Module 32, Architectural Reasoning Customer Space Sampling

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Abstract

This module introduces Customer Space Sampling as part of the course Architectural Reasoning using Conceptual Modeling.

September 9, 2018
status: preliminary
draft
version: 1.1

Story How To

by *Gerrit Muller*   University of South-Eastern Norway-NISE

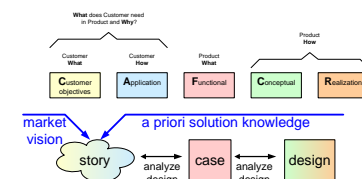e-mail: gaudisite@gmail.com

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Abstract

A story is an easily accessible story or narrative to make an application live. A good story is highly specific and articulated entirely in the problem domain: the native world of the users. An important function of a story is to enable specific (*quantified, relevant, explicit*) discussions.

September 9, 2018
status: concept
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From story to design

What does Customer need
in Product and **Why**?

Product
How

Customer **What**	Customer **How**	Product **What**	Product **How**	
Customer objectives	**A**pplication	**F**unctional	**C**onceptual	**R**ealization

market vision

a priori solution knowledge

story ⟷ analyze design ⟷ case ⟷ analyze design ⟷ design

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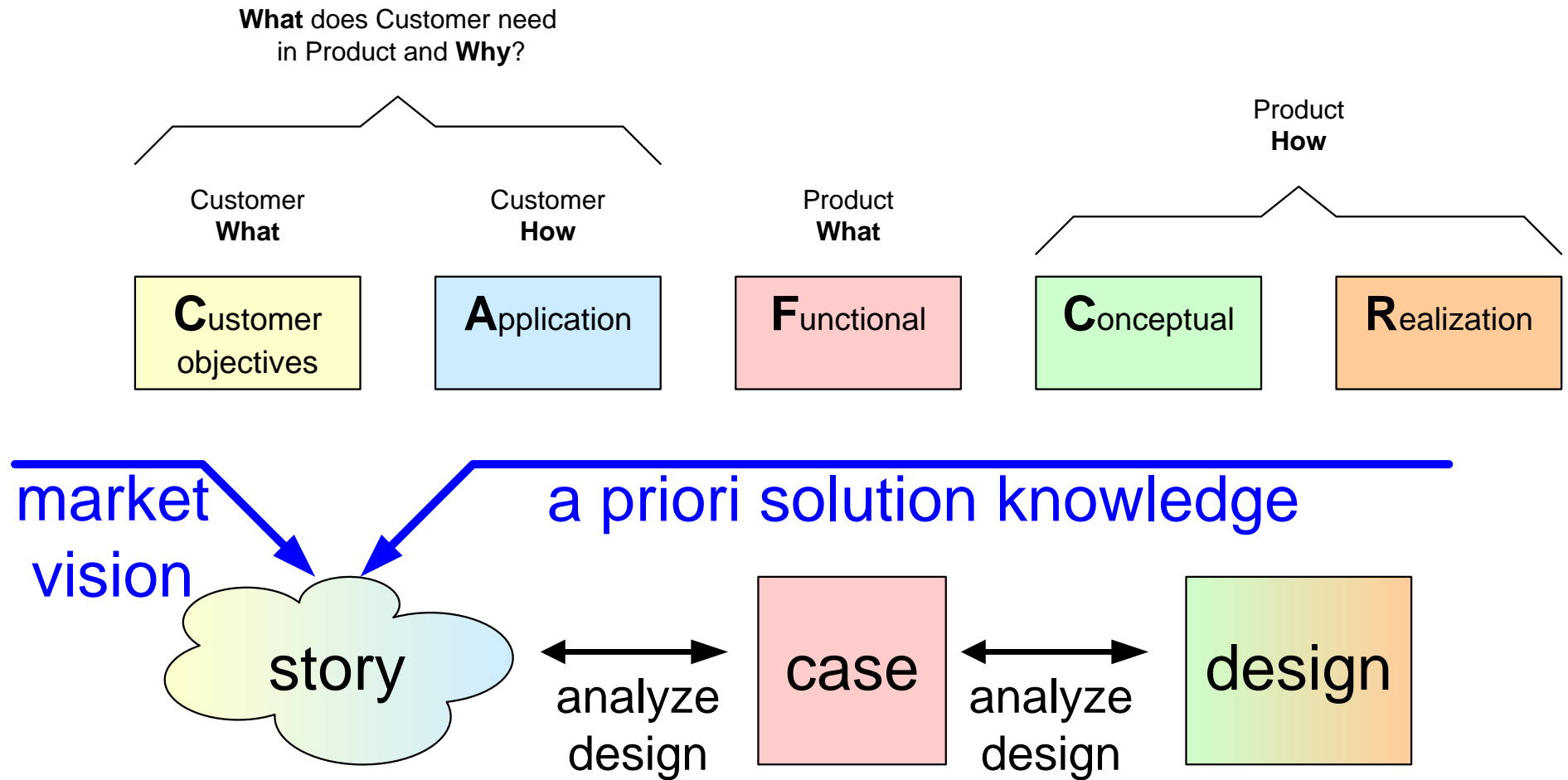
Example story layout

ca. half a page of plain English text

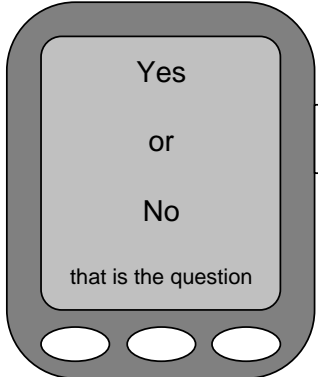**draft or sketch of some essential appliance**

A day in the life of Bob

bla blah bla, rabarber music bla bla composer bla bla qwwwety30 zeps.

nja nja njet njippie est quo vadis? Pjotr jaleski bla bla bla brree fgfg gsg hgrg

mjmm bas engel heeft een interressant excuus, lex stelt voor om vanavond door te werken.

In the middle of the night he is awake and decides to change the world forever.

The next hour the great event takes place:

Yes

or

No

that is the question

This brilliant invention will change the world foreverbecause it is so unique and valuable that nobody beliefs the feasibility. It is great and WOW at the same time, highly exciting.

Vtables are seen as the soltution for an indirection problem. The invention of Bob will obsolete all of this in one incredibke move, which will make him famous forever.

He opens his PDA, logs in and enters his provate secure unqiue non trivial password, followed by a thorough authentication. The PDA asks for the fingerprint of this little left toe and to pronounce the word shit. After passing this test Bob can continue.

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Points of attention

- purpose
  What do you need to know for specification and design?

- scope
  "umbrella" or specific event?

- viewpoint, stakeholders
  Define your stakeholder and viewpoint
  f.i. user, maintainer, installer

- visualization
  Sketches or cartoon
  Helps to share and communicate ideas

- size (max 1 A4)
  Can be read or told in few minutes

- recursive decomposition, refinement

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Criteria for a good story

Customer objectives	
Application	

- accessible, understandable

"Do you see it in front of you?"

Customer objectives	
Application	

- valuable, appealing

attractive, important
"Are customers queuing up for this?"

Conceptual	
Realization	

- critical, challenging

"What is difficult in the realization?"
"What do you learn w.r.t. the design?"

Application

- frequent, no exceptional niche

"Does it add significantly to the bottom line?"

Application	
Functional	

- specific

names, ages, amounts, durations, titles, ...

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Example of a story

Betty is a 70-year-old woman who lives in Eindhoven. Three years ago her husband passed away and since then she lives in a home for the elderly. Her 2 children, Angela and Robert, come and visit her every weekend, often with Betty's grandchildren Ashley and Christopher. As so many women of her age, Betty is reluctant to touch anything that has a technical appearance. She knows how to operate her television, but a VCR or even a DVD player is way to complex.

When Betty turned 60, she stopped working in a sewing studio. Her work in this noisy environment made her hard-of-hearing with a hearing-loss of 70dB around 2kHz. The rest of the frequency spectrum shows a loss of about 45dB. This is why she had problems understanding her grandchildren and why her children urged her to apply for hearing aids two years ago. Her technophobia (and her first hints or arthritis) inhibit her to change her hearing aids' batteries. Fortunately her children can do this every weekend.

This Wednesday Betty visits the weekly Bingo afternoon in the meetingplace of the old-folk's home. It's summer now and the tables are outside. With all those people there it's a lot of chatter and babble. Two years ago Betty would never go to the bingo: "I cannot hear a thing when everyone babbles and clatters with the coffee cups. How can I hear the winning numbers?!". Now that she has her new digital hearing instruments, even in the bingo cacophony, she can understand everyone she looks at. Her social life has improved a lot and she even won the bingo a few times.

That same night, together with her friend Janet, she attends Mozart's opera The Magic Flute. Two years earlier this would have been one big low rumbly mess, but now she even hears the sparkling high piccolos. Her other friend Carol never joins their visits to the theaters. Carol also has hearing aids, however hers only "work well" in normal conversations. "When I hear music it's as if a butcher's knife cuts through my head. It's way too sharp!". So Carol prefers to take her hearing aids out, missing most of the fun. Betty is so happy that her hearing instruments simply know where they are and adapt to their environment.

source: Roland Mathijssen
Embedded Systems Institute
Eindhoven

Value and Challenges in this story

Customer objectives
Application

Value proposition in this story:

quality of life:

   active participation in different social settings

usability for nontechnical elderly people:

   "intelligent" system is simple to use

   loading of batteries

Conceptual
Realization

Challenges in this story:

Intelligent hearing instrument

Battery life — at least 1 week

No buttons or other fancy user interface on the hearing instrument, other than a robust On/Off method

The user does not want a technical device but a solution for a problem

Instrument can be adapted to the hearing loss of the user

Directional sensitivity (to prevent the so-called cocktail party effect)

Recognition of sound environments and automatic adaptation (adaptive filtering)

source: Roland Mathijssen, Embedded Systems Institute, Eindhoven

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Exercise StoryTelling

Create a story

    as text + sketch or as cartoon

Use the criteria

    be highly specific!

    envision the future value proposition

Enjoy!

Use Case How To

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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.

September 9, 2018
status: planned
version: 0.1
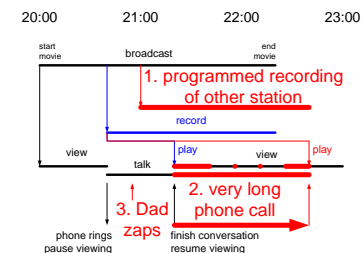
Why Use Cases?

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

record

view   **play**   **view**

              talk

phone rings   finish conversation
pause viewing   resume viewing

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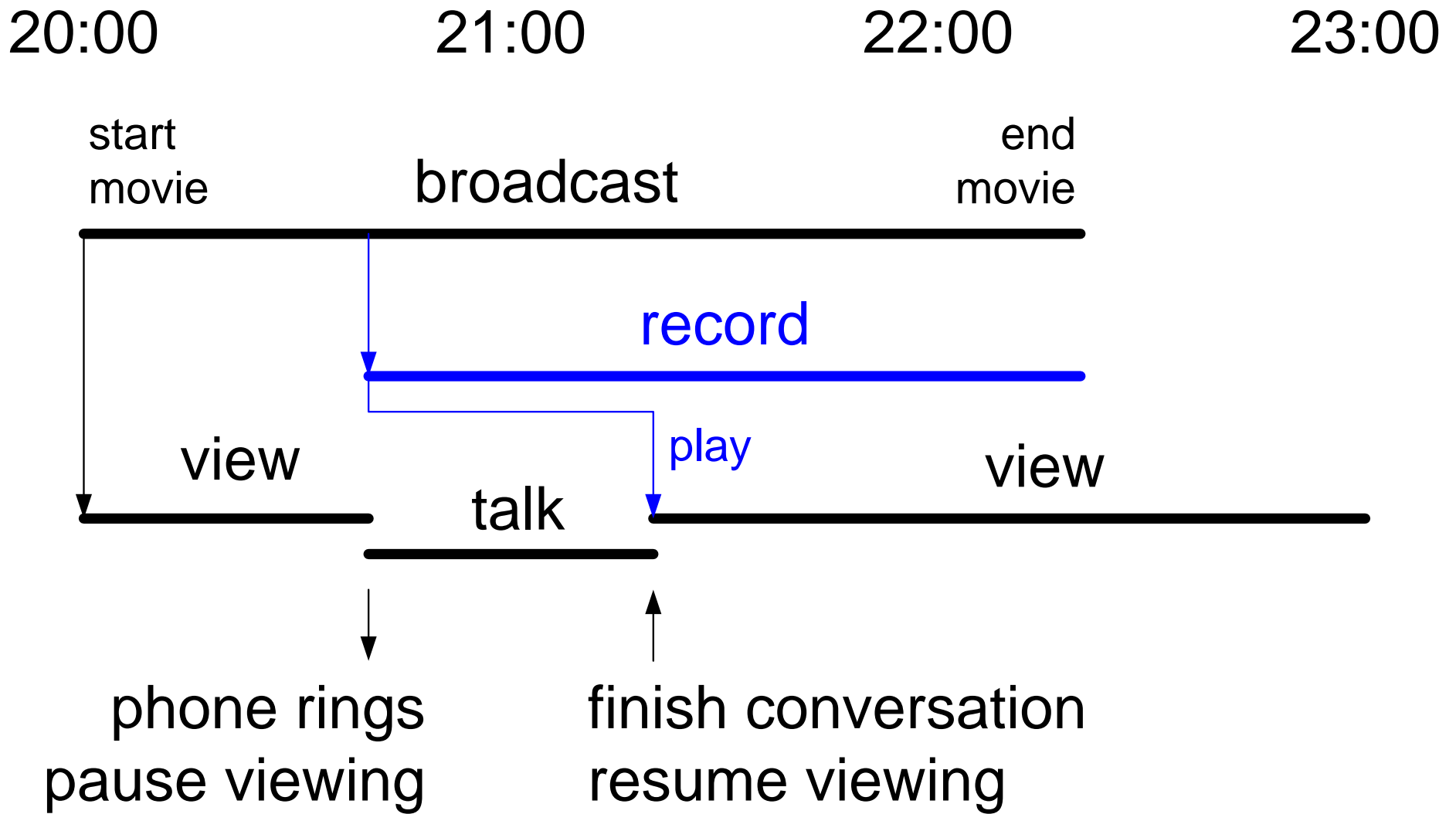
Construction limits intrude in User Experience

- number of tuners

- number of simultaneous streams (recording and playing)

- amount of available storage
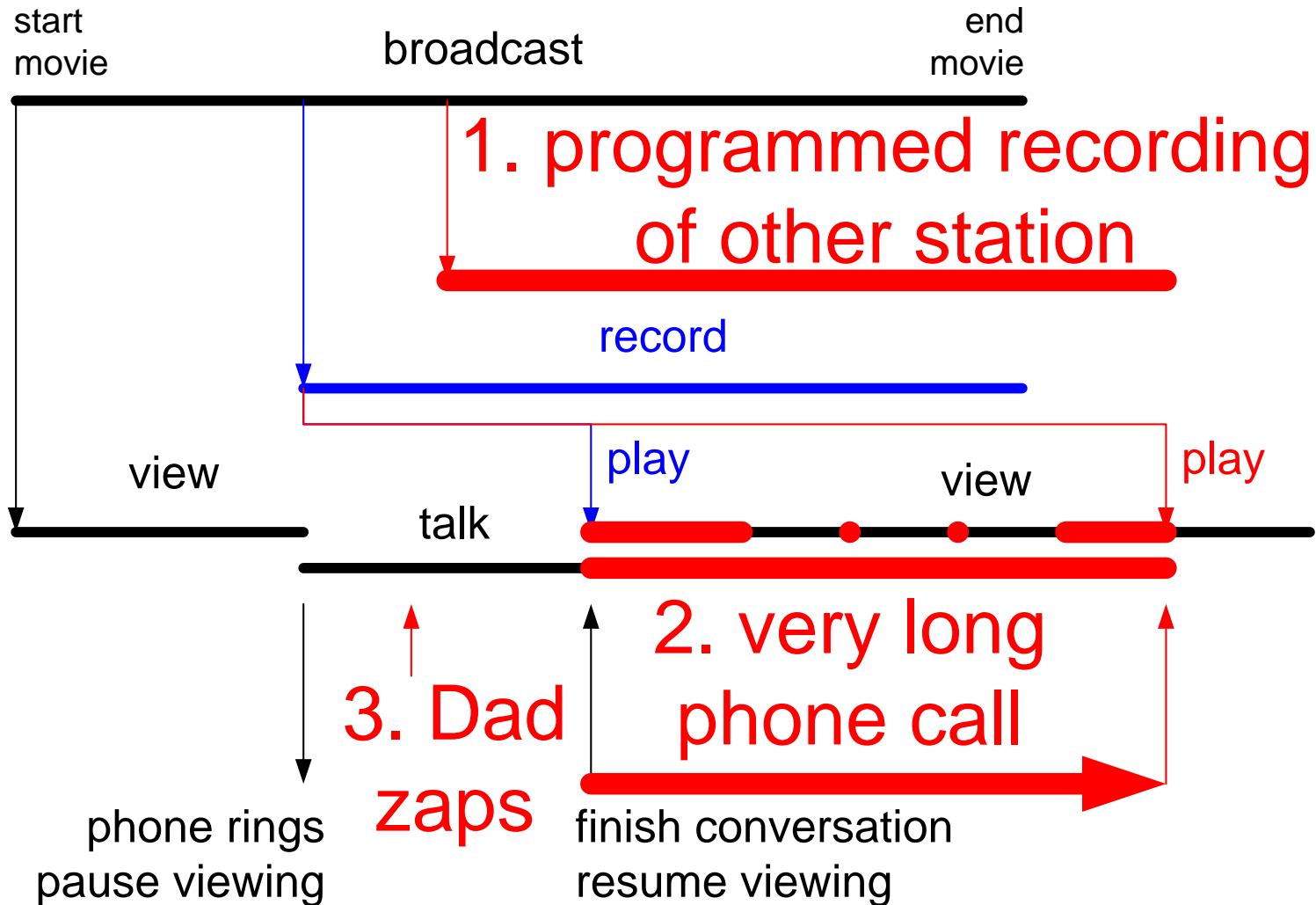
- management strategy of storage space

What if?

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

start
movie   broadcast   end
                                              movie

1. programmed recording of other station

record

play   view   play

view   talk

3. Dad zaps

2. very long phone call

phone rings   finish conversation
pause viewing   resume viewing

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Content of a Use Case

use case

user or system
specified
functionality
behavior
interfaces
qualities (NFR's)

input data
format
size
content

(sub)system
or component

output data
format
size
content

context
interaction

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Example personal video recorder use case contents

typical use case(s)	worst case, exceptional, or change use case(s)

interaction flow (functional aspects)
    select movie via directory
    start movie
    be able to pause or stop
    be able to skip forward or backward
    set recording quality
	functional
	    multiple inputs at the same time
	    extreme long movie
	    directory behaviour in case of
	        extreme many short movies

performance and other qualities (non-functional aspects)
    response times for start / stop
    response times for directory browsing
    end-of-movie behaviour
    relation recording quality and storage
	non-functional
	    response time with multiple inputs
	    image quality with multiple inputs
	    insufficient free space
	    response time with many directory entries
	    replay quality while HQ recording

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Example of Quantification of Typical Use Case

3 examination rooms connected to
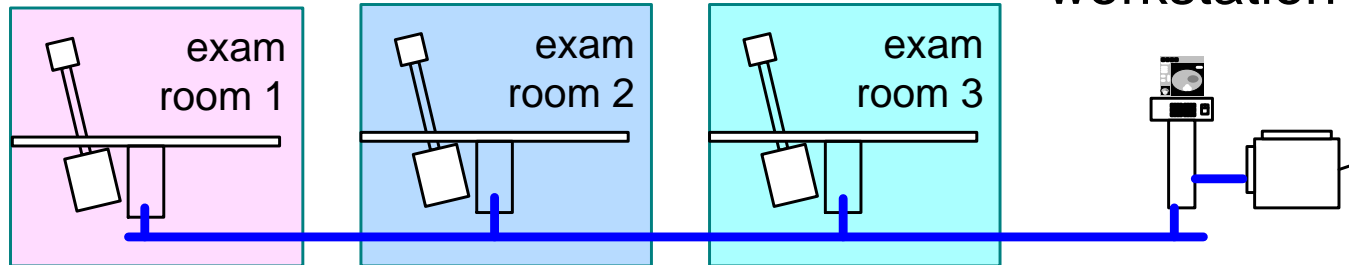
1 medical imaging workstation + printer

exam room 1

exam room 2

exam room 3
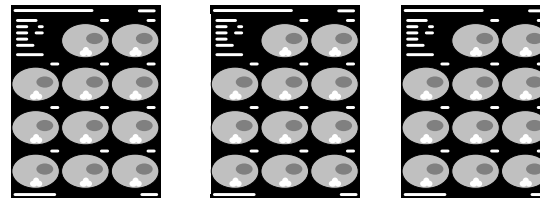
examination room: average 4 interleaved examinations / hour

image production: 20 1024^2 8 bit images per examination

film production: 3 films of 4k*5k pixels each
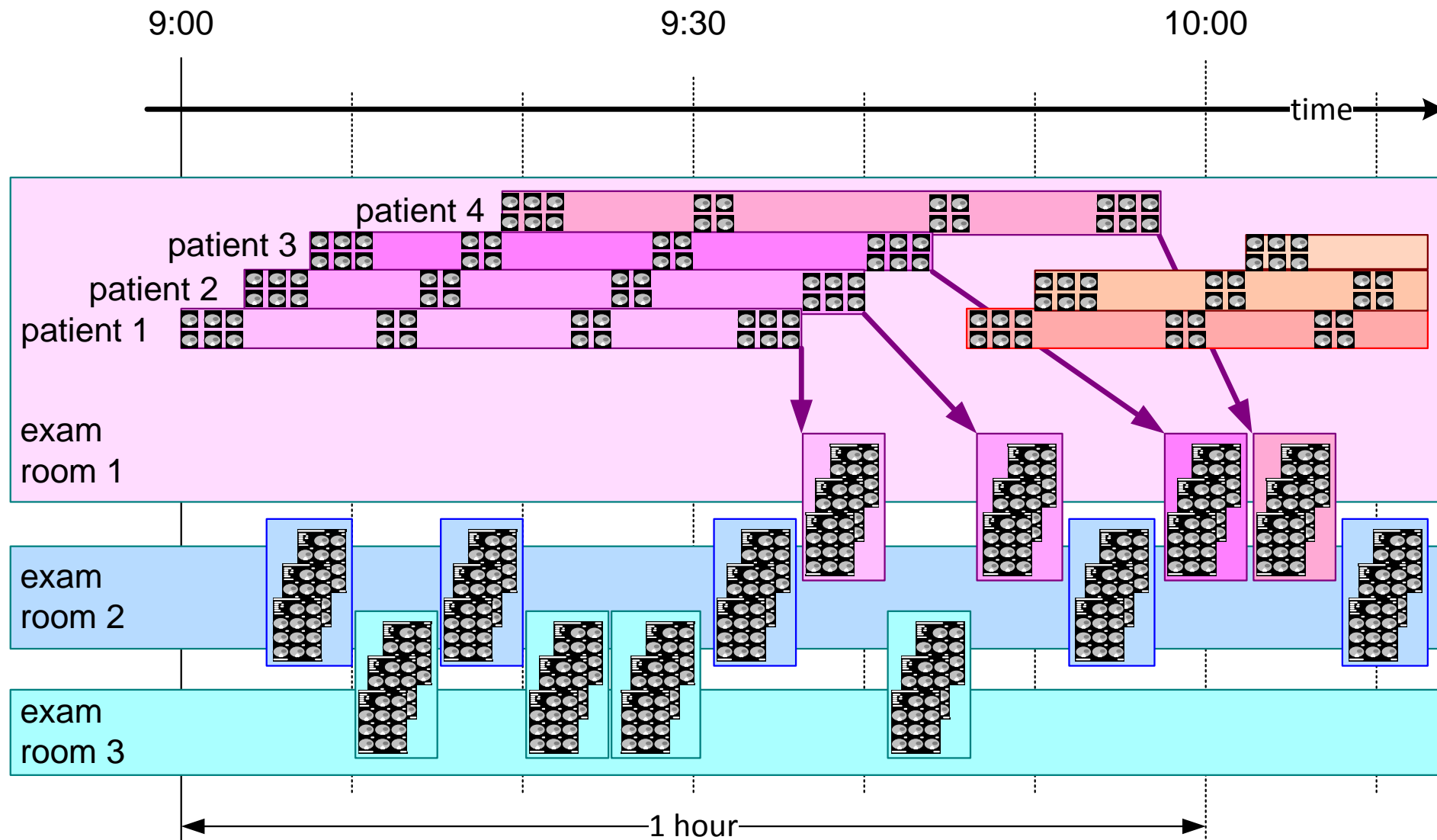
high quality output (bi-cubic interpolation)

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Timing of this Use Case

Patient 4, patient 3, patient 2, patient 1, exam room 1, exam room 2, exam room 3 timeline from 9:00 to 10:00, spanning 1 hour.

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Recommendations for working with use cases

+ combine related functions in one use case
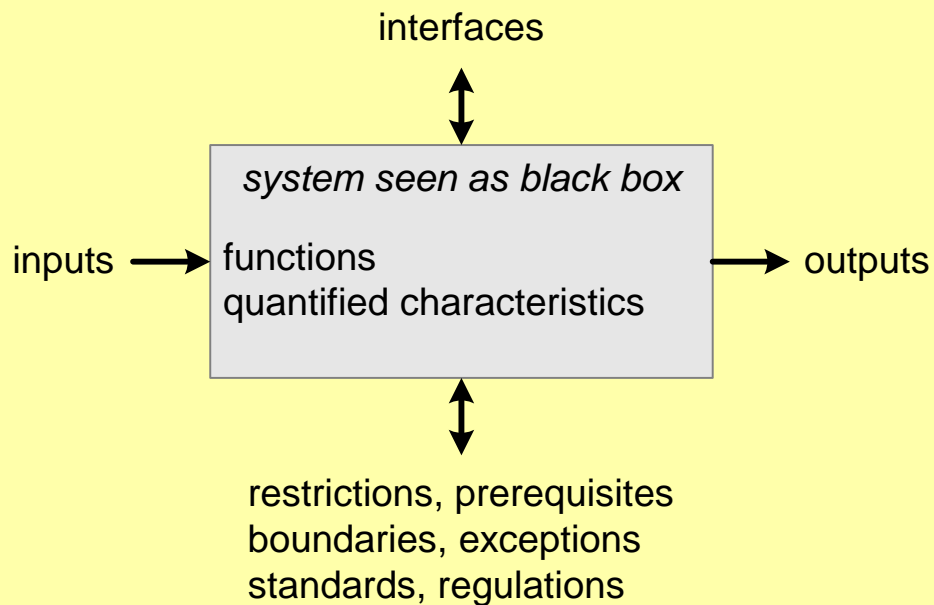
- do not make a separate use case for every function

+ 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

Use Case Exercise

Make specification overview with ~10 **SMART** Key Performance Parameters (or functions or interfaces)

determine at least one use case

interfaces

system seen as black box

inputs → functions
quantified characteristics → outputs

restrictions, prerequisites
boundaries, exceptions
standards, regulations

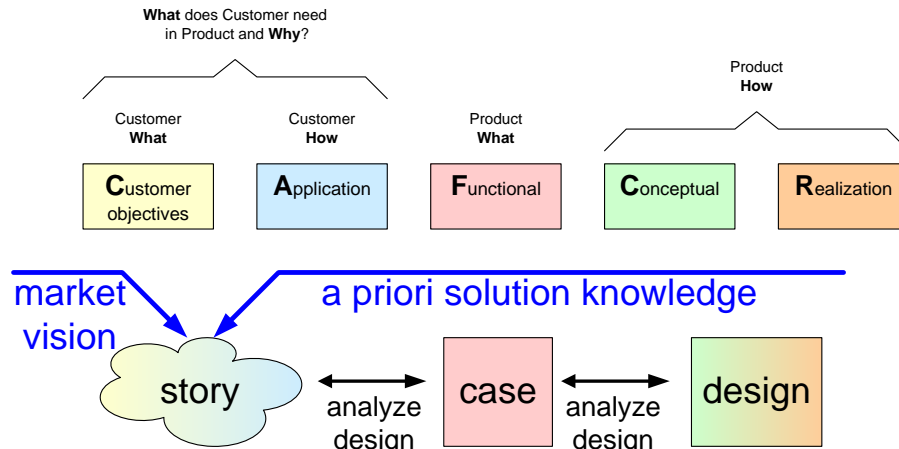*use case*
typical use with relevant
context data (quantified!)

- **S**pecific   quantified

- **M**easurable   verifiable

- **A**chievable (Attainable, Action oriented, Acceptable, Agreed-upon, Accountable)

- **R**ealistic (Relevant, Result-Oriented)

- **T**ime-bounded (Timely , Tangible, Traceable)
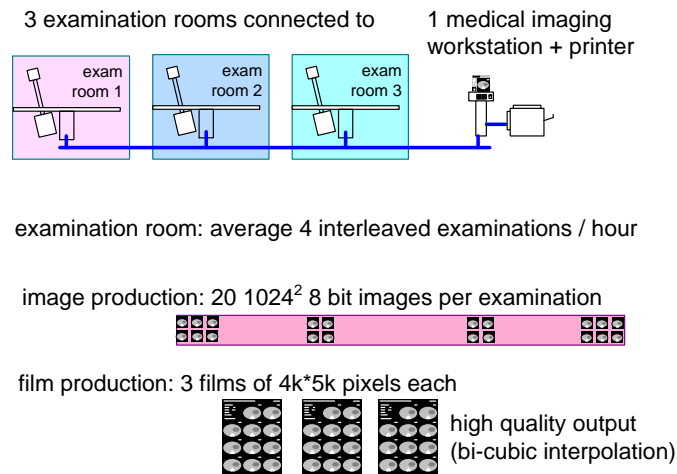
Story and Use Case Summary

Customer Language

What does Customer need in Product and **Why**?

Customer **What** | Customer **How** | Product **What** | Product **How**

| Customer objectives | Application | Functional | Conceptual | Realization |

market vision — a priori solution knowledge

story ←(analyze design)→ case ←(analyze design)→ design

Accesible and Specific to Learn

Customer objectives / Application	• accessible, understandable	"Do you see it in front of you?"
Customer objectives / Application	• valuable, appealing	attractive, important "Are customers queuing up for this?"
Conceptual / Realization	• critical, challenging	"What is difficult in the realization?" "What do you learn w.r.t. the design?"
Application	• frequent, no exceptional niche	"Does it add significantly to the bottom line?"
Application / Functional	• specific	names, ages, amounts, durations, titles, ...

Use Cases include Quantification

3 examination rooms connected to | 1 medical imaging workstation + printer

exam room 1 | exam room 2 | exam room 3

examination room: average 4 interleaved examinations / hour

image production: 20 1024^2 8 bit images per examination

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

high quality output (bi-cubic interpolation)

Typical and Worst case

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

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