Creativity and Innovation in Requirements Engineering

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Structure

Introduction

- What is creativity?
- How does it fit into requirements elicitation?

Current state in research and practice

- Traditional techniques
- Problem analysis
- i*, KAOS and RUP
- Innovation management

Background

- Creative process
- Future
- Innovation in the long term
- “Invention is part of the design process”

Background

- Knowledge of individuals.
- Requirements are an abstraction of these ideas.
- Restriction of design to the design phase.

Background

- To conclude: **Creative requirements engineering techniques and idea gathering are important for the innovation of a product, project or company. The biggest issues are lack of available methods, awareness and risk-aversity. We will now introduce two techniques that aim at eliciting new, innovative requirements.**

RESCUE

Background

- Creativity theory
- Concurrent engineering process with different modelling and analysis techniques
- System goal and use-case modelling

RESCUE

Principles

- Based on creativity workshops to support three different models from creativity theory

1. Divergence and convergence
2. Exploratory, combinatorial and transformational
3. Preparation, Incubation, Illumination and Verification.

RESCUE

Experience

- Six iterations
- 200 ideas
- Refinements
- Use-cases
- Brain storming, Constraint identification and removal
- Analogical mappings
- Visualization

RESCUE

Experience

Findings:

- First iteration
- 200 ideas by 20 people
- Learnings and improvements
- Existing creativity theories are not sufficient

RESCUE

Experience

Findings:

- Last iteration
- Brainstorming vs analogical reasoning
- Combining ideas during storyboard development
- Removing constraints
- Timing
- One-day workshops

Star Search

Background

- Focus on short-term financial security makes is harder to see beyond today's needs and distinguish between ongoing and soon-to-be initiated projects
- This leads to incoming requirements concentrate around current projects
- However, it is necessary to look forward (especially in software companies) to achieve long-term success

Star Search

Idea

- Companies use their employees' capability for innovation because the development organization must have a deeper domain-understanding than a customer that usually uses a company's products in a single domain. (Robot Example)
- Making innovation a part of day-to-day business

Star Search

Requirements for such a System

- Proper decision making processes and justification materials that help balancing long term innovation with indispensable short term development efforts
- Focus on long-term Requirements
- Inputs from entire organization (devs, sales, etc.)
- Cost effective
- Produces quality material that managements can base their decisions on

Star Search

Process (4 Steps)

1. Call for Innovation
2. Audition (Value Case)
3. Preparation (Business Case)
4. Decision (Business Case)

Star Search

Step 1: Call for Innovation

- Made by Audition Group (AG) chair
- Can be directed towards a certain product line or process
- Make form and information available to all people
- People/Groups with ideas sign up

Star Search

Step 2: Audition

- Informal setting with AG
- Flexible presentation/discussion style
- Important to give feedback to contender
- If case is dismissed, give reasons and publish case with reasoning
- Create Value Case (light version of a business case)

Star Search

Step 3: Case Preparation and Screening

- AG passes value cases from auditions to the Case Preparation Group (CPG)
- CPG focuses on further refining the case into a in-depth business case
- Contender my be consulted
- Consult with experts to assess feasibility and long-term impact
- Should a case be dismissed at this stage, the same “rules” apply as in the Audition Step

Star Search

Step 4: Case Decision

- CPG passes business cases to the company's Case Decision Group (CDG)
- CDG already exists in all software development companies
- Bring Star Search cases into requirements selection and priorization in addition to regular business cases

Star Search

Results and Conclusions

- Authors ran Star Search for 1 year at different organizations
- Generally positive results
- Face-to-face meetings are favored by employees, compared to static/passive techniques of innovation
- Fast feedback and immediate discussion of ideas considered more important than thorough evaluation

Company 1

- 25% increase in innovation candidates on roadmap
- 25% of of items in development-pipeline are from Star Search cases

Company 2

- 1 innovation candidate per 10 employees
- 5% of all innovation candidates make it to market

Comparison and Conclusion of the two Processes

Comparison of RESCUE and Star Search

When

- RESCUE is performed after the project's scope and goals have been defined
- The ideas are supposed to occur during the workshops
- Star Search can be applied to already existing products and processes, as well as products that are still in their planning phase (long-term focus)
- Ideas occur during day-to-day work and are presented when a call for innovation was made

Comparison of RESCUE and Star Search

How

- RESCUE is based on workshops where the initial goal is to find as much ideas possible due to the techniques used that encourage open mindedness
- Star Search is centered around interaction and feedback between the employee(s) that submit ideas and the employees that screen ideas (AG, CPG, CDG)
- This enables a filtering of ideas during the process

Comparison of RESCUE and Star Search

Inputs and Outputs

- RESCUE starts with a rough use case
- Produces an operation specification sheet for the project
- Star Search starts with a call for innovation in a certain field
- Successful ideas get transformed into a business case for future requirements