User Interface Design
& Development

Lecture 3
Task Models

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previously
outside-in design

in a nutshell:

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

last class
what to know about users?

- work experience
- computer experience
- language skills...

- captured in user **personas**

interface

task

task

task

task

what to capture is informed by
- **what does the user need to do & know?**
  to perform the **tasks** using the software

different **personas**
may perform diff tasks

job title	frequency of task per job title				
	query by patient	update data	query across patients	add relations	evaluate system
nurse	14%	11%			
physician	6%	4%			
records staff	7%	4%	4%	1%	
programmer			2%	2%	5%

excerpt from Shneiderman et al., *Designing the User Interface*

or may perform tasks differently

today
how to model tasks

outside-in design in a nutshell:

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

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why model tasks?
an actual email exchange with Yahoo!

- **Question : How can I print a receipt?**

- Answer: Thank you for writing to Yahoo! Travel concerning your receipt request. We are committed to provide quick and efficient service and will be glad to assist you.

  Additionally, you may also choose to print your receipt online. Please follow the instructions provided below:

  - Retrieve your reservation online
  - Click on the link 'Email a friend'
  - A different page will be displayed which will have a radio button 'View/ Print Receipt'
  - Click on this button and print your receipt for this reservation.

  We appreciate your association with us and look forward to being of assistance to you in the future.
  Yahoo! Travel/Travelocity Customer Support

model tasks
crucial part of outside-in design

- **pre-design** effort that enables
  later organizing the design to match
  - user needs
  - user expectations

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pre-design
model tasks semantically

- specify each task using only domain concepts
  - e.g. search string within a file/web page content
    - request a search
    - indicate string (to search)
    - indicate file/web page (to search on)

during design
translate each task into UI-specific syntax

- pre-design: semantic model of tasks
  - e.g. search string within a file/web page content
    - request a search
    - indicate string (to search)
    - indicate file/web page (to search on)

- design: concrete interactions
  - alternative syntaxes
    - open file - focus - Ctrl-F – focus on dialog – "bob" – Enter
    - open file – focus – menu Edit.find – focus...
    - command line: grep [string] [filename]

note: concepts appear in different order

red flag: a concept appears in the syntactic spec that did not appear on the semantic...

scenarios of use
help identify tasks

- Fred is driving home from work and asks his car to contact his smart home. Fred inquires about the indoors temperature and decides to turn on the heating to warm up the house. In the mean time, Maggie calls from the supermarket and they agree to eat dinner in. Fred asks the house to start preheating the oven in 10 minutes, to speed up dinner preparation once they get home.

identify each task/interaction

scenarios of use
help identify tasks

identify each task/interaction

- Barney is at home playing with his 3-year old and remembers he needs to pay the electric bill. He walks up to the computer in the kitchen and gets to the provider's site. He asks to review the latest bill and then moves to pay it. When entering the form of payment, Barney gets a phone call and walks away from the computer for a minute. Upon getting back he realizes his child has been busy with the keyboard. Barney quickly recovers the correct payment data and submits the request.

what to model about each task?

- functional requirement

task	
initiate	user/system event/periodic...
inputs	all inputs into system
outputs	all outputs of system

- e.g., in Fred's scenario

task: turn on the heating	
initiate	*user*
inputs	• *what: turn on heating* • *when: now, in x minutes* • *goal temp*
outputs	*confirmation message*

what to model about each task?
some tasks are composite

- decomposition

```
                           ┌──────────────┐
                           │ 0. find info │
                           │   on site    │
                           └──────────────┘
                                  │ do 1 then 2
                 ┌────────────────┴──────────────┐
          ┌──────────────┐                 ┌──────────────┐
          │  1.  find    │                 │  2.  read    │
          │  right page  │                 │    page      │
          └──────────────┘                 └──────────────┘
                  │ do 1.1 or 1.2
         ┌────────┴─────────┐
   ┌──────────────┐   ┌──────────────┐
   │ 1.1.  look for│   │ 1.2. website │
   │  direct link │   │   search     │
   └──────────────┘   └──────────────┘
          │ do 1.1.1 or 1.1.2, then 1.1.3   ...
   ┌──────┼──────────────────┐
┌──────────────┐ ┌──────────────┐ ┌──────────────┐
│ 1.1.1.  visual│ │ 1.1.2.  find │ │ 1.1.3.  click│
│ scan of page │ │ within page  │ │    link      │
└──────────────┘ └──────────────┘ └──────────────┘
```
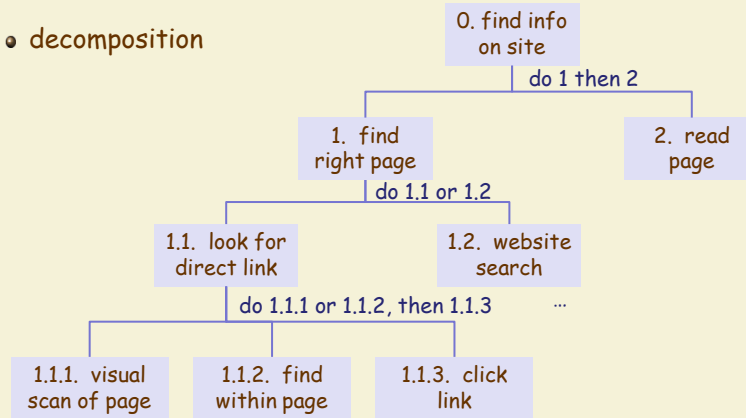
- also, *pay bill* in Barney's scenario includes *enter form of payment*

lots of examples on Dix+ Ch 15

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for each task model:

- functional requirement
  - who initiates / inputs / outputs
- decomposition

but: is it enough for the tough design decisions?
how will it help you decide among design alternatives?

not all tasks are equal
kinds of tasks

- react to visual and other sensory stimuli
  aka visceral
  - e.g., driving a car, playing an action game
- manage simple, everyday behaviors
  aka behavioral
  - e.g., setting cruise-control, browsing favorite music
- conscious consideration, evaluation of experiences
  aka reflective
  - e.g., planning a route considering traffic, buying a car online

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what to model about each task?
kind of task and context

- react to visual and other sensory stimuli
  aka visceral

- manage simple, everyday
  aka behavioral

- conscious consideration,
  aka reflective

- in what setting will product be used?
- will it be used for extended periods?
- will the user be interrupted frequently?
- are there multiple collaborating users?
- are there other simultaneous activities?
- what are the priorities of the user?

scenarios of use
help classify and situate tasks

- Fred is driving home from work and asks his car to contact his smart home. Fred inquires about the indoors temperature and decides to turn on the heating to warm up the house. In the mean time, Maggie calls from the supermarket and they agree to eat dinner in. Fred asks the house to start preheating the oven in 10 minutes, to speed up dinner preparation once they get home.

personas: role, skills, perceptions, expectations...

define context: situation, concurrent tasks, interruptions...

identify each task/interaction

detail the task model
context, personas, success criteria

for each task	
context	situation, concurrent tasks, interruptions...
personae	who is primary, served, negative...
initiate	user/system event/periodic...
inputs	all inputs into system
outputs	all outputs of system
decomposition	if applicable
success criteria	• user speed of performance (to provide inputs) • user error rates, speed to fix them • user time to locate and understand system outputs • ...other criteria as relevant for the specific task

detail the task model
example

task: inquire indoors temperature	
context	• keep an eye on the road and driving the car
personae	primary: Fred
initiate	user
inputs	• inquire (as opposed to set) • temperature (or humidity or…) • where: home indoors (or home outdoors or office or…)
outputs	• temperature in F
success criteria	• 5s or less to make the request • if user error, ok to repeat the interaction once • 3s or less than to locate and understand output

this kind of model will later help making design decisions, starting with identifying candidate dialogue styles

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dialogues aka interactions
traditional styles

• a dialogue asks the system to do something, or changes its internal state

• different styles:
  • menu selection
  • command language
  • natural language
  • form fill
  • direct manipulation

more in upcoming lecture

the story so far
how to go about modeling tasks

for each task:
- look at alternative support
  - competing apps
  - what do users do today: empirical (ethnographic) study

- describe scenarios

- model task *semantics* and *context*

- set success criteria
  categories: learn, retention, speed, errors
  - measure what current/competing apps do
  - set ideal and minimum acceptable

what else?

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which tasks to optimize in your design
depends on task frequencies

	tasks				
	task 1	task 2	task 3	task 4	task 5
frequency	11%	3%	24%	2%	0.05%

- real world: budget for quality is limited
- which tasks do you spend the most designing for?
  - most frequent
  - safety/business critical

knowing what to optimize is crucial
for delivering a quality product
on budget and on time

what else?

model task frequencies
for each persona

users	frequency of task for each persona				
	task 1	task 2	task 3	task 4	task 5
persona 1	6%	1%	21%	2%	0%
persona 2	5%	2%	3%	0%	0.05%

- how to optimize?
  split frequencies by personae and consider also:
  - proportion of users in each persona
  - importance of personae roles
  - importance of each task to the goals of each persona

optimized design
diff design for diff personas

users	frequency of task for each persona				
	task 1	task 2	task 3	task 4	task 5
persona 1	6%	1%	21%	2%	0%
persona 2	5%	2%	3%	0%	0.05%

- example
  optimize productive vs. overhead tasks
  - persona 1: high domain knowledge, low attention to syntax; context: works standing up, moves around with busy hands
  - persona 2: mix of domain and computer knowledge, prefers expressive power and speed; context: works at desk
  - task 1: considered overhead for persona 1, whose job description focuses on task 3; focus of attention for persona 2, who deals with complex cases

remember: everybody is a lot of people to design for

in summary
model user, context & tasks

pre-design

- model user personas

- scenarios of use

- task models
  - functional requirement, decomposition
  - context: setting & concurrent activities, interruptions…
  - success criteria: learn, retention, speed, errors
  - frequencies for each persona

- leave for participatory design
  - identify candidate dialogue styles for each task x persona
  - dialogues – realization of tasks over a concrete syntax