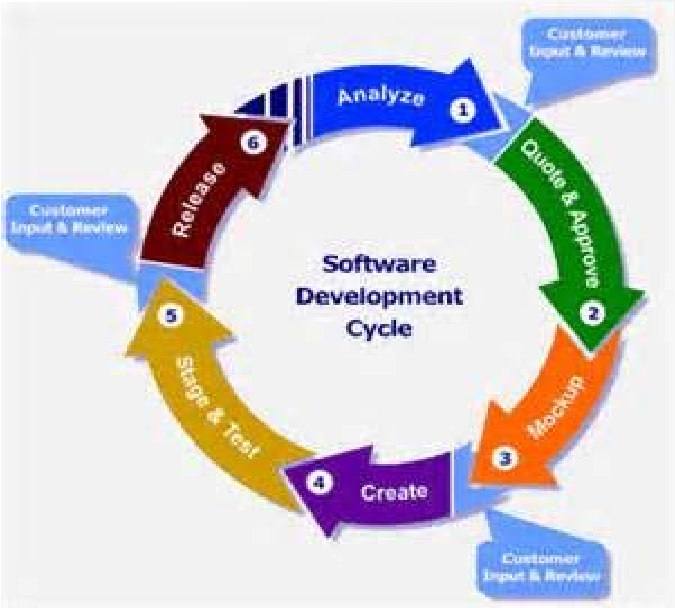


Actual Implementation



Agile – How “Agile” can we be?

- Proponents argue addresses unknowns faster
- More collaborative process
- Actually traces back to 1957
- Increased Customer Satisfaction
- Pros
  - Conceptually faster process
  - More customer involved
  - Iteration allows for continuous improvement
- Cons
  - Potential “endless loop”
  - Cost control
  - Concept of “rework”



Case Studies

NITSL

- Two utilities presented their experience with an Agile "experiment".
- Not sure either fully understood what they were doing.
- Mixed but generally positive results
  - One followed process more literally
    - Appears to be producing the desired product/quality
    - PM frustrated – "Done" seems to be undefined
  - One followed a bit more of a hybrid.
    - Had "90%" requirements definition
    - Incremental releases within implementation group
    - Determining how to address SQA

Scientech Process – Some History

- In the "early days" – Process? What Process?
  - Documentation afterthought
- Moving to the current era
  - Moving up on CMM scale
  - Lessons Learned
  - Increased rigor
  - Zero defect target
  - Cost control
- Solution
  - Strict adherence to Waterfall Model

How Is It Working?

The debate goes on….

- The Scientech Approach
  - Work upfront to get solid requirements (SRS) set in “stone”
  - Follow with highly detailed design (SDD)
    - Content and level of detail have varied over time.
  - Heavy customer involvement in requirements and design review process
- Concept:
  - Catch errors early at a point when cost is lower to correct.
- Practice:
  - Protracted review cycles costly from an internal perspective as well as customer perspective
  - Increased schedule time required to accommodate numerous review cycles
  - Significant errors and omissions still appear late in process

How Is It Working? Continued…

- The issue of the “unknown”
  - Process does not accommodate the unknown very well
  - Ambiguity or missing requirements discovered late
  - Especially true of complex systems/interfaces
  - Results can be significant redesign late in process
- “Customer” Issues
  - Sorry folks, but frankly you are not all that good at articulating requirements!
  - Tend to think in terms of “how” not “what”
  - Customer reviews tend to miss the same things internal reviews miss and focus on wrong content.
- Implementation Issues
  - What looks good on paper doesn’t always look so good in practice.
  - Stick with it anyway because it’s approved?

Revisiting The Concepts

i.e. lessons learned, continuous improvement

- Concept:
  - Heavily involving customer in requirements and design decreases risk and cost. Get customer buy-in.
  - Reality? Not so much. Even with fully approved documents, customers will be customers… You want what you want and we still end up “owning” most of the risk.
- Concept:
  - Not starting development reduces time and cost.
  - Reality!

Revisiting The Concepts

Process Improvement?

- Scientech Concept:
  - Internally, we have been contemplating reducing customer involvement in design and looking for increase focus in testing and verification.
  - Scientech ultimately responsible for design. Exception might be for something with significant unknown or risk.
- Cultural Changes:
  - Scientech staff needs to have a more “questioning” attitude when reviewing and accepting requirements.
  - Customer staff needs to focus more on requirements, especially on missing information and error conditions.

TMI - The perfect proving ground?

TMI Process

- TMI Provided SRS’s
  - Scientech, review, revise, accept
  - Scientech develop SDD –
    - Multiple internal reviewers.
    - Release for development.
    - Developer Revise in process
    - Pre-FAT review
  - Scientech Incremental releases
  - TMI Test Case Development
    - TMI providing some test cases.
    - Heavy involvement in FAT reviews

Hybrid Waterfall - Agile

- Start with solid (90% or better) requirements
- Produce solid, not necessarily final SDD. Assure all functional requirements are covered
- Developer will produce internal revisions and releases.
  - Internal Reviews as Necessary
  - Incremental releases to Customer
  - Formal review as precursor to FAT
- SRS is FAT input – SRS should be As-Built
- Future Risks/Concerns – Tendency to compress schedule and reduce interim quality checkpoints.