Validation Techniques

- What are goals of verification and validation?
- Checking quality
- Model analysis
- Prototyping
Prototyping lifecycle

• **Prototyping is used for:**
  • understanding the requirements for the user interface
  • examining feasibility of a proposed design approach
  • exploring system performance issues

• **Problems:**
  • users treat the prototype as the solution
  • a prototype is only a partial specification
Prototyping

“A software prototype is a partial implementation constructed primarily to enable customers, users, or developers to learn more about a problem or its solution.” [Davis 1990]

“Prototyping is the process of building a working model of the system” [Agresti 1986]

- **Approaches to prototyping**
  - **Presentation Prototypes**
    - explain, demonstrate and inform – then throw away
    - e.g. used for proof of concept; explaining design features; etc.
  - **Exploratory Prototypes**
    - used to determine problems, elicit needs, clarify goals, compare design options
    - informal, unstructured and thrown away.
  - **Breadboards or Experimental Prototypes**
    - explore technical feasibility; test suitability of a technology
    - Typically no user/customer involvement
  - **Evolutionary (e.g. “operational prototypes”, “pilot systems”):**
    - development seen as continuous process of adapting the system
    - “prototype” is an early deliverable, to be continually improved.
• **Throwaway Prototyping**
  - **Purpose**:
    - to learn more about the problem or its solution…
    - discard after desired knowledge is gained.
  - **Use**:
    - early or late
  - **Approach**:
    - horizontal - build only one layer (e.g. UI)
    - “quick and dirty”
  - **Advantages**:
    - Learning medium for better convergence
    - Early delivery → early testing → less cost
    - Successful even if it fails!
  - **Disadvantages**:
    - Wasted effort if reqts change rapidly
    - Often replaces proper documentation of the requirements
    - May set customers’ expectations too high
    - Can get developed into final product

• **Evolutionary Prototyping**
  - **Purpose**
    - to learn more about the problem or its solution…
    - …and reduce risk by building parts early
  - **Use**:
    - incremental; evolutionary
  - **Approach**:
    - vertical - partial impl. of all layers;
    - designed to be extended/adapted
  - **Advantages**:
    - Requirements not frozen
    - Return to last increment if error is found
    - Flexible(?)
  - **Disadvantages**:
    - Can end up with complex, unstructured system which is hard to maintain
    - early architectural choice may be poor
    - Optimal solutions not guaranteed
    - Lacks control and direction
Validation Techniques

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Build a prototype

Goal:
- Illustrate the major functionality of the system
- Check the feasibility and validity of the requirements

The prototype should support (a part of) the requirements specified in the requirements specification. Revise and complement the specification, if prototyping shows discrepancies

- Prototyping using
  - Pen, paper, post-its, markers, etc
  - Develop the mockups, show scenario what the specified system should do

- Prototyping using
  - proto.io
  - 15 days trial
Examples

- Paper mockups
  https://youtu.be/E1dNYHdA-bs
  https://youtu.be/ea069CQe-I4
  https://youtu.be/pUligNL4t_Y
  https://youtu.be/KqvY6B1HJEM

- Using prototype tools
  https://app.moqups.com/VxOuSI2HQ2/view/page/ad64222d5?ui=0
  https://youtu.be/Mz0dZ4s067U