Understand your Users

- “Know thy user” — W. Hansen (1971)
- User profiling
  - Interviews, instrumented UIs
- Persona
  - Model of a representative member of one important class of system users
- Levels of knowledge/experience can be addressed by level-structured/layered approach
  - Levels of training/documentation
  - Levels of UI functionality
  - Levels of feedback
Levels of Training/Documentation

Google past (2006)

Simple search

Opportunistic suggestion to use advanced feature

Documentation of advanced feature

Levels of Training/Documentation

Google 2014

Search help and advanced search are in pull-down menu

Search help:
Several levels of indirection are needed to learn about “OR”

Advanced search:
Documentation of “OR”

Type OR between all the words you want: miniature OR standard
Levels of Training/Documentation

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Levels of UI Functionality

Selective enabling of operations
Levels of UI Functionality

Simple vs. advanced UI

Wizard vs. regular UI

Identify the Tasks

- “Common tasks should be easy. Uncommon tasks should be possible.” — ?

- Determine mapping to lexical level based on frequency of use:
  - Special keys
  - Modifier key combinations
  - Top-level menu item/icon
  - Menu navigation/form fill-in

What’s wrong with this approach?
Determine the Interaction Styles

- Direct manipulation
- Menu selection
- Form fill-in
- Command language

- “Natural” interaction
  - Speech
  - Touch, Gesture: 2D, 3D, multitouch,…
  - Body sensing

Golden Rules of UI Design: 1. Consistency

- Action language / grammar
- Terminology
- Look and feel
  - Layout
  - Color palette
  - Shapes, typography
  - Behavior during interaction
  - Confirmation of irreversible actions

- But, note need for exceptions
Golden Rules of UI Design:
1. Consistency

- Confirmation received when requesting the CU libraries to order a book for reserve, 2014

Golden Rules of UI Design:
2. Universal Usability

- Diversity, diversity, diversity
  - Experience, ability, technology,…
- E.g., support for shortcuts
  - Increase speed for frequent users/cmds
  - Accommodate/encourage increasing expertise
    - Abbreviations, key accelerators
    - Macro facilities
Golden Rules of UI Design:
2. Universal Usability

- Accessibility

Golden Rules of UI Design:
3. Feedback

- Minimize the “Gulf of Evaluation”
- Discrete ↔ Continuous Feedback
  - Highlighting selected object
  - Displaying object/cursor tracking finger/mouse
Golden Rules of UI Design:
4. Closure

- Group actions to provide frequent “milestones”
- Give sense of accomplishment when (part of) a task has been finished
- Minimize feeling of suspense

Golden Rules of UI Design:
5. Error Prevention/Handling

- Prevent errors
- Minimize consequences
Golden Rules of UI Design:
6. Easy Reversal of Actions

- Undo
  - One level
  - Multi-level
  - Across sessions

Golden Rules of UI Design:
7. Internal Locus of Control

- User in charge; system responds
Golden Rules of UI Design: 8. Reduce STM Load

- **Remember**
  - $\mu_{WM}$ (and even $\mu_{WM^*}$) are small
  - $\delta_{WM}$ is short

- **Minimize**
  - amount of information to remember
  - time information must be remembered

\[\begin{align*}
\mu_{WM} &= 3 \text{ chunks} \\
\mu_{WM^*} &= 7 \text{ chunks} \\
\delta_{WM} &= 7 \text{ sec} \\
\delta_{WM} (1 \text{ chunk}) &= 73 \text{ sec} \\
\delta_{WM} (3 \text{ chunks}) &= 7 \text{ sec}
\end{align*}\]
Golden Rules of UI Design:
8. Reduce STM Load

- Minimize
  - amount of information to remember
  - time information must be remembered
Golden Rules of UI Design:
8. Reduce STM Load

- Minimize
  - amount of information to remember
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Errors
- Matching pairs: [], {}, <TAG> </TAG>, ...
  - If possible to correct, why require?
- Editor support for language
  - Automated checks
  - Syntax-directed editors / Structure editors
  - Editor knows about / enforces language syntax
Errors

- Package complete sequences of actions
  - Minimize need for user to repeatedly issue the same set of commands
    - Predefined sequences ("wizards")
    - Facilities for defining/invoking sequences
      - Macros