On Models and Modelling

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user interfaces for everyone?

vision simulation from Arizona Center for the Blind and Visually Impaired, Inc: http://www.acbvi.org/albums/vision

current interests (1)

- large-scale information management in the AEC (Architecture, Engineering and Construction sector)
  - users: planners, architects, engineers, owners, facility managers, contractors, end-users (tenants, shoppers...)
    - full list not enumerated at this stage
    - will continue to evolve
  - problems of standard terminology across A, E and C and countries (ontologies?)
  - accessibility concerns add complexity
  - UIs and UI modelling are of direct concern
  - technologies (mobile and others) add another dimension

current interests (2)

- Green ICT
  - similar concerns as with the AEC sector problem
    - users – lay persons to policy makers (un-enumerated and evolving)
  - internationalisation (languages and culture) probably of greater influence on UI than in the AEC sector

- i need models (say it three times, with emphasis on each word)!

some background

- what are models? an idiosyncratic answer:
  - attempts to nail down vague ideas to build a bigger picture that can be tested for validity
- a few observations based on personal experience:
  - statistical modelling
  - mathematical modelling
  - OR modelling
  - simulation modelling
  - architectural
- some models not worth commenting upon here:
  - economic and econometric
  - religious
  - science fiction (Dune, Foundation trilogy, Space Odyssey?)

characteristics of models

- statistical modelling
  - empirical, data-based, rigorous basis in theory
  - developed as descriptive then used as predictive
  - design of experiments for rigorous modelling
  - both data-based and predictive/hypothesis testing models have been abused in practice, examples: MLR, ANOVA, …
- OR modelling
  - mathematical, probabilistic, based on data and observations, use **sensitivity analyses**
- simulation modelling
  - repetitions
  - conscious, theory-based attempts to remove bias (antithetical sampling)

to be realistic:

models and modelling in these areas also have not had smooth sailing

examples?

- integer programming for everything!
- new problems re-formulated in old models
- multiple linear regression and hypothesis testing in inappropriate ways
- simulation models based on insufficient validation

underlying characteristics of models

- *measurements*
- *verification and validation*

objective

- *to build a bigger, realistic picture that can be tested for validity*

how do software models, including UI models. fare on these points?

verification?

the proof of a programme is:

- *it executes successfully on the computer*

and

- *gives the expected answers to the (often artificial) test data*

validation?

the proof of UI is:

- *it works in the expected way if the user follows the instructions correctly*

- *(we are not responsible if the user does something unexpected or an unforeseen event takes place)*

users make mistakes

unforeseen events happen

…

can we model these?

a bit more on modelling

- a brief anecdote of a 1993 survey
  - methodologies mainly used for documentation after the event
  - mainly e-r diagrams
  - pre-OO, pre-UML
- teaching
  - students in mathematics, statistics, OR, Simulation (even economics) who understand the importance of models as the starting point; not so computing students
  - UML is still not well-understood; anecdotal evidence suggests that it's more popular in academia than in industry
  - MVC is now more widely promoted but needs to be illustrated properly and exhaustively with appropriate models

from Jean-Loup's presentation yesterday

- for the end-user GUI is the application
- an iceberg with V above the sea level, CM below it

- similar to my students' reaction to MVC

an insight?

- agile/iterative

- (VCM)(VCM)(VCM)...
- =
- (VC)(MVC)(MVC)(M...

- is it time to reconsider MVC?

utility of standards

- obvious in this forum
- from the teaching perspective:
  - Web standards help students both to understand their purpose and to use them as checklists
    - XHTML, CSS are seen as simple whereas WAI and accessibility on the whole are treated as important to a class of users
  - questions
    - can we create guidelines for choosing appropriate models and modelling techniques?
    - how are the myriad models, available in literature, tested? (the expressions of interest for this Workshop list about 10 models or variations thereof)
    - how can the models be made rigorous? surveys? focus groups? questionnaires? click-streams?...

summary

- modelling is difficult but essential
- measurements are lacking
- testing strategies take care of verification of the code but are they enough overall?
- validation must become a primary concern
  - walkthroughs are not good enough, merely verbal validation!
- standards will help in teaching
- vision simulation is just one example of how complex UI modelling will be – this is more like a start

two (temporary) conclusions

i need models

we need standards