Creativity and Innovation in Requirements Engineering

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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

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

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

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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

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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

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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

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Process (4 Steps)

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

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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

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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)

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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

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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

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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/Conclusion of the two