ASSUMPTIONS IN DESIGN AND IN DESIGN RATIONALE

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Definition: An Assumption is…

- An assuming that something is true
- A fact or statement (as a proposition, axiom, postulate, or notion) taken for granted
- Something which is accepted in the absence of evidence to the contrary

Motivation

- Designers make both explicit and tacit assumptions
- Decisions can be based on assumptions
- Design reuse and modification can violate assumptions
- Violated assumptions cause failure

Motivation

- Help the designer avoid failures by making assumptions more visible
- Collect/infer and record assumptions
- Retrieve/infer and use assumptions to alert designer
- Use assumptions to evaluate design decision reliability
- At design, redesign, or reuse time

Causes

- Lack of knowledge
  - e.g., no knowledge of temperature of part, assume no thermal expansion of part
- Simplify problem & constrain design space
  - e.g., assume friction is negligible
  - e.g., assume right-handed user
- Standardize the problem
  - e.g., with “standard” NFRs
  - e.g., with Reqs from similar projects

Causes

- Make a general statement rather than a specific one
  - e.g., assume that differences are not significant
- Different tools inherit/encourage different assumptions
  - e.g., sketching vs. CAD vs. flowcharting
  - e.g., models with no mass, no friction

Causes

- Cultural pressure
  - e.g., design trends/fads, such as “streamlining”, bring assumptions about preferences
- The arrogance of experts
  - e.g., familiarity, old technology, and continued successful deployment, hide past assumptions

Causes

- Ambiguity in Requirements
  - e.g., assumptions about what the requirements mean
- Rules, norms and conventions
  - e.g., rules have applicability assumptions, so rule use adopts those assumptions

Causes

- Desire to break away from routineness
  - e.g., deliberately made, perhaps incorrect, assumptions might take the design into a different search space, leading to creative results
- Assumptions are the norm in everyday activity
  - e.g., life would be too complex if we didn't make them

Detection & Capture

- Sample detection methods
  - Noticing mismatches between actual and intended behaviours
  - Challenging assumptions by using “what if” questions
  - Inference using design rationale
- Sample capture methods
  - direct (explicit capture)
  - by inference (implicit capture)

DR for Decisions & Assumptions

- Explicit assumptions can be part of rationale for decision
  - e.g., select due to low cost & high strength, where low cost is assumed to be important
- Similarly for inferred tacit assumptions
- Assumptions themselves may have rationale
  - e.g., low cost is assumed, as it was important last time this was designed