

Module Scenarios, Story Telling and Use Cases

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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.

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October 11, 2020
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

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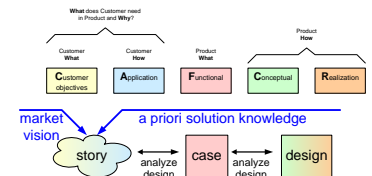
Abstract

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.

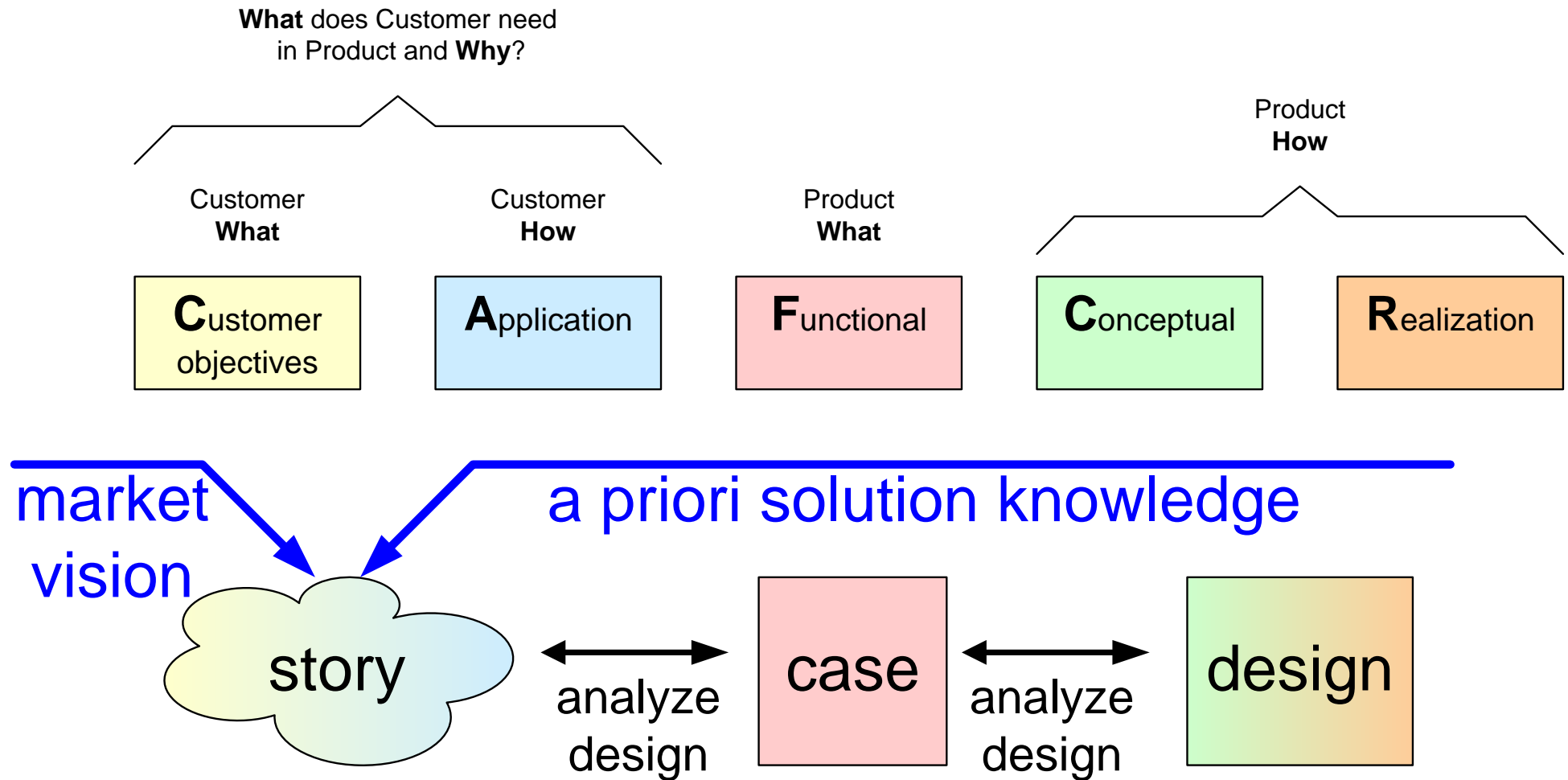
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status: concept
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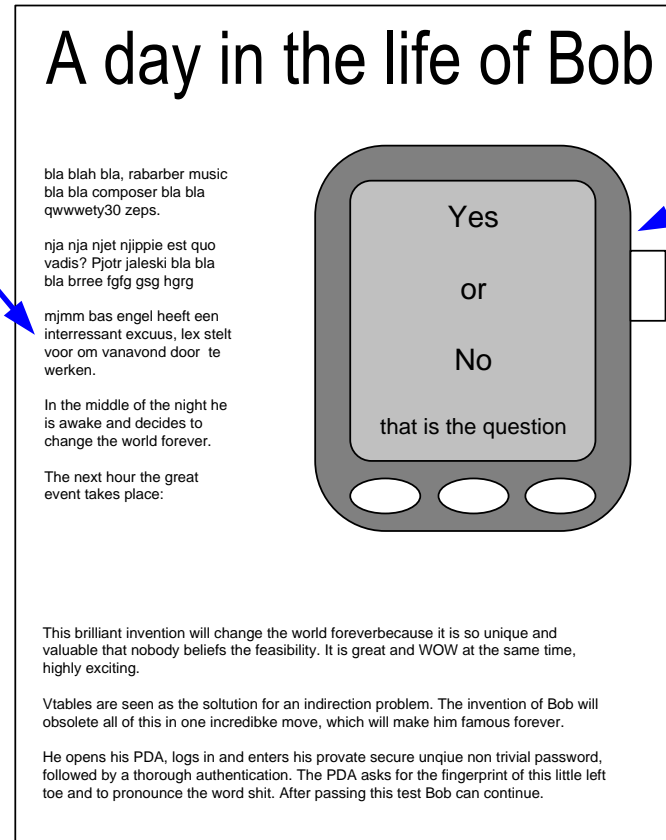


From story to design



Example story layout

ca. half a page of
plain English text



draft or sketch of
some essential
appliance

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

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, ...

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 of arthritis) inhibit her to change her hearing aids' batteries. Fortunately her children can do this every weekend.

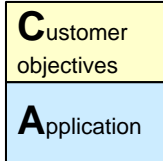
This Wednesday Betty visits the weekly Bingo afternoon in the meetingplace of the old-folk's home. It's summer now and the tables are outside. With all those people there it's a lot of chatter and babble. Two years ago Betty would never go to the bingo: "I cannot hear a thing when everyone babbles and 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 rumbling 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



Value proposition in this story:

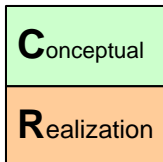
quality of life:

active participation in different social settings

usability for nontechnical elderly people:

"intelligent" system is simple to use

loading of batteries



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

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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.

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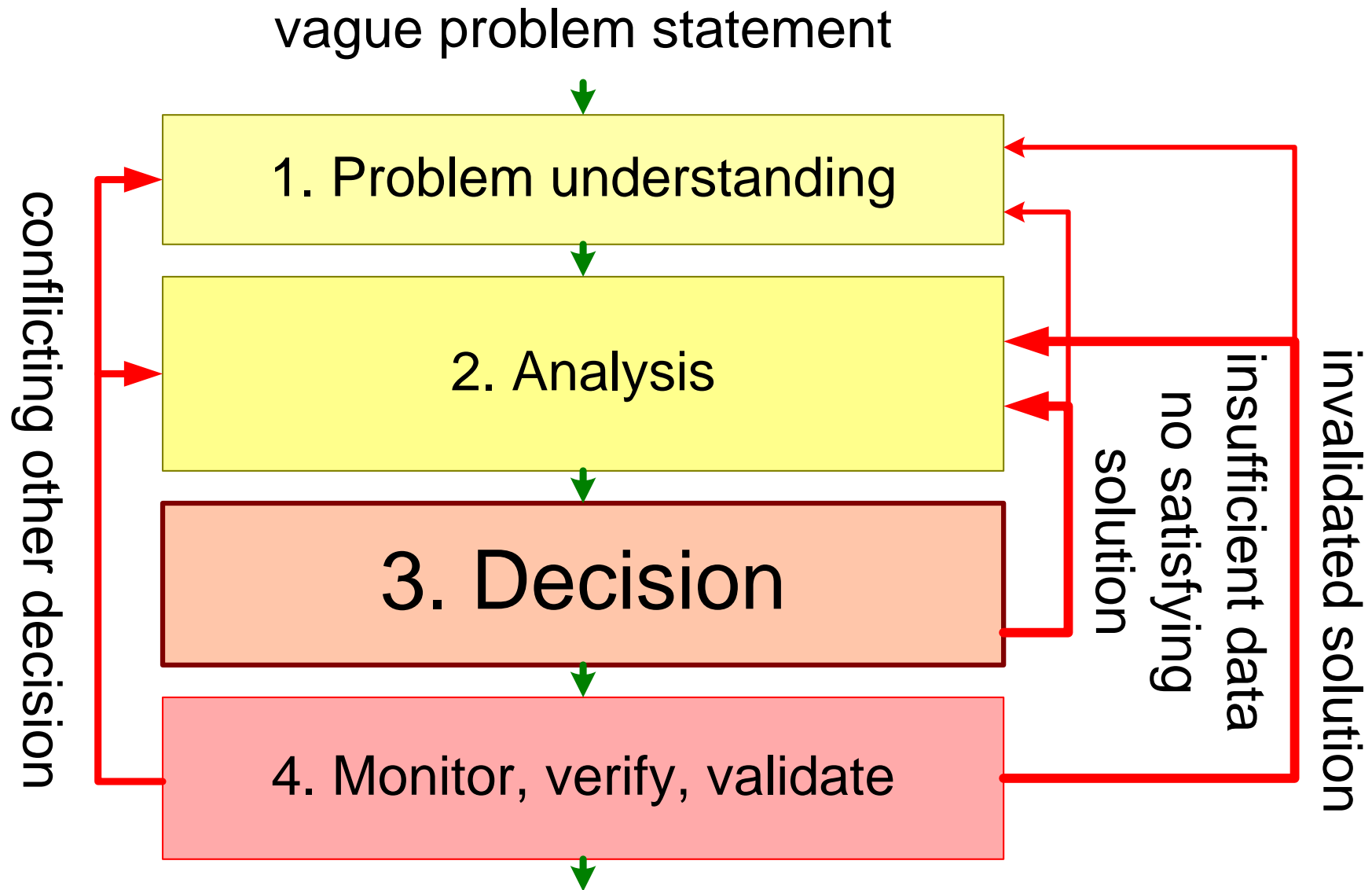
content of this presentation

Decision making

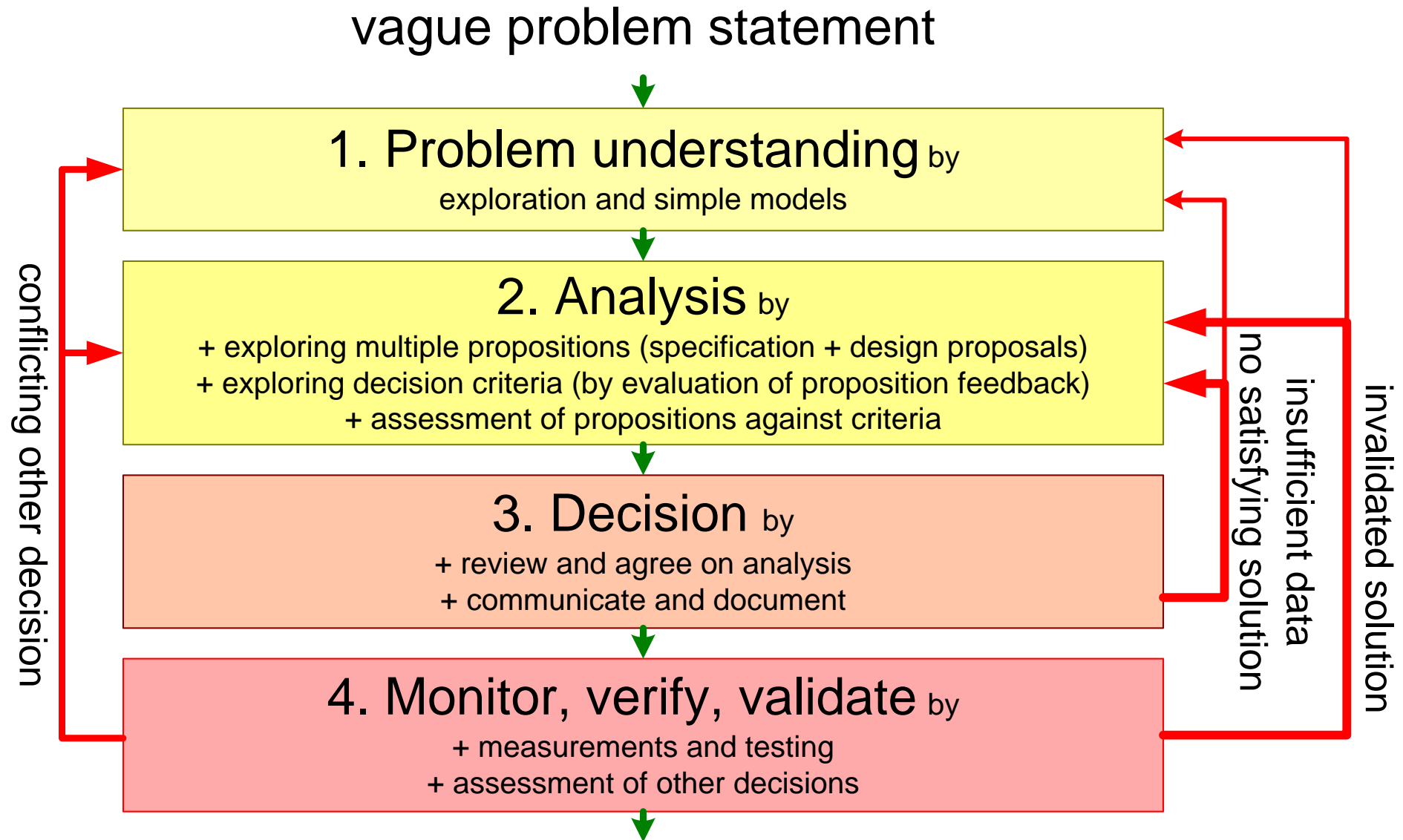
Multiple propositions

Scenarios

Decision Making Process



Flow from problem to solution



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

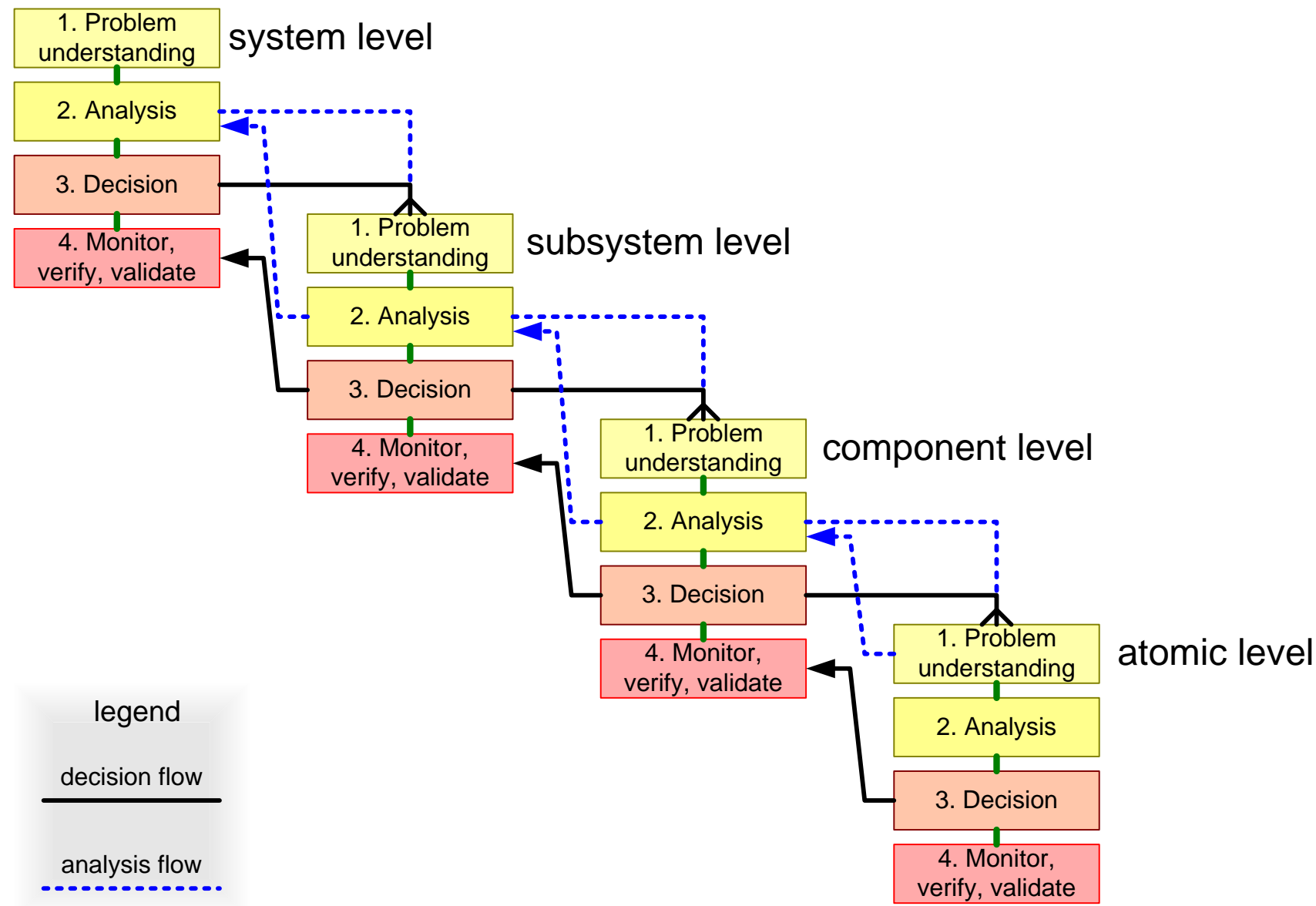
throughput	20 p/m	high-performance sensor	300 ns
cost	5 k\$	high-speed moves	10 m/s
safety			

low cost and performance 2

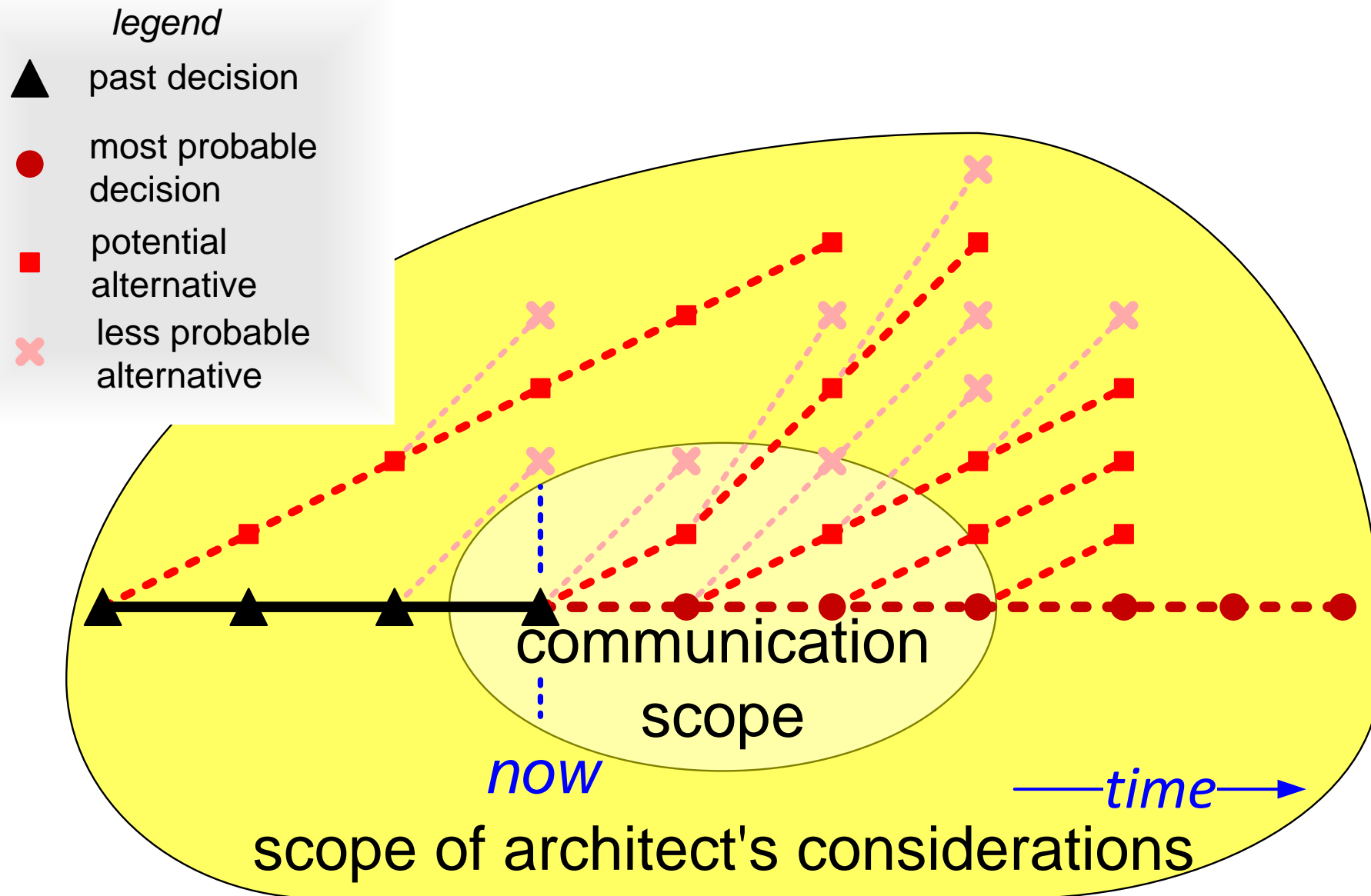
throughput	25 p/m	highperformance sensor	200 ns
cost	7 k\$	high-speed moves	12 m/s
safety		additional collision detector	

high cost and performance

Recursive and concurrent application of flow



Graph of Decisions and Alternatives



Different Types of Decisions



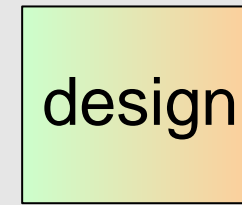
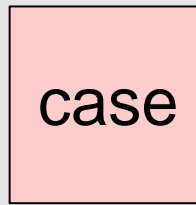
basic
principles

requirements

architecture rules
implementation choices
f.i. technology

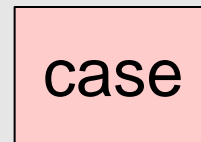
Elements of a Scenario

scenario: <clear title>



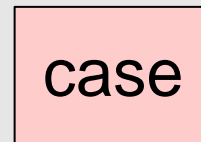
key specification and design decisions

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

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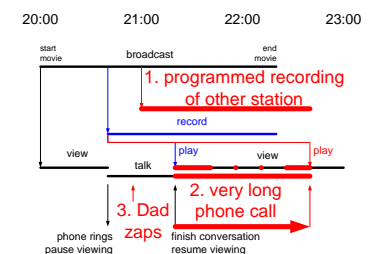
Abstract

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.

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Why Use Cases?

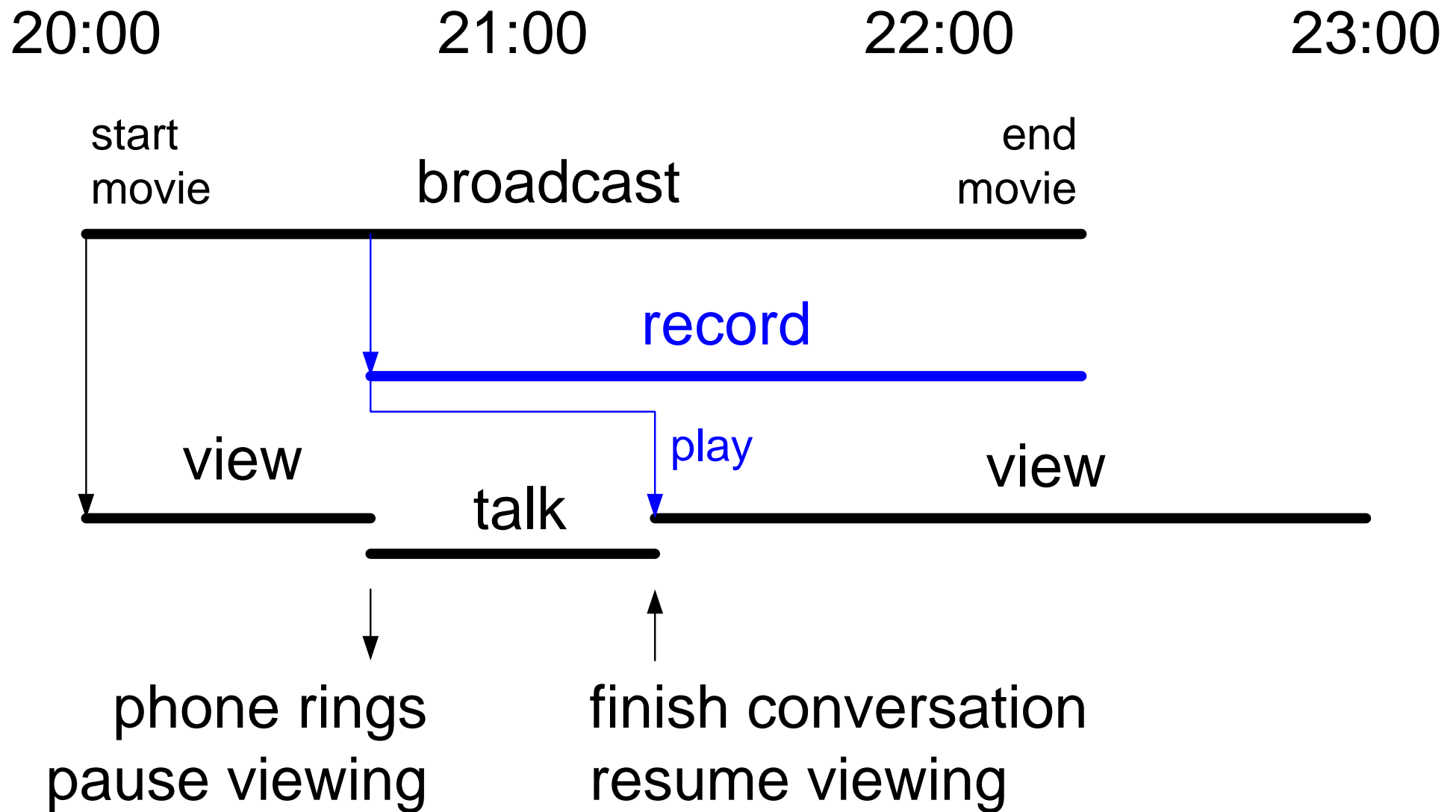
Supports or is part of specification

by providing specific data in user perspective

Facilitates analysis and design

Facilitates verification and testing

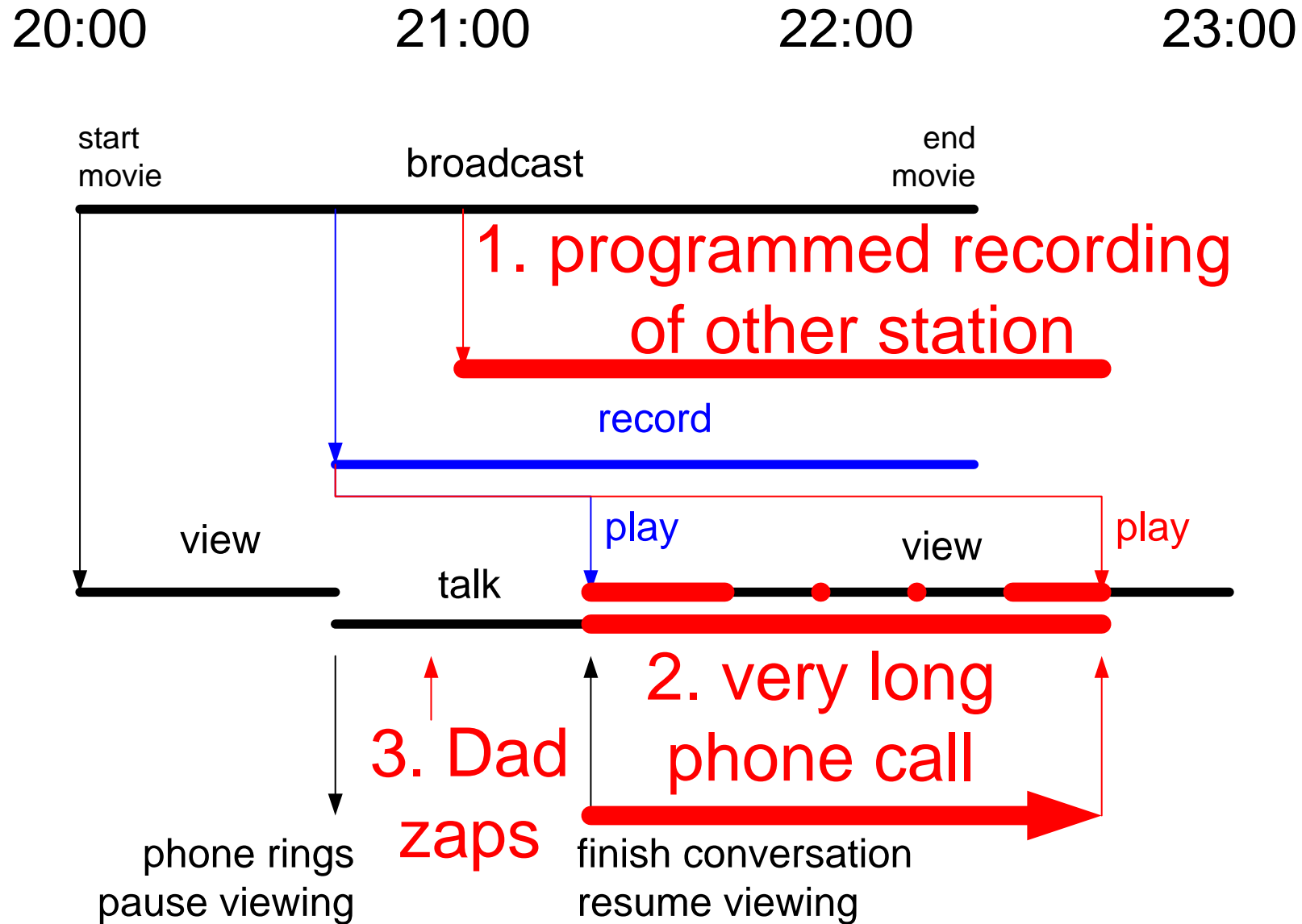
Example Time Shift recording



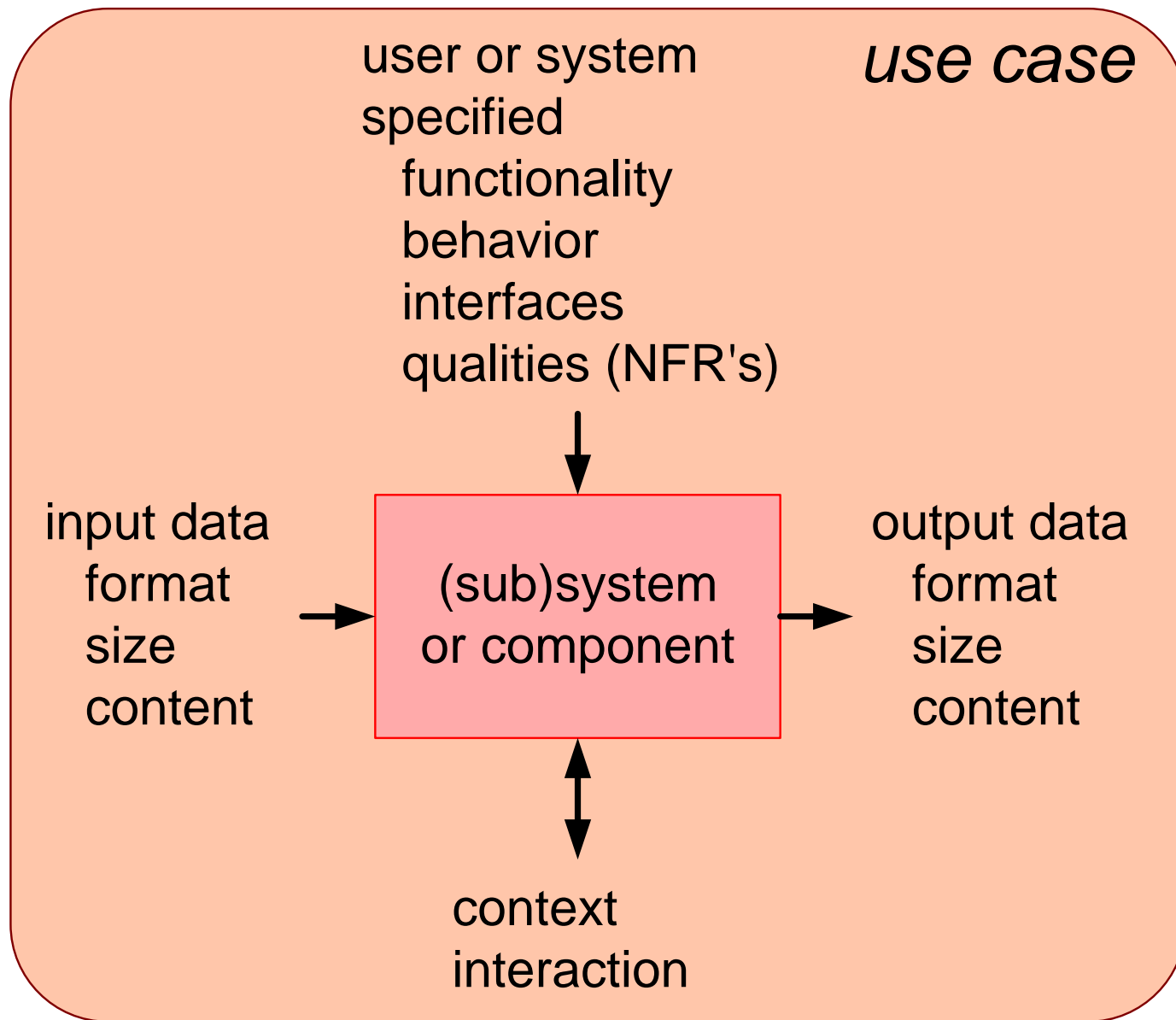
Construction limits intrude in User Experience

- 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



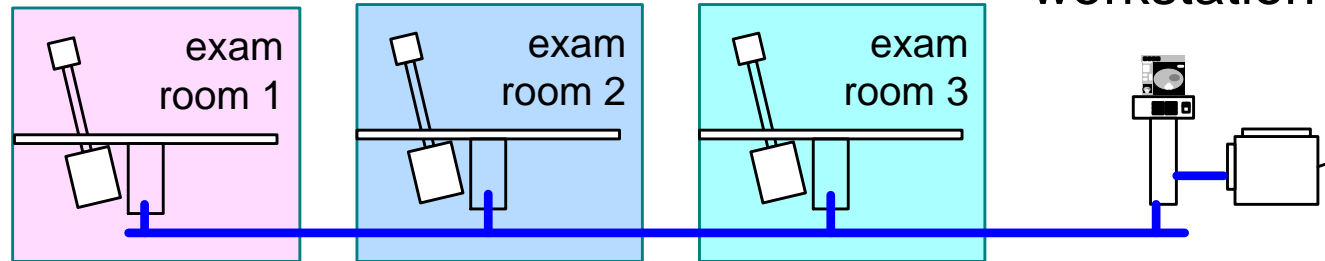
Example personal video recorder use case contents

typical use case(s)	worst case, exceptional, or change use case(s)
<p>interaction flow (functional aspects)</p> <ul style="list-style-type: none">select movie via directorystart moviebe able to pause or stopbe able to skip forward or backwardset recording quality	<p>functional</p> <ul style="list-style-type: none">multiple inputs at the same timeextreme long moviedirectory behaviour in case ofextreme many short movies
<p>performance and other qualities (non-functional aspects)</p> <ul style="list-style-type: none">response times for start / stopresponse times for directory browsingend-of-movie behaviourrelation recording quality and storage	<p>non-functional</p> <ul style="list-style-type: none">response time with multiple inputsimage quality with multiple inputsinsufficient free spaceresponse time with many directory entriesreplay quality while HQ recording

Example of Quantification of Typical Use Case

3 examination rooms connected to

1 medical imaging workstation + printer

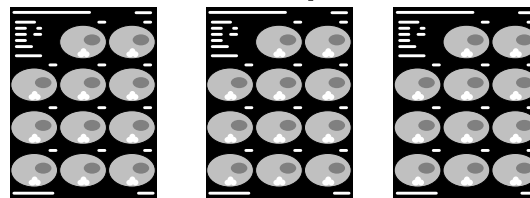


examination room: average 4 interleaved examinations / hour

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

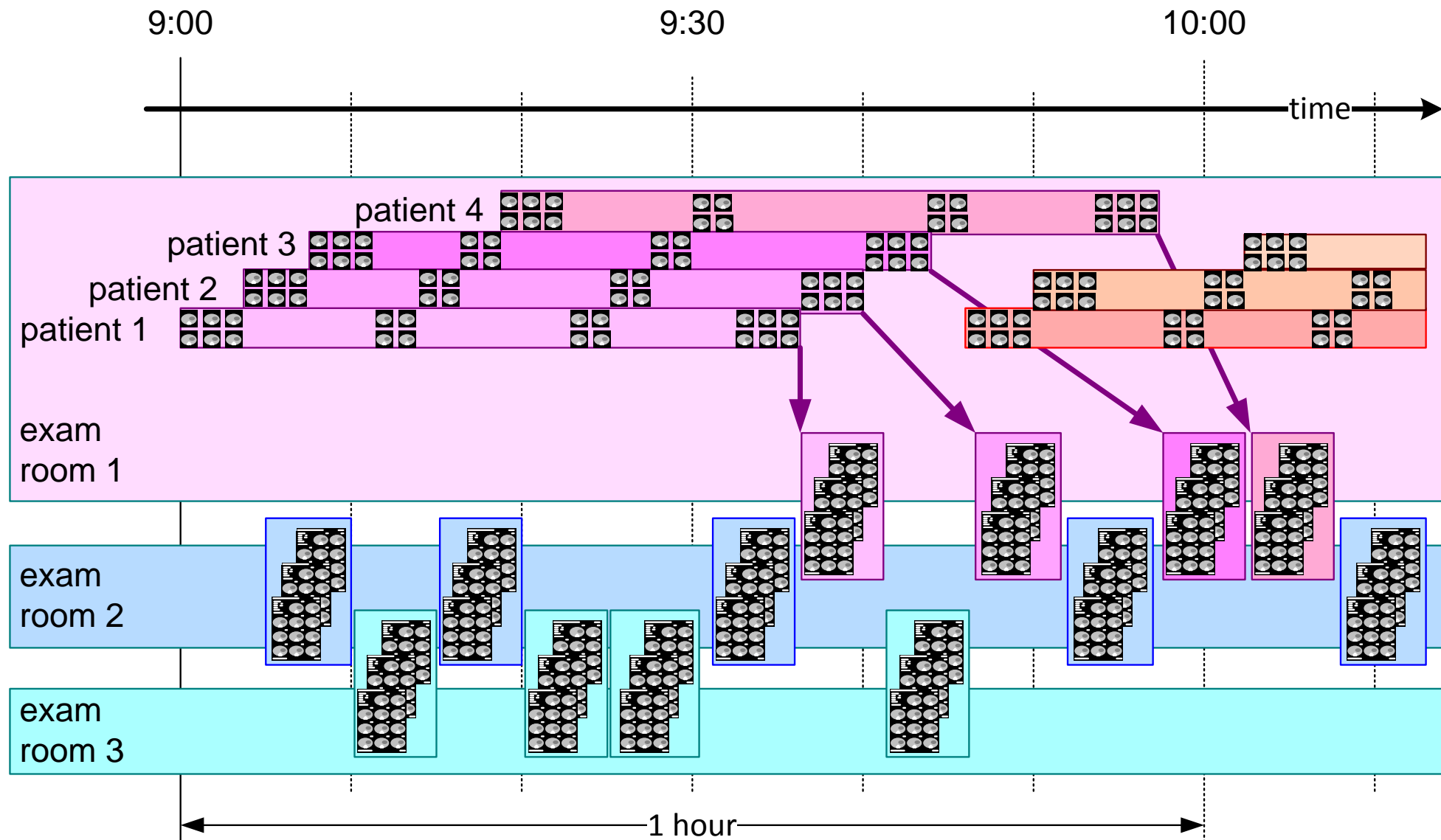


film production: 3 films of 4k*5k pixels each



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