

Module Scenarios, Story Telling and Use Cases

by *Gerrit Muller* Embedded Systems Institute
e-mail: `gerrit.muller@embeddedsystems.nl`
`www.gaudisite.nl`

Abstract

This module addresses Scenarios, Story Telling and Use Cases. Scenarios are used to cope with multiple alternatives for specification or design. Story telling is a means to explore customer needs and as a means for communication. Use Cases are used to analyze the design for specific circumstances.

Distribution

This article or presentation is written as part of the Gaudí project. The Gaudí project philosophy is to improve by obtaining frequent feedback. Frequent feedback is pursued by an open creation process. This document is published as intermediate or nearly mature version to get feedback. Further distribution is allowed as long as the document remains complete and unchanged.

July 20, 2011
status: preliminary
draft
version: 0.1

logo
TBD

Content Scenarios, Story Telling, Use Cases

goal of this module

Be able to apply story telling technique.

Be able to use scenario analysis.

Be able to use use-cases for design.

content of this module

Format and criteria for stories

Elements of scenarios

Role of scenarios in decision making

Quantified use cases

exercise

Create a story and translate story via use cases in design

Story How To

by *Gerrit Muller* Embedded Systems Institute
e-mail: `gerrit.muller@embeddedsystems.nl`
`www.gaudisite.nl`

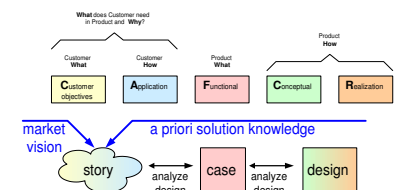
Abstract

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.

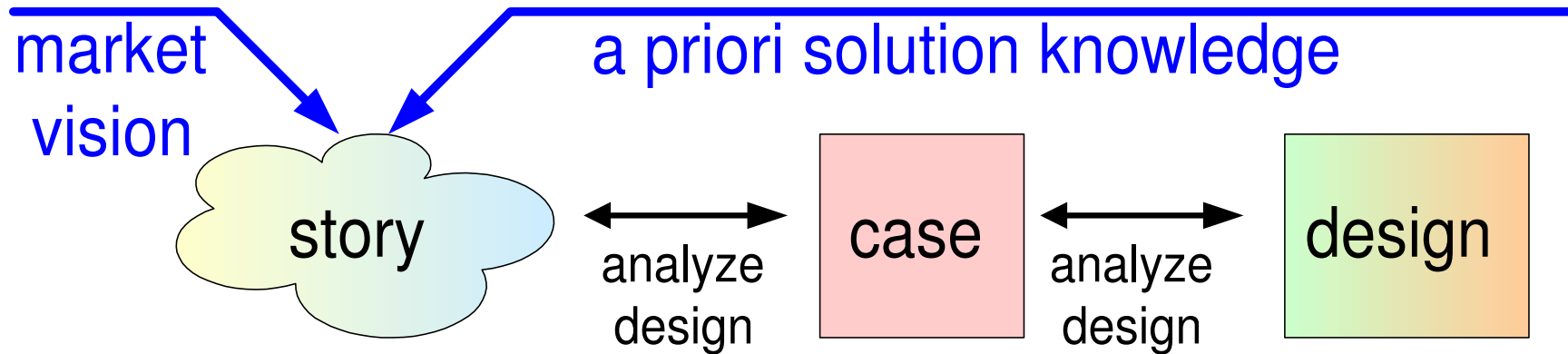
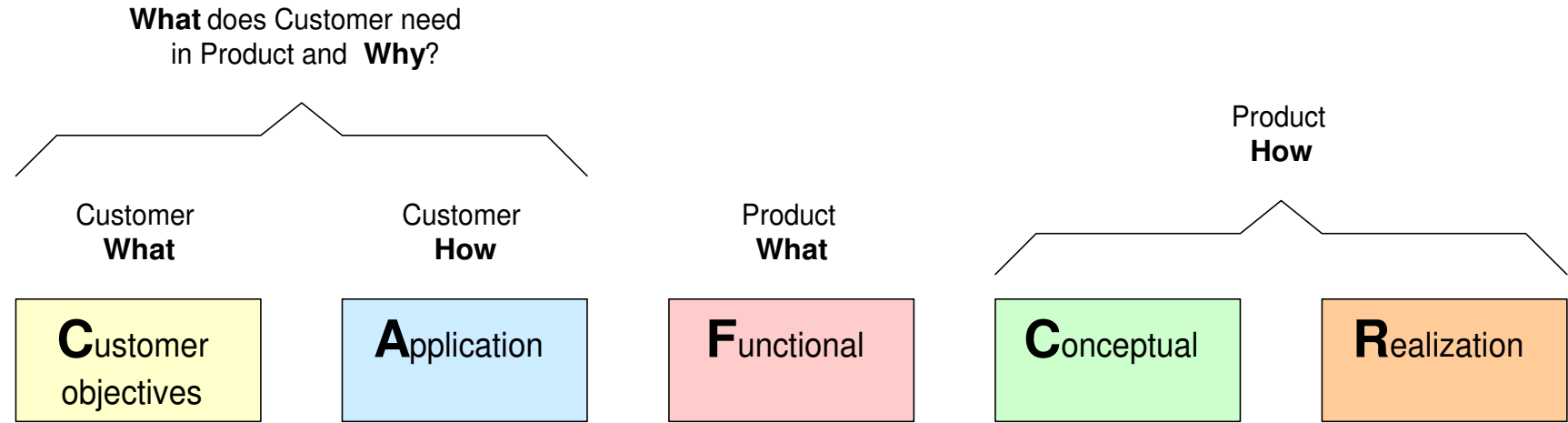
Distribution

This article or presentation is written as part of the Gaudí project. The Gaudí project philosophy is to improve by obtaining frequent feedback. Frequent feedback is pursued by an open creation process. This document is published as intermediate or nearly mature version to get feedback. Further distribution is allowed as long as the document remains complete and unchanged.

July 20, 2011
status: concept
version: 1.1



From story to design



Example story layout

ca. half a page of plain English text

A day in the life of Bob

bla blah bla, rabarber music
bla bla composer bla bla
qwerty30 zepps.

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

mjimm bas engel heeft een
interessant excuus, lex stelt
voor om vanavond door te
werken.

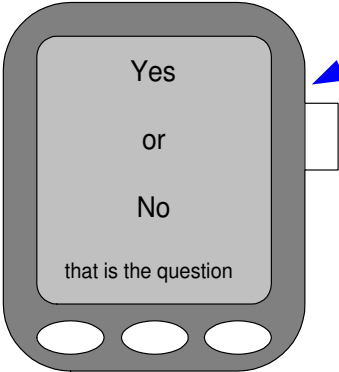
In the middle of the night he
is awake and decides to
change the world forever.

The next hour the great
event takes place:

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

Vtables are seen as the sollution 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 unqie 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.



draft or sketch of
some essential
appliance

Points of attention

- purpose
- scope
- viewpoint, stakeholders
- visualization
- size (max 1 A4)
- recursive decomposition, refinement

Criteria for a good story

Customer
objectives

- accessible, understandable

Application

"Do you see it in front of you?"

Customer
objectives

- valuable, appealing

Application

attractive, important

"Are customers queuing up for this?"

Conceptual

- critical, challenging

Realization

"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

- specific

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

Functional

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

Scenario How To

by *Gerrit Muller* Embedded Systems Institute
e-mail: `gerrit.muller@embeddedsystems.nl`
`www.gaudisite.nl`

Abstract

Good designers keep multiple alternatives open in parallel. This improves the specification and design quality. Scenarios can be used to cope with these alternatives and as a means for communication with stakeholders.

Distribution

This article or presentation is written as part of the Gaudí project. The Gaudí project philosophy is to improve by obtaining frequent feedback. Frequent feedback is pursued by an open creation process. This document is published as intermediate or nearly mature version to get feedback. Further distribution is allowed as long as the document remains complete and unchanged.

July 20, 2011
status: planned
version: 0

logo
TBD

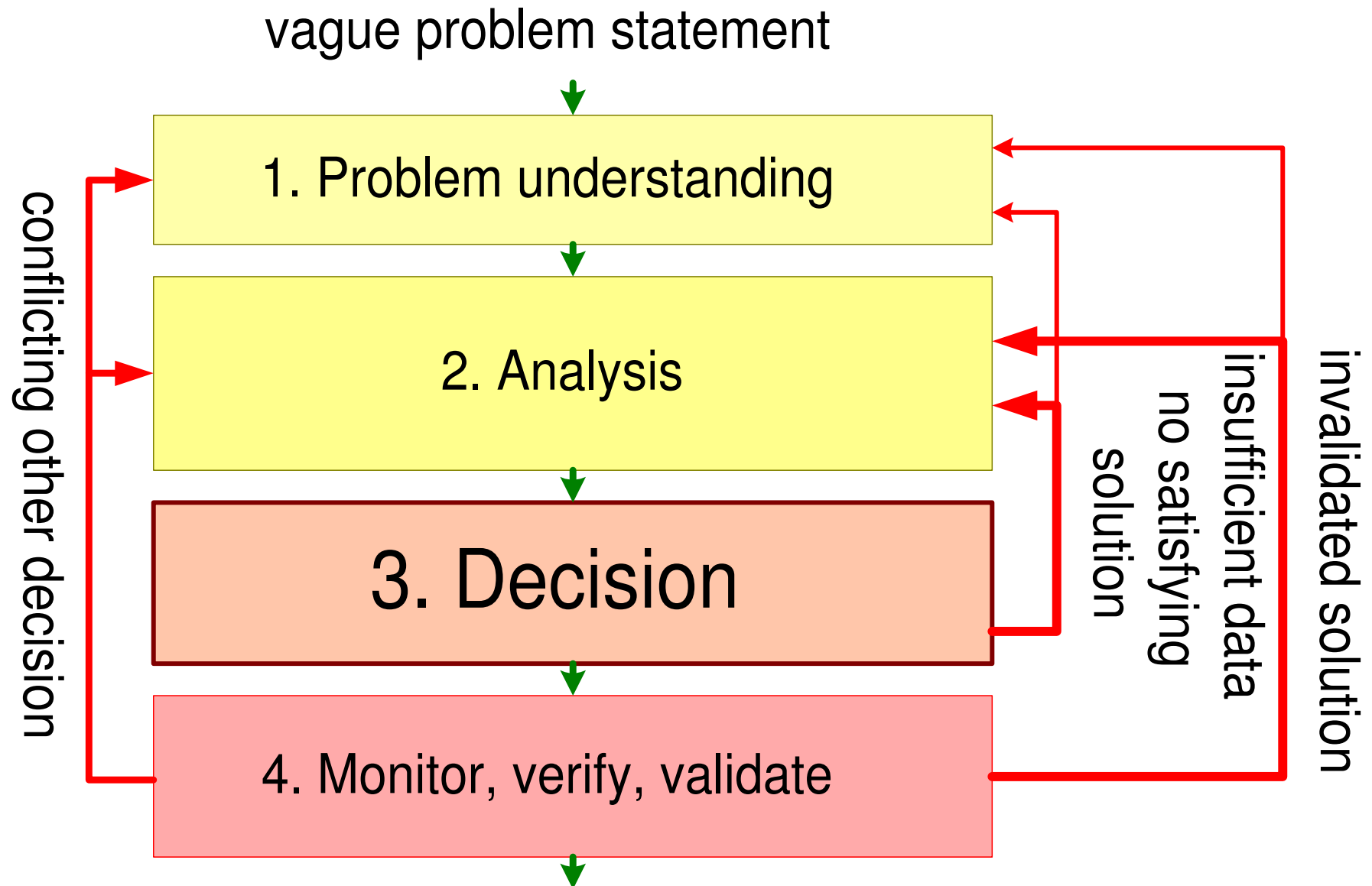
content of this presentation

Decision making

Multiple propositions

Scenarios

Decision Making Process



Example of Multiple Propositions

throughput	20 p/m	high-performance sensor	350 ns
cost	5 k\$	high-speed moves	9 m/s
safety		additional pipelining	

low cost and performance 1

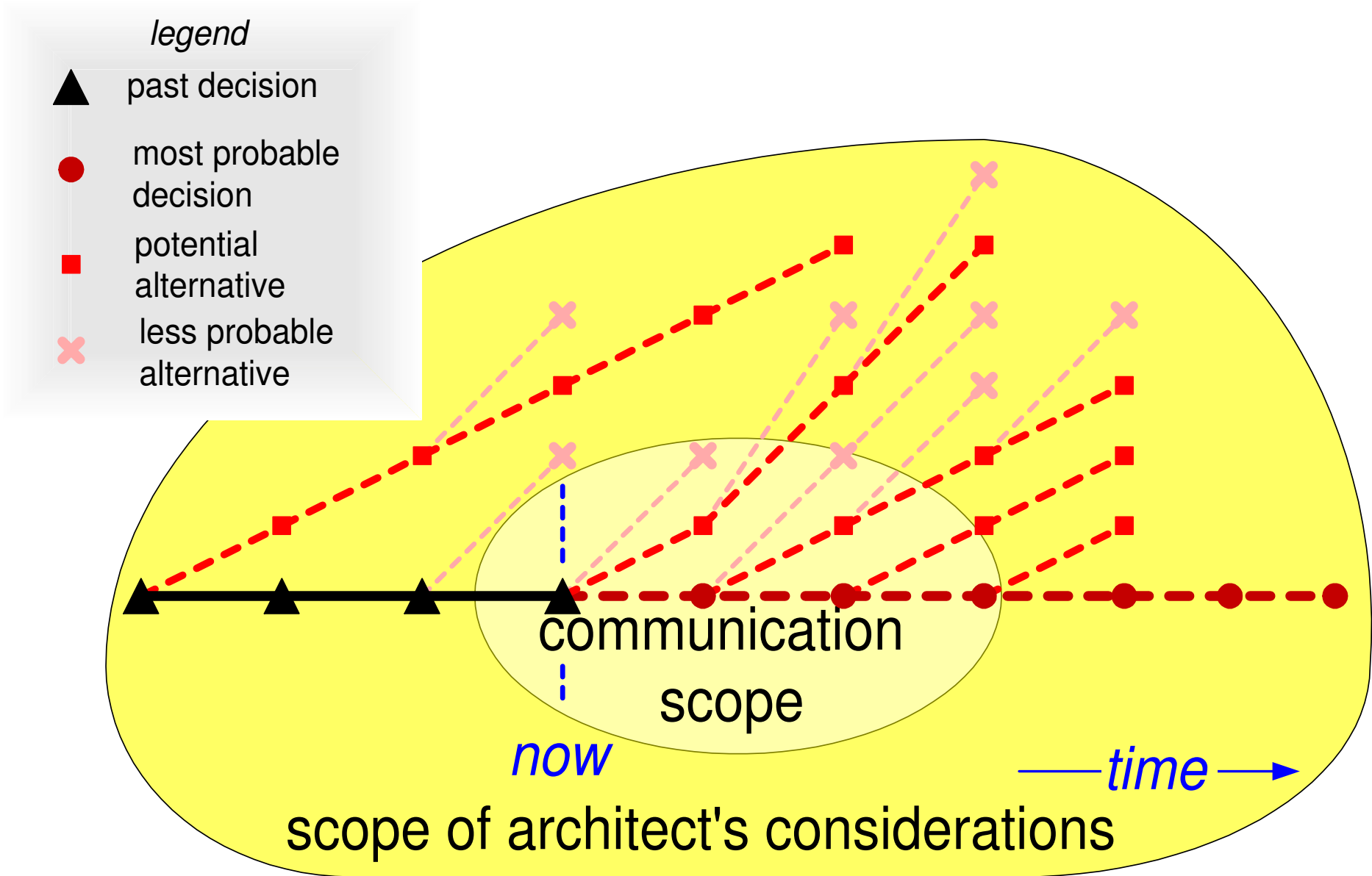
throughput	20 p/m	high-performance sensor	300 ns
cost	5 k\$	high-speed moves	10 m/s
safety			

low cost and performance 2

throughput	25 p/m	highperformance sensor	200 ns
cost	7 k\$	high-speed moves	12 m/s
safety		additional collision detector	

high cost and performance

Graph of Decisions and Alternatives



Different Types of Decisions



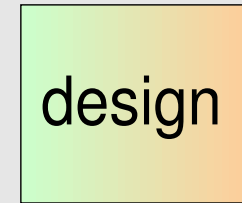
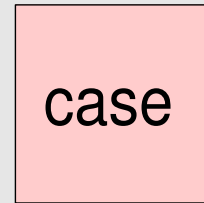
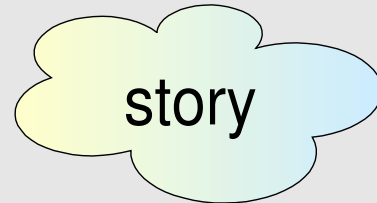
basic
principles

requirements

architecture rules
implementation choices
f.i. technology

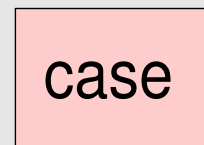
Elements of a Scenario

scenario: <clear title>



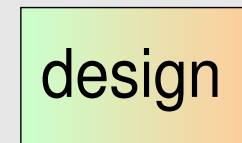
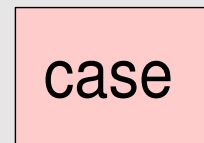
key specification and design decisions

scenario: <clear title>



key specification and design decisions

scenario: <clear title>



key specification and design decisions

Summary of Scenarios

Exploration and analysis require multiple propositions.

Architects continuously work with multiple alternatives.

Scenarios have a clear title, story, use case and design.

Scenarios are differentiated by key specifications and design decisions.

Use Case How To

by *Gerrit Muller* Embedded Systems Institute
e-mail: `gerrit.muller@embeddedsystems.nl`
`www.gaudisite.nl`

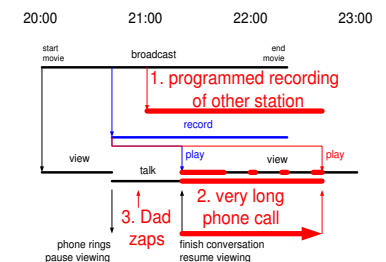
Abstract

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.

Distribution

This article or presentation is written as part of the Gaudí project. The Gaudí project philosophy is to improve by obtaining frequent feedback. Frequent feedback is pursued by an open creation process. This document is published as intermediate or nearly mature version to get feedback. Further distribution is allowed as long as the document remains complete and unchanged.

July 20, 2011
status: planned
version: 0.1



Why Use Cases?

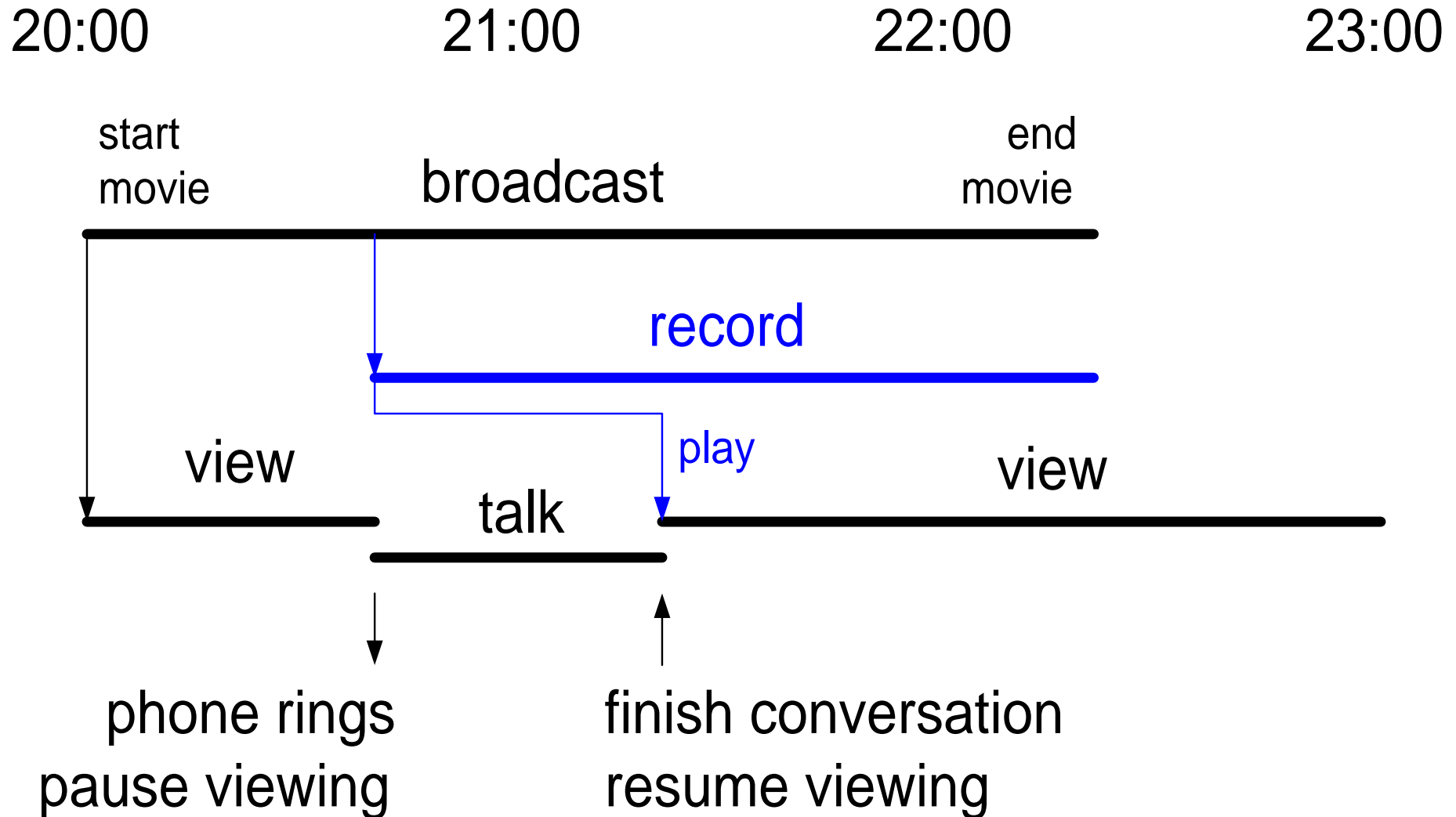
Supports or is part of specification

by providing specific data in user perspective

Facilitates analysis and design

Facilitates verification and testing

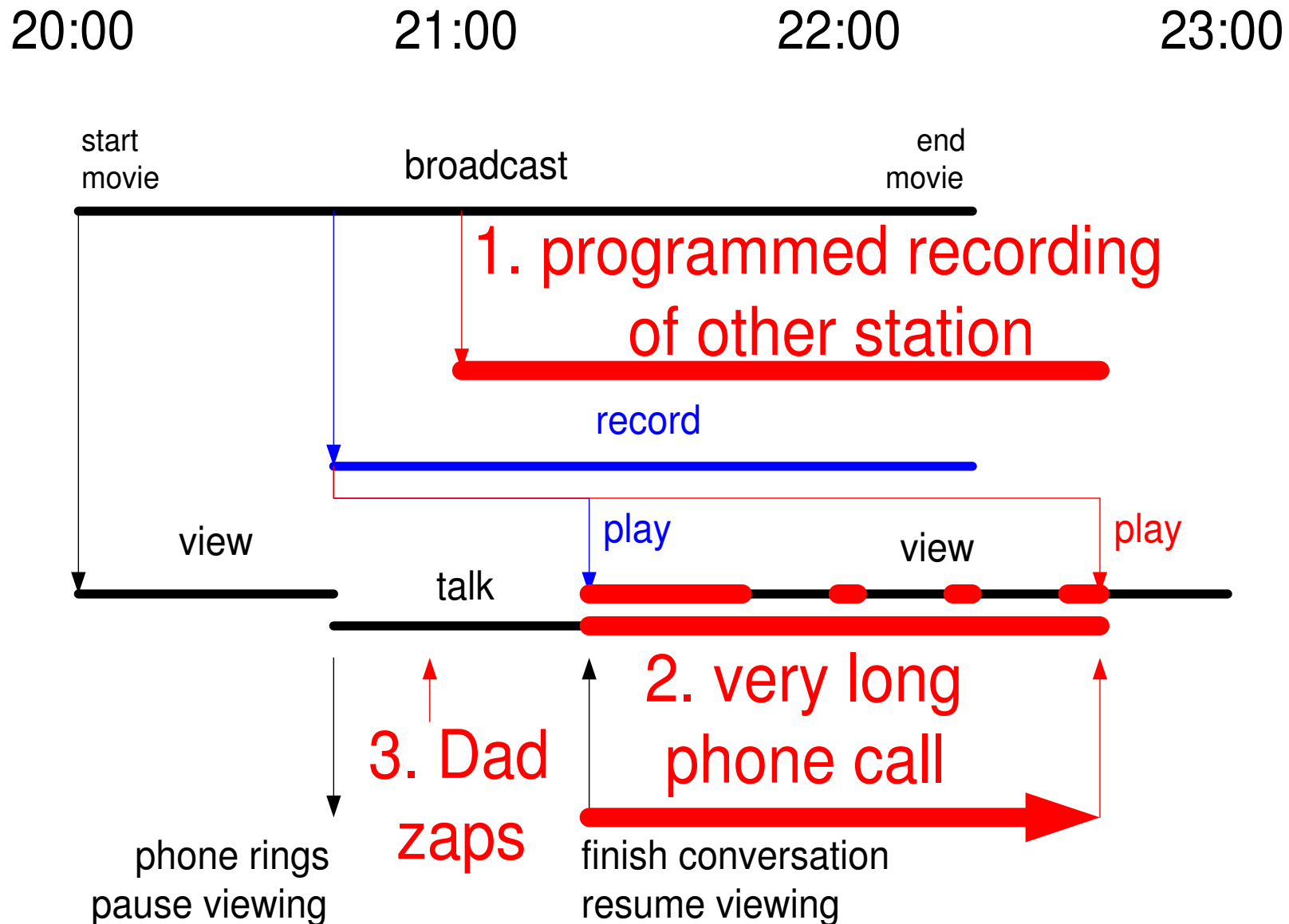
Example Time Shift recording



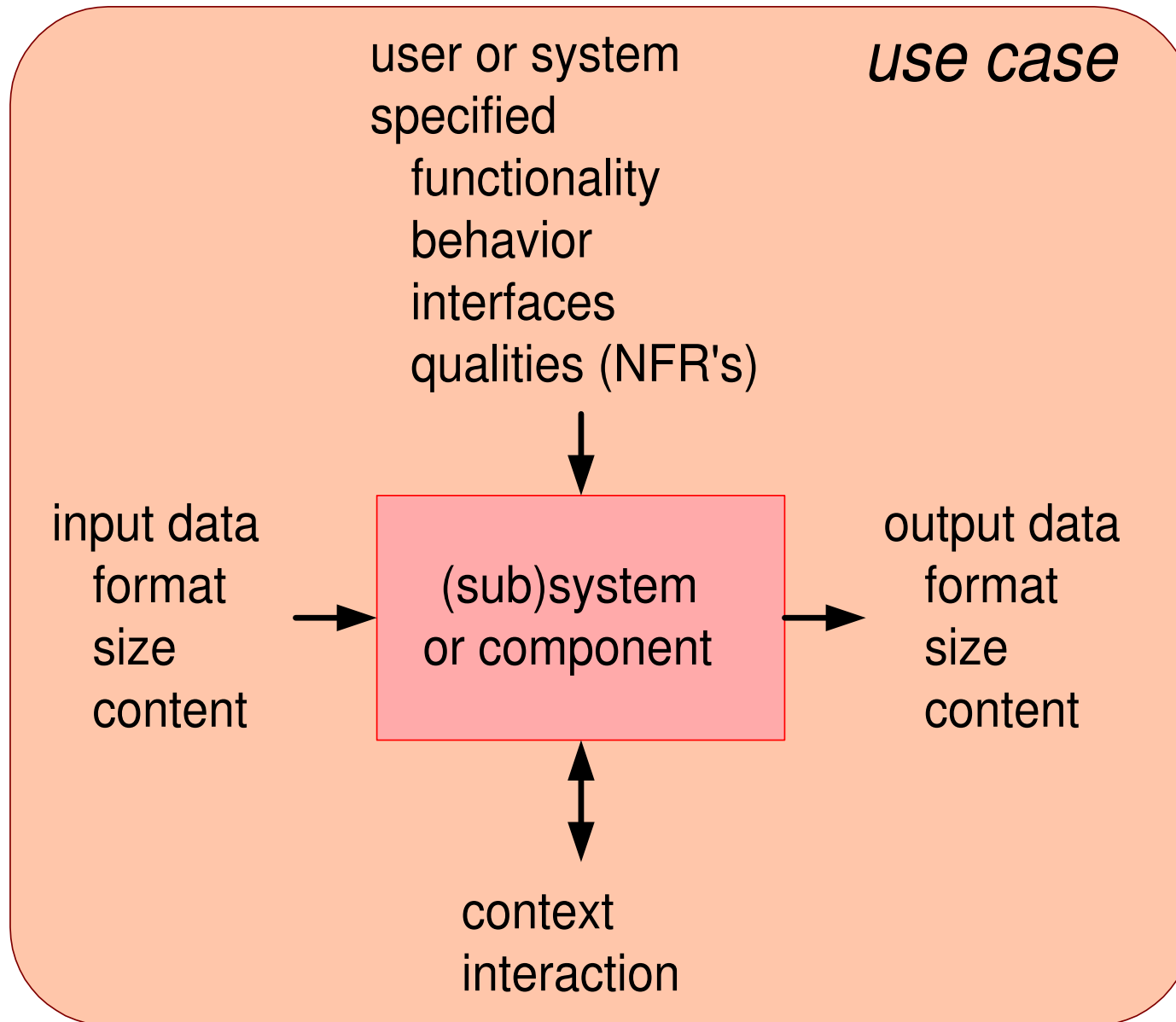
Construction limits intrude in User Experience

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

What if?



Content of a Use Case



Example personal video recorder use case contents

typical 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

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

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

functional

- multiple inputs at the same time
- extreme long movie
- directory behaviour in case of
extreme many short movies

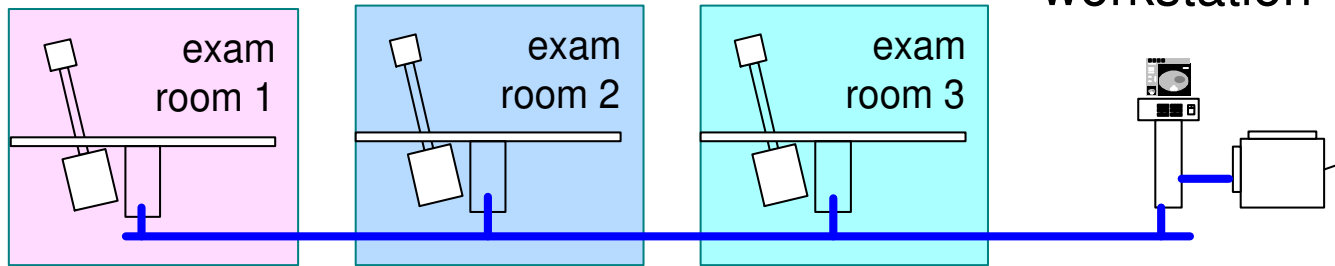
non-functional

- response time with multiple inputs
- image quality with multiple inputs
- insufficient free space
- response time with many directory entries
- replay quality while HQ recording

Example of Quantification of Typical Use Case

3 examination rooms connected to

1 medical imaging workstation + printer

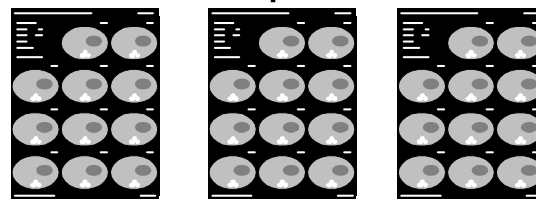


examination room: average 4 interleaved examinations / hour

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

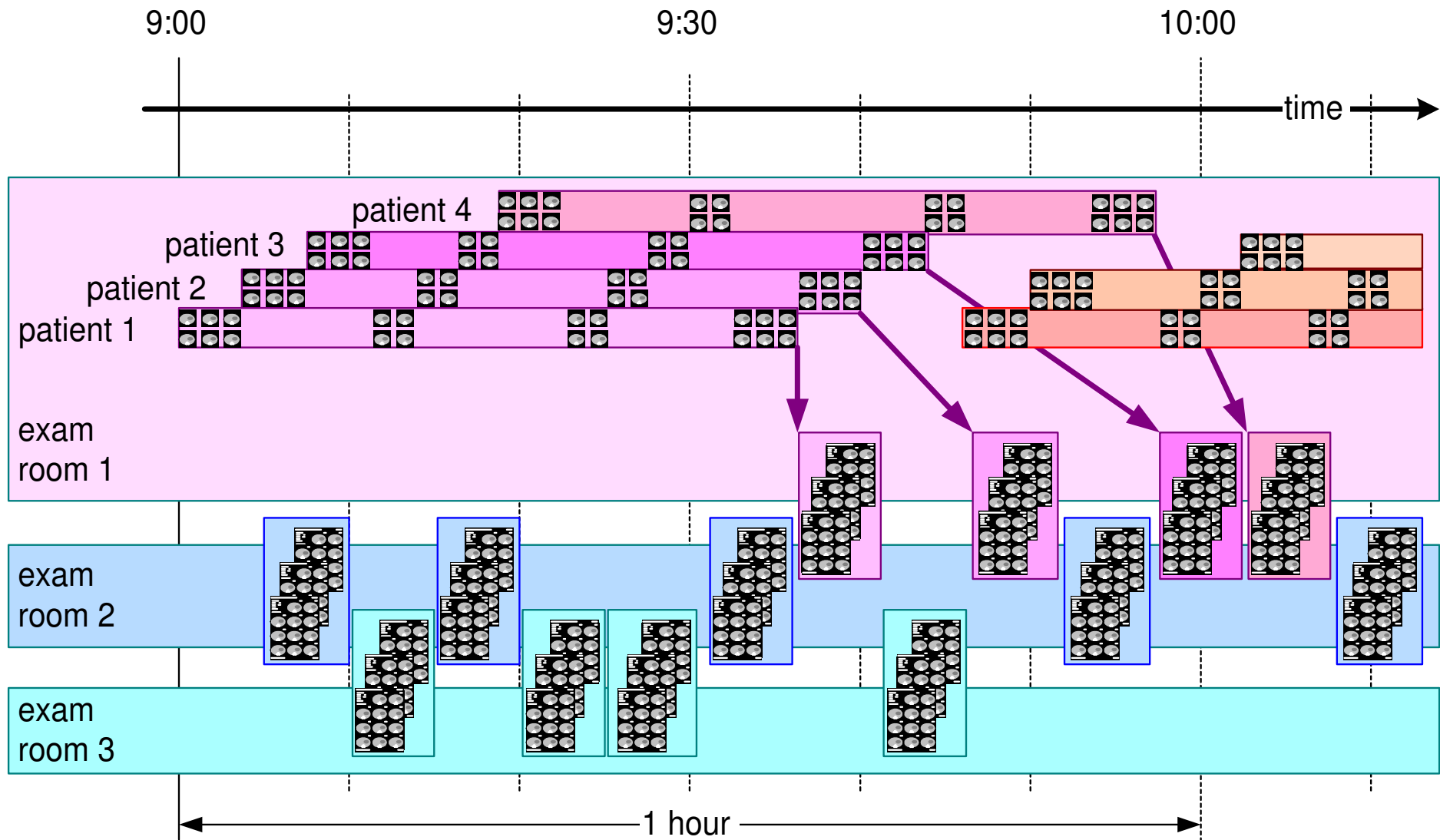


film production: 3 films of 4k*5k pixels each



high quality output
(bi-cubic interpolation)

Timing of this Use Case



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

1. Create a story

- use the criteria

2. Transform the story into a case

- functional, as well as quantitative

3. Perform a short design exploration

- based on the case.

4. Improve the story

- first iteration based on feedback from case and design.
- Use time boxes to ensure that you make all the indicated steps.

- + stories make discussions much more specific
- + implicit assumptions are identified

~ creating relevant stories is far from trivial

- too much fun

starting point for generalization: specification
and design

Conclusions

Stories help to focus early design discussions

Scenarios help to cope with multiple alternatives

Use cases address integral use: functional and quantitative

Techniques, Models, Heuristics of this module

Story telling, criterias

Scenarios

Quantified use cases

Worst case , *exceptional* and *change* use cases