Module Functional View

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Abstract

This module addresses the Functional View.
The functional view

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Abstract
The purpose of the functional view is described. A number of methods or models is given to use in this view: (use) case descriptions, commercial decomposition function and feature specifications performance models and specifications, information models. The role of standards is discussed.
### 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 extreme many short movies</td>
</tr>
<tr>
<td>be able to skip forward or backward</td>
<td></td>
</tr>
<tr>
<td>set recording quality</td>
<td></td>
</tr>
<tr>
<td>performance and other qualities (non-functional aspects)</td>
<td>non-functional</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></td>
<td>replay quality while HQ recording</td>
</tr>
</tbody>
</table>
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
Logistic decompositions for a product

- Commercial decomposition
  - Saleable features

- Service decomposition
  - Replaceable items (such as consumables)

- Goods flow decomposition
  - Stockable items
  - Purchasable items
## Mapping technical functions on products

### technical functions

<table>
<thead>
<tr>
<th></th>
<th>home cinema system</th>
<th>flat screen cinema TV</th>
<th>bedroom TV</th>
</tr>
</thead>
<tbody>
<tr>
<td>HD display</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>SD-&gt;HD up conversion</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>HD-&gt;SD down conversion</td>
<td>+</td>
<td>+</td>
<td>0</td>
</tr>
<tr>
<td>HD storage</td>
<td>0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>SD storage</td>
<td>0</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>HD IQ improvement</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>SD IQ improvement</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>HD digital input</td>
<td>+</td>
<td>+</td>
<td>0</td>
</tr>
<tr>
<td>SD digital input</td>
<td>+</td>
<td>+</td>
<td>0</td>
</tr>
<tr>
<td>SD analog input</td>
<td>0</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>6 HQ channel audio</td>
<td>+</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>2 channel audio</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

### legend

- **+** present
- **0** optional
- **-** absent
The functional view

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Layering of information definitions

*human understanding and interpretation of the information*

**information model**, semantic defined in terms of:
- entities
- relations
- operations

**data model or data dictionary**
- identifiers
- types
- ranges
The functional view

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FVInformationModel
### Small part of a datamodel

<table>
<thead>
<tr>
<th>12 bit Image:</th>
</tr>
</thead>
<tbody>
<tr>
<td>nx: 16 bit unsigned integer</td>
</tr>
<tr>
<td>ny: 16 bit unsigned integer</td>
</tr>
<tr>
<td>pixels[nx][ny]: 16 bit unsigned integers [0..4095]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>16 bit Image:</th>
</tr>
</thead>
<tbody>
<tr>
<td>nx: 16 bit unsigned integer</td>
</tr>
<tr>
<td>ny: 16 bit unsigned integer</td>
</tr>
<tr>
<td>pixels[nx][ny]: 16 bit unsigned integers</td>
</tr>
</tbody>
</table>
Example of performance modelling

The functional view

required dose
field size
field map
alignment
procedure
internal parameters from realisation:
max v,a
laser power
laser frequency
transmission factor
alignment time

throughput model

user level
throughput
The role of standards

well defined standards and legislation

HL7
DICOM
HIPAA
EMC
FDA
VDE
ISO 9001

but many thousands of pages

business objectives
application intention?
realization consequences
conceptual assumptions

but many thousands of pages

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FVstandardsForces
Functional view summary

The functional view = What: externally observable

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FVoverview

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Exercise Functional View

- Make an overview of functions, performance figures, interfaces and optional features
- Identify "most important" (related to CA-views)
- Identify "most challenging" (related to CR-views)
- Explain why "most important" or "most challenging"
- Present in 5 minutes

Goals:

- Create awareness of the breadth of the specification
- Share the spec with the team
create a "living" image of the Functional view
Exercise Functional View, second iteration

- Define a typical case, both functions and quantitative
- Create a single page product specification
- Define a worst case, suitable for design exploration and verification