Abstract

Use cases are frequently used in Software Engineering. Use cases support specification and facilitate design, analysis, verification and testing. Many designers, unfortunately, apply use cases in a rather limited way. This presentation provides recommendations for effective use cases.
Why Use Cases?

Supports or is part of specification
by providing specific data in user perspective

Facilitates analysis and design

Facilitates verification and testing
Example Time Shift recording

20:00  21:00  22:00  23:00

start movie  broadcast  end movie

view  record  play  view

phone rings  pause viewing  finish conversation  resume viewing
Construction limits intrude in User Experience

- number of tuners
- number of simultaneous streams (recording and playing)
- amount of available storage
- management strategy of storage space
What if?

20:00  21:00  22:00  23:00

- start movie
- broadcast
- end movie
- view
- talk
- record
- play
- phone rings
- pause viewing
- zaps

1. programmed recording of other station
2. very long phone call
3. Dad

view
play
view
play
finish conversation
resume viewing
Content of a Use Case

- **use case**
  - user or system
  - specified
  - functionality
  - behavior
  - interfaces
  - qualities (NFR's)

- **(sub)system or component**
  - input data
    - format
    - size
    - content
  - output data
    - format
    - size
    - content
  - context
  - interaction
**Example personal video recorder use case contents**

<table>
<thead>
<tr>
<th>typical use case(s)</th>
<th>worst case, exceptional, or change use case(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>interaction flow (functional aspects)</td>
<td>functional</td>
</tr>
<tr>
<td>select movie via directory</td>
<td>multiple inputs at the same time</td>
</tr>
<tr>
<td>start movie</td>
<td>extreme long movie</td>
</tr>
<tr>
<td>be able to pause or stop</td>
<td>directory behaviour in case of</td>
</tr>
<tr>
<td>be able to skip forward or backward</td>
<td>extreme many short movies</td>
</tr>
<tr>
<td>set recording quality</td>
<td>performance and other qualities (non-functional aspects)</td>
</tr>
<tr>
<td>response times for start / stop</td>
<td>response time with multiple inputs</td>
</tr>
<tr>
<td>response times for directory browsing</td>
<td>image quality with multiple inputs</td>
</tr>
<tr>
<td>end-of-movie behaviour</td>
<td>insufficient free space</td>
</tr>
<tr>
<td>relation recording quality and storage</td>
<td>response time with many directory entries</td>
</tr>
<tr>
<td>replay quality while HQ recording</td>
<td></td>
</tr>
</tbody>
</table>
Example of Quantification of Typical Use Case

3 examination rooms connected to 1 medical imaging workstation + printer

examination room: average 4 interleaved examinations / hour

image production: 20 1024² 8 bit images per examination

film production: 3 films of 4k*5k pixels each

high quality output (bi-cubic interpolation)
Timing of this Use Case

9:00  9:30  10:00

9:00
9:30
10:00

patient 1
patient 2
patient 3
patient 4

exam room 1
exam room 2
exam room 3

1 hour
Recommendations for working with use cases

+ combine related functions in one use case
- do not make a separate use case for every function
+ include non-functional requirements in the use cases

+ minimise the amount of required worst case and exceptional use cases
- excessive amounts of use cases propagate to excessive implementation efforts
+ reduce the amount of these use cases in steps
- a few well chosen worst case use cases simplifies the design