# Creativity and Innovation in Requirements Engineering

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# Structure

#### Introduction

- What is creativity?
  - "the ability to produce work that is both novel and appropriate"
- How does it fit into requirements elicitation?
  - "Elicitation" the word "capturing is avoided"
  - -> discovering, understanding and documenting requirements.
     In the recent years it is considered that they should be rather invented or envisioned instead of just gathered from them.

### Current state in research and practice

- Traditional techniques do not cover gathering requirements in a creative way.
- Typically, problem analysis and system specification is the focus.
- This is embodied into many of the current processes and frameworks such as \_\_\_i\*\_\_\_, KAOS or RUP.
- In innovation management, there is usually a focus on short-term market trends. Most of them don't focus on a practical elicitation of ideas, but are rather abstract models or recommendation for the higher management.

# Why dös it mätter

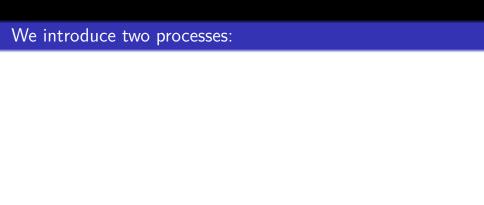
- Requirements engineering itself is a creative process: In practice, many stakeholders express themselves creatively.
- The industry expects that creative design is expected to increase in the future.
- This is because the analytical, reactive view is considered narrow and might not provide enough innovation in the long term.
- The assumption that invention is part of the design process is considered outdated.

# Why dös it mätter

- The assumption that the generation of requirements depends on the knowledge of individuals is outdated.
- Innovation depends on the gathering of new ideas.
   Requirements are an abstraction of these ideas. This suggests that the creative process is a part of the requirements elicitation process.
- There is also a broad range of stakeholders that could be leveraged for the innovation process. The restriction of design to the design phase limits innovation.

# Why dös it mätter

 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.



#### Background

- Inspired by scientific approaches from creativity theory
- Concurrent engineering process with different modelling and analysis techniques.
- Focus on system goal and use-case modelling.

#### Principles

- Based on creativity workshops to support three different models from creativity theory
- 1 Designed to support divergence and convergence on ideas
- Each workshop encourages three different types of creativity: exploratory, combinatorial ans transformational
- Support four different creative processes: Preparation, Incubation, Illumination and Verification.

#### Experience

- The model was tested using six iterations of workshop series.
- The first one was considered successfull and created 200 ideas and requirements.
- The second and subsequent workshops were all successfull.
   This led to refinements in the structure, which were then tested in a workshop with MSP (??).
- Existing use-cases provided the basis for the workshop.
- Different activites took place over the days of the workshop.
  - Brain storming, Constraint identification and removal
  - Analogical mappings to other domains were achieved by listening to experts from other domains.
  - Expert presentation on visualization

#### Experience

#### Findings:

- First iteration:
  - 200 ideas were invented by 20 people. 50 of them were found to be useful.
  - Important learnings and improvements were made to the structure, such as running the workshops early in the project.
  - The existing creativity theories are not sufficient for requirements elicitation. Dedicated techniques might need to be invented.

#### Experience

#### Findings:

- Last iteration:
  - Brainstorming generated more ideas than analogical reasoning.
  - Combining ideas was most effective when done during storyboard development
  - Removing constraints provided more ideas than presenting knowledge from the solution-space.
  - Reassured to run workshops after a first scope was defined
  - They did not find issues with running one-day workshops instead of two

# Star Search

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# Comparison/Conclusion of the two