

# Creativity and Innovation in Requirements Engineering

Luc Boillat, Jan von der Assen

# 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.**

# 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 it 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 may 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 prioritization 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 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