Teaching Rationale Management in Agile Project Courses

Software Engineering im Unterricht der Hochschulen - SEUH 2019

Anja Kleebaum[1], **Jan Ole Johanssen**[2], **Barbara Paech**[1], **Bernd Bruegge**[2]

Heidelberg University[1], Institute of Computer Science
Technical University of Munich[2], Department of Informatics

Bremerhaven – February 22, 2019

What is Rationale?

- Developers have to make decisions and solve issues
- Rationale covers justifications behind these decisions
- Decision knowledge is knowledge about issues that lead to decisions, alternatives, and arguments
- Decision knowledge is hard to capture
- Representation in form of rationale models

Definition

Another word for rationale is decision knowledge. We use both words interchangeably.

Why Should we Capture Rationale?

- Improves decision-making
- Prevents knowledge vaporization
- Makes issues and decisions more transparent to stakeholders
- Helps to deal with change

How to Model Rationale?

Emoji	Name	Indicating Phrases
⚠	Issue	I have a question . . . How should . . . , any suggestions? We need to discuss how . . .
🪧	Alternative	I { suggest | propose } . . . One { option | proposal } is . . . What { about | do you think } . . .
➕	Pro	The { advantages | pros } are . . . I { like | prefer } it because . . . I agree with user . . .
➖	Con	The { disadvantages | cons } are . . . I don't like it because . . . I disagree with user . . .
🔨	Decision	Let's do . . . We decided . . . The best option is . . .

Continuous Rationale Management (ConRat)

- Goal: Integrate rationale management into continuous software engineering (CSE)
- Developers capture rationale in various documentation locations
- Enable explicit capture supported through
  - Supervised text classification
  - Summarization of changes
- Support exploitation through visualization of knowledge (also for change impact analysis)
- Capturing and exploitation support included in CSE practices (triggers)
  - Committing code
  - Changing status of JIRA issues
  - Writing meeting protocols

Lecture on Rationale Management

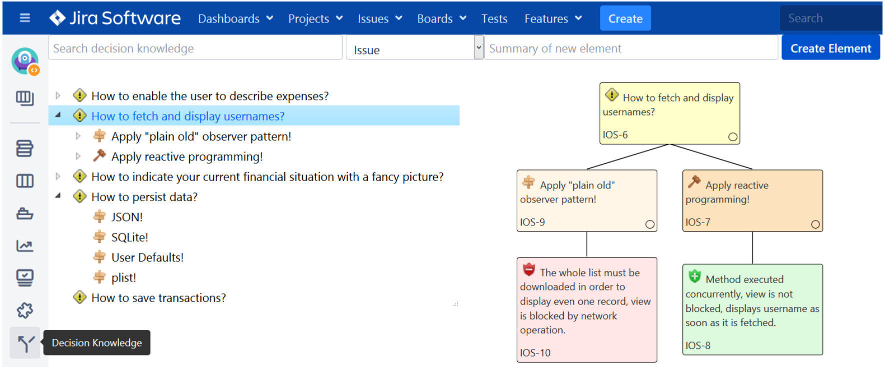
- Why? Address rationale capture problem by teaching rationale management

⇒ Lecture on rationale management to motivate students

- Duration: 90 minutes
- Covers theoretical part and six exercises
- First instantiation November 8, 2018 @iPraktikum @TUM

Lecture on Rationale Management: Prerequisites

- Students grouped into teams, web-connected devices
- JIRA, Confluence, Slack (Polly App)
- JIRA ConDec plug-in (available via Atlassian Marketplace)
- For every team: JIRA and Confluence project



- How to enable the user to describe expenses?
- How to fetch and display usernames?
  - Apply "plain old" observer pattern!
  - Apply reactive programming!
- How to indicate your current financial situation with a fancy picture?
- How to persist data?
  - JSON!
  - SQLite!
  - User Defaults!
  - plist!
- How to save transactions?

How to fetch and display usernames?
IOS-6 ○

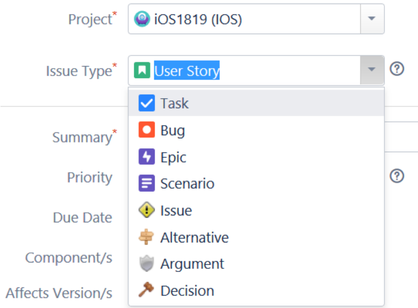
Apply "plain old" observer pattern!
IOS-9 ○

Apply reactive programming!
IOS-7 ○

The whole list must be downloaded in order to display even one record, view is blocked by network operation.
IOS-10

Method executed concurrently, view is not blocked, displays username as soon as it is fetched.
IOS-8

Capturing Rationale in JIRA



Project* iOS1819 (IOS)

Issue Type* User Story

- Task
- Bug
- Epic
- Scenario
- Issue
- Alternative
- Argument
- Decision

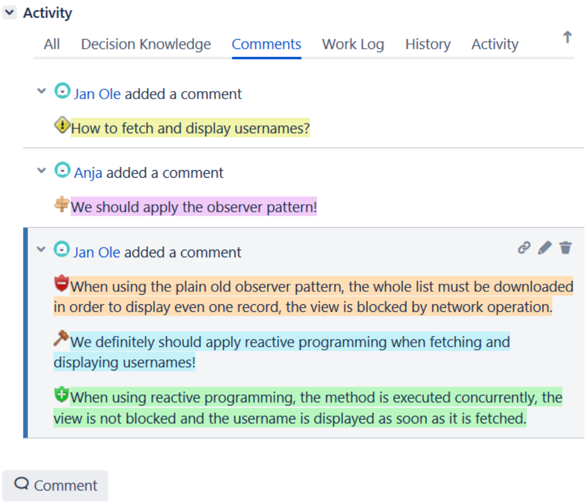
Summary*

Priority

Due Date

Component/s

Affects Version/s



Jan Ole added a comment

How to fetch and display usernames?

Anja added a comment

We should apply the observer pattern!

Jan Ole added a comment

When using the plain old observer pattern, the whole list must be downloaded in order to display even one record, the view is blocked by network operation.

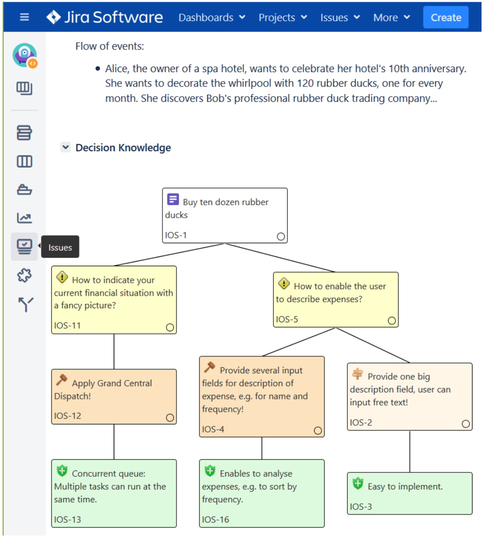
We definitely should apply reactive programming when fetching and displaying usernames!

When using reactive programming, the method is executed concurrently, the view is not blocked and the username is displayed as soon as it is fetched.

Students' Exercises

Number of Issues

Find the scenario documented in the project.
How many issues are linked to the scenario?



Flow of events:

- Alice, the owner of a spa hotel, wants to celebrate her hotel's 10th anniversary. She wants to decorate the whirlpool with 120 rubber ducks, one for every month. She discovers Bob's professional rubber duck trading company...

Decision Knowledge

Buy ten dozen rubber ducks
IOS-1

How to indicate your current financial situation with a fancy picture?
IOS-11

How to enable the user to describe expenses?
IOS-5

Apply Grand Central Dispatch!
IOS-12

Provide several input fields for description of expense, e.g. for name and frequency!
IOS-4

Provide one big description field, user can input free text!
IOS-2

Concurrent queue: Multiple tasks can run at the same time.
IOS-13

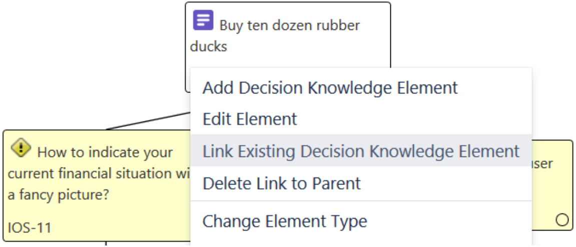
Enables to analyse expenses, e.g. to sort by frequency.
IOS-16

Easy to implement.
IOS-3

Students' Exercises

Linking Elements

Link the existing issue "How to save transactions?" to the scenario.

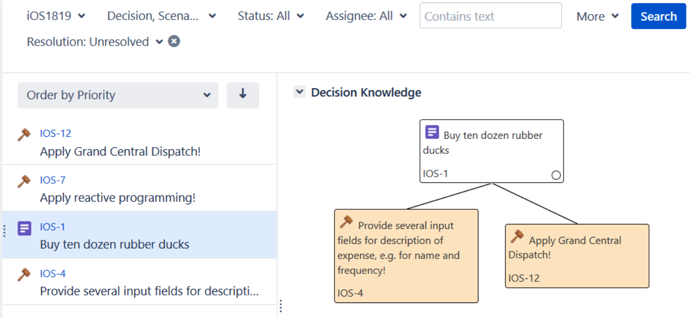


Buy ten dozen rubber ducks
How to indicate your current financial situation wi a fancy picture?
IOS-11
ıser
Add Decision Knowledge Element
Edit Element
Link Existing Decision Knowledge Element
Delete Link to Parent
Change Element Type

Students' Exercises

Filtering

Filter the element types so that only the scenario and decisions are shown in the rationale tree.



iOS1819 ⌄ Decision, Scena... ⌄ Status: All ⌄ Assignee: All ⌄ Contains text

Resolution: Unresolved ⌄

Order by Priority ⌄

IOS-12
Apply Grand Central Dispatch!

IOS-7
Apply reactive programming!

IOS-1
Buy ten dozen rubber ducks

IOS-4
Provide several input fields for descripti...

Decision Knowledge

Buy ten dozen rubber ducks
IOS-1

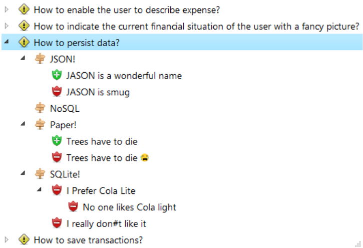
Provide several input fields for description of expense, e.g. for name and frequency!
IOS-4

Apply Grand Central Dispatch!
IOS-12

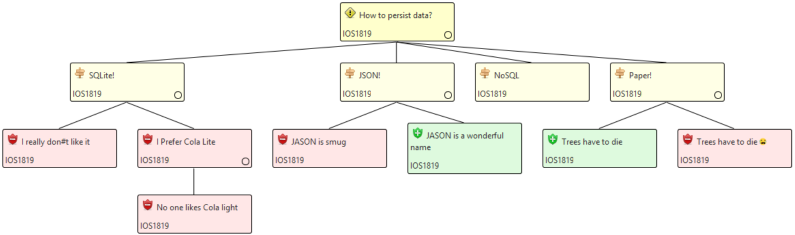
Students' Exercises

Discuss in Team

Create a new issue “How to persist data?”. Add the following alternatives: “JSON!”, “SQLite!”. Discuss and capture pro and cons of each persistence alternative in your team. Add more alternatives and make a decision.



- ▷ How to enable the user to describe expense?
- ▷ How to indicate the current financial situation of the user with a fancy picture?
- ◢ How to persist data?
  - ◢ JSON!
    - JASON is a wonderful name
    - JASON is smug
  - NoSQL
  - ◢ Paper!
    - Trees have to die
    - Trees have to die 😫
  - ◢ SQLite!
    - ◢ I Prefer Cola Lite
      - No one likes Cola light
    - I really don#t like it
- ▷ How to save transactions?

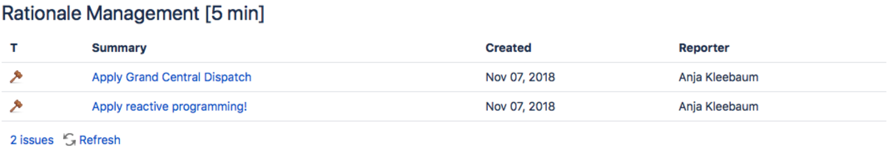


- Every student contributed a mean value of 1.4 rationale elements

Students' Exercises

Import Rationale into Meeting Agenda

Open your Confluence space and create a new page called <Rationale Lecture> (one per team). Create a sub-page called <Your Name> (every team member). Use the JIRA Issue/Filter macro to display decisions from your JIRA project. Answer the question: How many decisions do you see?

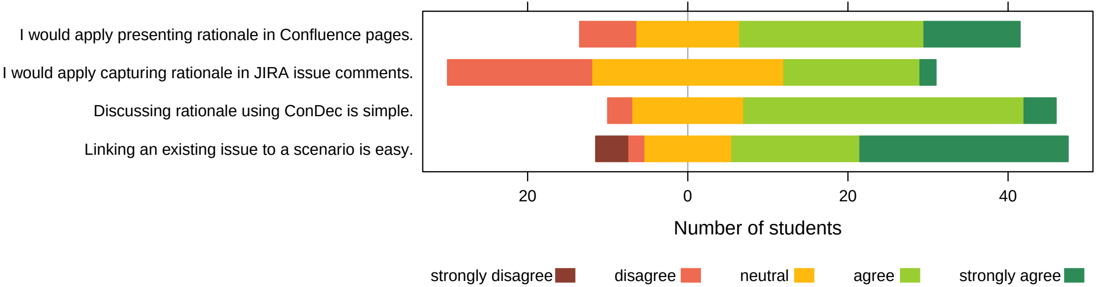


Rationale Management [5 min]

T	Summary	Created	Reporter
🔨	Apply Grand Central Dispatch	Nov 07, 2018	Anja Kleebaum
🔨	Apply reactive programming!	Nov 07, 2018	Anja Kleebaum

2 issues Refresh

First Evaluation



- Many elements make it hard to get overview
- Rationale elements should not always be a single ticket (ticket-overflow)

Conclusion and Upcoming Work

- Students comprehend the usage of rationale model
- Rationale management during the agile project course
- Role of rationale manager
- Collection of feedback using a questionnaire

Selected References

- Bruegge, B., Krusche, S., & Alperowitz, L. (2015). "Software Engineering Project Courses with Industrial Clients". In: *ACM Transactions on Computing Education* 15.4, 17:1–17:31.
- Dutoit, A. H., Wolf, T., Paech, B., Borner, L., & Rückert, J. (2005). "Using Rationale for Software Engineering Education". In: *18th Conference on Software Engineering Education and Training (CSEE&T)*. Ottawa, Canada: IEEE, pp. 129–136.
- Kleebaum, A., Johanssen, J. O., Paech, B., Alkadhi, R., & Bruegge, B. (2018a). "Decision knowledge triggers in continuous software engineering". In: *4th International Workshop on Rapid Continuous Software Engineering (RCoSE)*. Gotheburg, Sweden: ACM, pp. 23–26.
- Kleebaum, A., Johanssen, J. O., Paech, B., & Bruegge, B. (2018b). "Tool Support for Decision and Usage Knowledge in Continuous Software Engineering". In: *3rd Workshop on Continuous Software Engineering*, pp. 74–77.
- Malloy, J. & Burge, J. (2016). "SEURAT_Edu: A Tool to Assist and Assess Student Decision-Making in Design". In: *47th Technical Symposium on Computing Science Education (SIGCSE)*. Memphis, Tennessee, USA: ACM, pp. 669–674.