analyzing needs and impacts: levels of analysis

analysing users and their tasks

*what sorts of things would you be trying to find out?*
developing a set of user profiles

◆ help qualify and explain usability specifications used to manage testing process later on
  – don’t assume others in process will “know” about users
◆ typical data you would seek to characterize:
  ✔ organizational roles, responsibilities
  ✔ educational level, perhaps gender if an issue
  ✔ general computer literacy, technology expertise, especially with related hardware or software
  ✔ typical usage platforms (hardware, software)
  ✔ relevant special skills (e.g., driving, typing, drawing ...)

designing a user survey

◆ introduction—motivation, definitions
◆ background information
  – e.g., age group, socio-economic status, education (BUT only ask for data relevant to your problem domain)
◆ followed by questions focused on problem area
  – EX: reactions to related systems; frequency estimates of critical tasks; value of sample tasks or technology
  – generally trying to get ratings, numerical estimates
◆ finish with open-ended questions, comments
  – perhaps later quantified through “content analysis”
analyzing task structures
—can be constructed in either/both intrinsic or pay-off mode—

- typically use some form of hierarchical analysis
  - simple decomposition of tasks into subtasks, perhaps annotated by “plans” which provide procedural logic
- iterative: What do we do to do X? Then what do we do to do each of those things, etc.
  - examine for completeness, inconsistencies, complexity, likely sources of error
- key issues: scoping of task; stopping rule for the decomposition process
  - depend entirely on the purpose of the analysis
detailed task analysis: UAN

- language for representing user actions (i.e., for the behavioral rather than constructional domain) and system reactions
  - goals: concise, precise, expressive, extensible, practical
  - specialized symbols (many borrowed from vocabulary of regular expressions) combine with actions/objects
- user action — UI feedback — UI state — system state
  - some or all analyzed, could extend to others (e.g., system actions)
- major concern is with abstraction and locality of definition
  - representing what user does, not details of how
  - analyze at varying levels depending on purpose
- temporal relationships used to organize subtasks or related tasks into larger composites
  - sequence, iteration, optionality, repeating choice, order independence, interruptibility, interleavability, concurrency, waiting

examples of using the UAN

<table>
<thead>
<tr>
<th>TASK: double-space a paragraph</th>
</tr>
</thead>
<tbody>
<tr>
<td>(click-and-drag select</td>
</tr>
<tr>
<td>open Paragraph dialog box</td>
</tr>
<tr>
<td>select Double Line Spacing</td>
</tr>
<tr>
<td>close Paragraph dialog box</td>
</tr>
</tbody>
</table>

- starting point is to break down into subtasks, don’t worry about articulatory level here, then choose subtasks for more detailed analysis
- note choice symbol in selection, rest is sequential
### examples of UAN notation

**TASK:** select Double Line Spacing

<table>
<thead>
<tr>
<th>User Actions</th>
<th>UI Feedback</th>
<th>UI State</th>
<th>System State</th>
</tr>
</thead>
<tbody>
<tr>
<td>dialogBox' open : ~[menu button'] Mv</td>
<td>display (menu list) choice !</td>
<td>selected = choice</td>
<td>paragraph' currently set to choice</td>
</tr>
<tr>
<td>~[menu choice] *</td>
<td>menu choice ! &gt; ~</td>
<td>selected = choice</td>
<td></td>
</tr>
<tr>
<td>~[menu choice']</td>
<td>menu choice' !</td>
<td>selected = choice'</td>
<td></td>
</tr>
<tr>
<td>M^</td>
<td>redisplay (menu button')</td>
<td>selected = (indent field')</td>
<td></td>
</tr>
<tr>
<td>~[confirm button]Mv^</td>
<td>close (dialogBox')</td>
<td>paragraph' re-set to choice'</td>
<td></td>
</tr>
</tbody>
</table>

- entire subtask conditional on dialog box already open
- option highlighting repeats, note use of prime for final choice
- system update only happens at commit (box close)

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### when to use UAN (or similar)?
analyzing the user’s mental experience
—some common concepts used in discussing users’ cognition—

goal: what the user wants to accomplish
plan: the method used to realize the goal
representation: a piece of stored user knowledge
actions: the concrete operations carried out, including mental acts
perception: internal representations (encoded) of information coming in over sensory channels
inference: assigning causes or making predictions about things that have been experienced

Note: many or all of these may transpire unconsciously

Norman’s Theory of Action
for the case of double-spacing a paragraph
—what is going on at each phase?—

GOAL:
INTENTION:
PLAN:
EXECUTION:
  <something happens>
PERCEPTION:
INTERPRETATION:
EVALUATION:


for the case of double-spacing a paragraph
—what factors might influence usability?—

GOAL:
INTENTION:
PLAN:
EXECUTION:
  <something happens>
PERCEPTION:
INTERPRETATION:
EVALUATION:
first homework, due next Thursday (2/11)

- make up two episodes of user-system interaction
  - brief, similar to the example of double-spacing
  - include task context that motivates goal
- make up episodes that illustrate something interesting happening in one of Norman’s stages
  - one from Gulf of Execution, one for Evaluation
  - need not be a major problem, maybe not even conscious
  - be clear how user’s experience is related to system use
  - name or label the episodes appropriately

(basically making up what are often known in usability evaluation as critical incidents)