Usability

Fritz Solms

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Usability Metrics

???
Usability Metrics

- **Learnability**
  - Average *effort & time* to use product effectively
    - No of help/manual accesses
    - No of assistance queries

- **Efficiency**
  - Average speed with which tasks who learnt system perform tasks.
  - No of user interactions required to complete task
    - can be used as initial assessment without any information about usage

- **Effectiveness**
  - Accuracy & completeness with which tasks performed

- **Reliability**
  - Error density
    - per task/time/user

- **Satisfaction**
  - Satisfaction surveys/ratings
  - Percentage of users/customers who
    - continue to use product
    - recommend product to others
Usability Requirements (1/2)

- Expected user profile
  - age groups
  - education-levels
  - computer literacy
  - location (language/customs)
  - medical
    - Application could target users requiring certain medical assistance
    - Could target blind/deaf/…

- Target devices
  - operating systems
  - screen sizes and resolutions
  - touch screen availability
  - available input channels
    - keyboard, mouse, touch-screen, microphone, …
  - output channels (LEDs, vibrations, speaker, …)
Usage environments
- outside/inside/light levels
- noise levels (factory, driving, social gatherings, ...)
- dust, humidity, ...

User activities during usage
- expected primary activity
  - using app
  - driving, jogging, ...
- expected secondary activities
Usability Assessment

- **Important:**
  - you really do not know (most of the time)
- Measure each usability metric
  - learnability
  - efficiency
  - effectiveness
  - reliability
  - satisfaction
- Can use
Usability Assessment

- **Important:**
  - you really do not know (most of the time)

- Measure each usability metric
  - learnability
  - efficiency
  - effectiveness
  - reliability
  - satisfaction

- Can use
  - Application analysis
  - Usability testing
  - User/usage tracking info analysis
  - Feedback analysis
  - Specialized tools
Usability assessment

Application analysis

Application Analysis

- Conformance to standards
  - general usability standards
    - adherence to recommended fonts, touch target sizes, . . .
  - for device or OS
    - Usability and application design guidelines
  - for application type/industry
    - Terms, icons, work-flows, colours, . . .
    - game looking like business app or vice versa

- Validate style and look & feel consistency
- Check that important elements stand out
- Check undo/redo and cancel functionality
- Validate navigation paths
- **Beware:** application analysis
  - Necessary, but not sufficient
  - Need also real users use the system
    - development team has very different perspective
Usability Testing

- Probability of making right decision increases drastically
  - even with little data
- ⇒ can be based on small user samples
  - but analyze carefully and interpret results
- Ask them to execute representative use cases
- Capture
  - Time taken for tasks
  - How long they require to use application
  - Number of questions raised
  - User feedback/improvement suggestions
Tracking Analysis

- User navigation tracking and analysis
  - Tracking
    - along tasks/workflows
    - navigation across screens
  - Can be done from logs
  - For mobile/ubiquitous apps
    - need to transfer logs to analysis server
- User event log
- Error log analysis
- Usage tracking
  - How often is the application used and for what?
Feedback Analysis

- Surveys
- Ratings
- Complaints
- Reviews
Eye Tracking Analysis

- Requires specialized equipment
  - usually infrared light reflected off retina
- What is measured?
  - Point user focuses on
  - Movement of eye relative to head
- Data interpreted using tools generating
  - Gaze fixation durations
    - cumulative time spent on specific points in UI
  - Saccade paths
    - quick eye movements between fixation pts
  - Heat maps
- Usually done on larger screens
  - for accuracy
    - larger eye movements
  - Mobile devices simulated on larger screen
Usability

Usability assessment

Accessibility testing

Accessibility Testing

- Test
  - without sound
  - without color
  - using high-contract-mode
  - using screen magnification
  - voice control only
  - voice I/O only (screen not visible)
Cross-Device Usability

- Test across devices with different
  - screen sizes
  - screen resolutions
  - operating systems
  - processing power
  - input/output channels
Usability in Mobile Computing

- Particularly critical
  - Users tend to discard mobile applications more quickly
- Non-trivial
  - users from very different background
  - technology literacy
Usability Challenges for Mobile Computing

- **Device heterogeneity**
  - Operating system and standards
  - Screen sizes
  - Memory/processing power
  - Sensors and networking support

- **Mobility related challenges**
  - unreliable networking
  - task interference
    - incoming calls, messages, …
    - luminescence variance
    - background audio variance
    - proximity to other people
    - …

- Users tend to come from much wider background variations
  - literacy, technology literacy, language, culture, age, …

- Customs/standards change (e.g. blue links)
Usability
Usability in mobile computing
Mobile application versus Mobile web site

## MobileApplication versus Mobile Web Site

<table>
<thead>
<tr>
<th>Mobile Application</th>
<th>Mobile Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher development cost</td>
<td>Lower development cost¹</td>
</tr>
<tr>
<td>Installation required</td>
<td>No installation required</td>
</tr>
<tr>
<td>Portability limited</td>
<td>Device/OS portability</td>
</tr>
<tr>
<td>Offline usage</td>
<td>No offline usage</td>
</tr>
<tr>
<td>Access to sensors/actuators</td>
<td>Limited (though can use Cordova)</td>
</tr>
<tr>
<td>Usability easy</td>
<td>Usability more difficult</td>
</tr>
<tr>
<td>Revenue sharing</td>
<td>No revenue sharing</td>
</tr>
<tr>
<td>Approval process</td>
<td>No approval process</td>
</tr>
<tr>
<td>More accessible from device</td>
<td>Less accessible</td>
</tr>
<tr>
<td>Upgrading &amp; multiple versions</td>
<td>All users use single version</td>
</tr>
<tr>
<td>Difficult to share</td>
<td>Easy to share</td>
</tr>
<tr>
<td>May get access to local info (contacts, location, . . .)</td>
<td>Limited access to local info</td>
</tr>
</tbody>
</table>

¹Maybe can just use std web app with responsive design.