User Interface Design
& Development

Lecture 2
User Models

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previously
usability lifecycle aka process

- pre-design
  - model the user, context & tasks
- design
  - participatory design: paratypes, prototypes, Wizard of Oz
  - analysis of current practice and competition
  - coordinated design & guidelines
- evaluation
  - functional testing
  - empirical studies: lab, in situ, in the wild
- revise design for future releases

evaluation

today: pre-design
model user, context & tasks

outside-in design in a nutshell:

- know the user
- know the tasks
- design the interface

Acknowledgment
some of the material presented in this course is adapted from previous offerings of the same by Jeff Offutt

know the user
what to know about users?

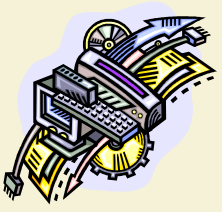
- work experience
- computer experience
- age
- sex
- education
- reading skills
- language skills
- visual acuity
- dexterity...

which ones matter?
depends on the problem you're trying to capture

different perspectives give rise to different models

- mental
  - users' perception

- representation/manifestation
  - how the UI designer represents the implementation to the user



- implementation
  - how a machine, virtual or otherwise, is actually built

three models example: driving a car

- mental
  - push the gas pedal, the car goes faster
  - turn the wheel, the car turns

- representation/manifestation
  - steering wheel, speed selector
  - pedals for gas and breaks, speedometer…
- implementation
  - more gas -> stronger explosions -> more RPMs
  - transmission transforms RPMs into tire spins at variable rates and in different directions
  - steering wheel activates hydraulic servo-system that controls angle of tires

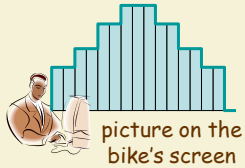
problem
bridging implementation to user models

- specialists trained on developing implementations
  - e.g. computer scientists, software engineers
- often have trouble coming up with a representation model that users can get their head around

example
bridging implementation to user models

- mental
  - push uphill
  - coast downhill

- representation/manifestation
  - height of the bar represents effort



- implementation
  - stationary bicycle at the gym

inside-out design

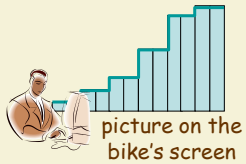
example
bridging implementation to user models

- what representation
  would map the designer's intent
  to the user's understanding?

intended workout

outside-in design

- representation/manifestation
  - most users are familiar with hills
  - phys ed specialists are familiar with effort charts



picture on the bike's screen

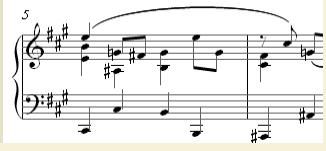
more generally:
how to capture meaning?

form vs. meaning
aka syntactic vs. semantic knowledge

- representations
  - words
  - sentences
  - symbols (icons)

thank you
gracias
xie xie
cám ón

- combination & sequences



- things that exist
  - objects
  - people
- things that may happen
  - actions
  - causes and effects
- abstract concepts
  - responsibilities
  - goals
  - tasks

form vs. meaning

aka syntactic vs. semantic knowledge

- representations
  - words
  - sentences
  - symbols (icons)
- combination & sequences
- various dialects
- dependent on device, OS, app…
- rote memorization
- easily forgotten

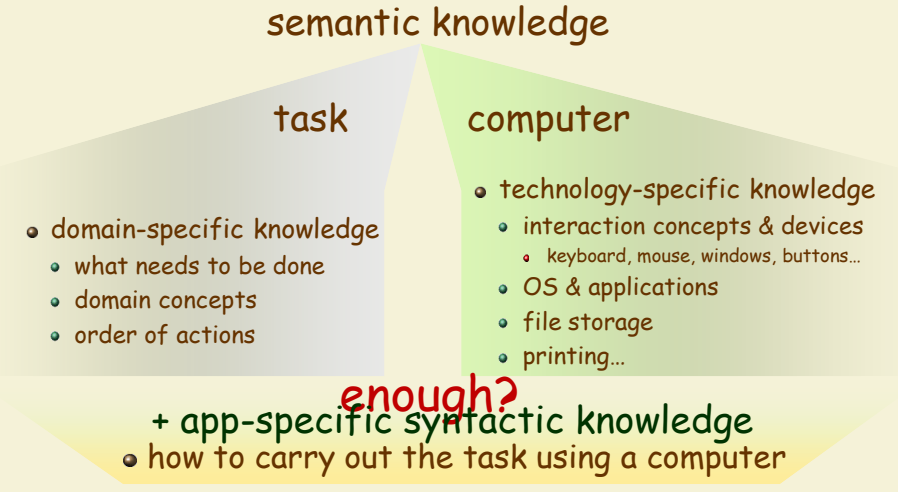
- things that exist
  - objects
  - people
- things that may happen
  - actions
  - causes and effects
- abstract concepts
  - responsibilities
  - goals
  - tasks
- computer-supported tasks

form vs. meaning
examples of syntax

- find files
  - find . –name "*.ppt"
  - Start – Find – Files or Folders
  - …
- search within files
  - grep "b.b" filename
  - open - focus - Ctrl-F – focus – "bob" - Enter
  - …

how do you call this?
- regular expression?
- wild card?

form vs. meaning
more than one aspect/layer



traditional assessment of users
is simplistic but a good starting point

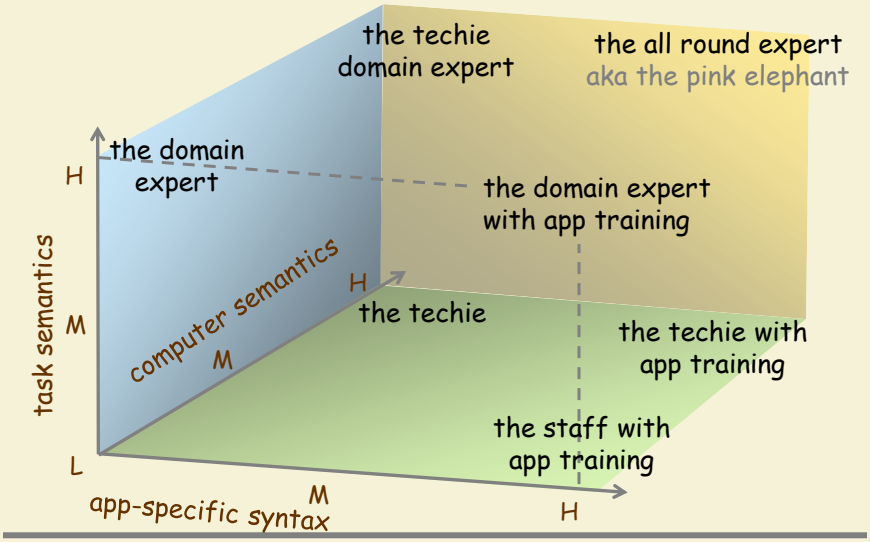
	UI strategies

• novice users
  • little or no knowledge
• first-time users
  • some knowledge of semantics
  • no knowledge of syntax
	few and simple features
	lots of feedback and confirmation
	careful defaults
	tutorials

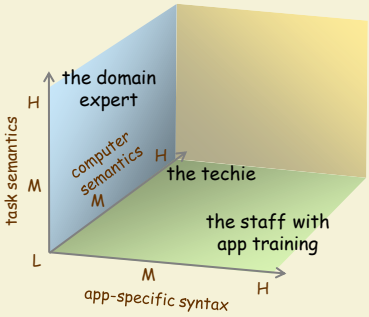
• knowledgeable intermittent users
  • difficulty retaining syntax
  • good retention of semantic
	help remembering
	easy to recognize, consistent
	on-line help with search

• frequent users/experts • familiar with syntax and semantics	shortcuts customization little or no feedback (distracting)

traditional assessment does a poor job at distinguishing different kinds of experts



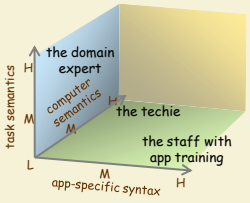
different competencies need different UI strategies

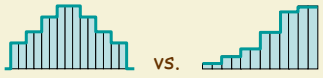


- the techie
  - help with domain concepts
  - some app-specific help
    - not how to do a search
    - not how to get focus on field
- the domain expert
  - help with computer concepts
    - how to print
    - how to import data…
  - detailed app-specific help
- the staff…

understand users
model personas

- a persona is not a real person – it's a model
- a persona captures
  - skills & demographic profiles
  - how users perceive & behave
  - goals, motivations, responsibilities





persona models
inform evaluation and design decisions

- which characteristics to model depends on the specific problem
  - user & stakeholder goals
  - demographics: vocabulary, interpretation of symbol/signs
  - pref. on graphical representation
    e.g., map vs. list vs. augmented reality
  - disabilities, sight, color-blindness
    see http://www.section508.gov/
  - voice: native speaker vs. foreigner
  - left-handed, right-handed

understand all relevant roles

- primary users
  - each interface typically targets one primary persona and maybe one or a few more secondary personas
  - the primary target persona shapes most design decisions
- served personae
  - don't use the UI, but benefit/are hurt by it
    e.g., nurse uses system while treating *patient*
- negative personae
  - clarify who each interface will not cater for
    e.g., hospital director

discussion

- suppose a construction company asks your team to design a UI for controlling the features of its new line of high-end homes
  - e.g., remotely inquire and control the burglars alarm, status of lights and major appliances, such as the kitchen range, heating, etc.
- a team member proposes the following model of personas:
  - *primary homeowner* – an individual who lives in the apartment and has complete control over all features of the system.
  - *secondary homeowner* – same as primary homeowner, but not be allowed to control the burglars alarm.
  - *emergency monitor* –a third party individual who has access to monitor the status, but not to control the features of the home. Examples of this include home security company, fire department, and police department.
- is this a model of users that bears relevance for UI design? or is it a model of something else?

know the user
what to know about users?

- work experience
- computer experience
- age
- education
- reading skills
- language skills
- work environment
- task frequency
- ...

once you decide which skills & demographics are needed, how do you go about assessing them?

assessment
judging or measuring a quality
of someone or something

- is she a good teacher?
- is he a good student?
- how tall is she?
- how familiar is he with Unix?
  ≠ is he familiar with Unix?
- how experienced is the nurse?
  how many years? what specialties? what procedures?
- ...

assertions
statements that can be true or false
validity is observable

- is she a good teacher?
  her exams reflect and cover all the material
- is he a good student?
  he always reads the material before class
- how tall is she?
  she is 5'10"
- how familiar is he with Unix?
  he is familiar with basic file manipulation
- how experienced is the nurse?
  she has 9 years experience in obstetrics
- ...

result of an assessment
may be a truth value

- is she a good teacher?
- is he a good student?
- how tall is she?
- how familiar is he with Ur
- how experienced is the nu
- ...

yes / no

an assessment
is well grounded
if there exist
adequate
supporting assertions

result of an assessment may be a quantity

- is she a good teacher?
- is he a good student?
- how tall is she?

she is 5'10"

- how familiar is he with Unix?
- how experienced is the nurse?
- ...

result of an assessment may be a qualitative scale

- is she a good teacher?
- is he a good student?
- how tall is she?
- how familiar is he with Unix?

novice

- how experienced is the nurse?

expert in obstetrics

- ...

an assessment is well grounded if there exist adequate supporting assertions

qualitative assessment is guided by standards

example

1. beginner
   little knowledge or skills
2. novice
   understands rules or process
3. competent
   usually does what is expected
4. proficient
   sets a standard for others

5.a master
   superior performance at a level that most could never reach, helps others rise to new heights of excellence

5.b virtuoso
   groundbreaking achievement, widely admired and inspirational

the community sets the standards for the set of assertions that supports each assessment level

may vary between different communities

qualitative assessment is guided by standards

another example

1. A
   superior demonstration of knowledge
2. A-
   solid demonstration of knowledge
3. B+
   understands most material, no serious problems
4. B
   understands most material, some problems
5. C
   significant lapses in knowledge, mostly adequate
6. F
   inadequate, most material not learned

the community sets the standards for the set of assertions that supports each assessment level

may vary between different communities

in general assessments are used to prepare for action

- offering/accepting a job
- making a recommendation
- taking a class
- working on a project
- voting for a candidate
- buying a car
- ...

in summary what to know about users?

- work experience
- computer experience
- age...

now reformulated as

- what to assess about users?
  in precise terms

what to assess is informed by

- what does the user need to know?
  to perform the tasks using the software

user personas
more than demographics & expertise

what's relevant for the tasks

- knowledge
  - task semantics, computer semantics, app syntax
- goals
  - priorities, commitment, attention, responsibilities
- skills & perceptions
  - short & long-term memory,
    graphical interpretation,
    language speaking/understanding,
    visual impairment,
    dexterity…

prj 2: model personas, tasks & context guidelines

- tasks & context for *your* project
  - model a few representative tasks
  - include measurements and success criteria
    concrete usability metrics for each task
- user personas
  - think of important knowledge & skills
  - assess those with your user base: Feb 20, Mar 19
- write-up
  - polish your models after user assessment
  - turn in by Feb 25