

Topic C

The Role Of Creativity in Requirements Engineering

Creativity

Definition by Sternberg:

“the ability to produce work that is both novel (i.e. original, unexpected) and appropriate (i.e. useful, adaptive concerning task constraints)”.

RESCUE

Requirements Engineering with Scenarios for User-centered Engineering

Kinds Of Creativity

- **Exploratory Creativity**

Explore similar domains to create new ideas

- **Combinatorial Creativity**

Create new ideas by combination and synthesis of existing ideas

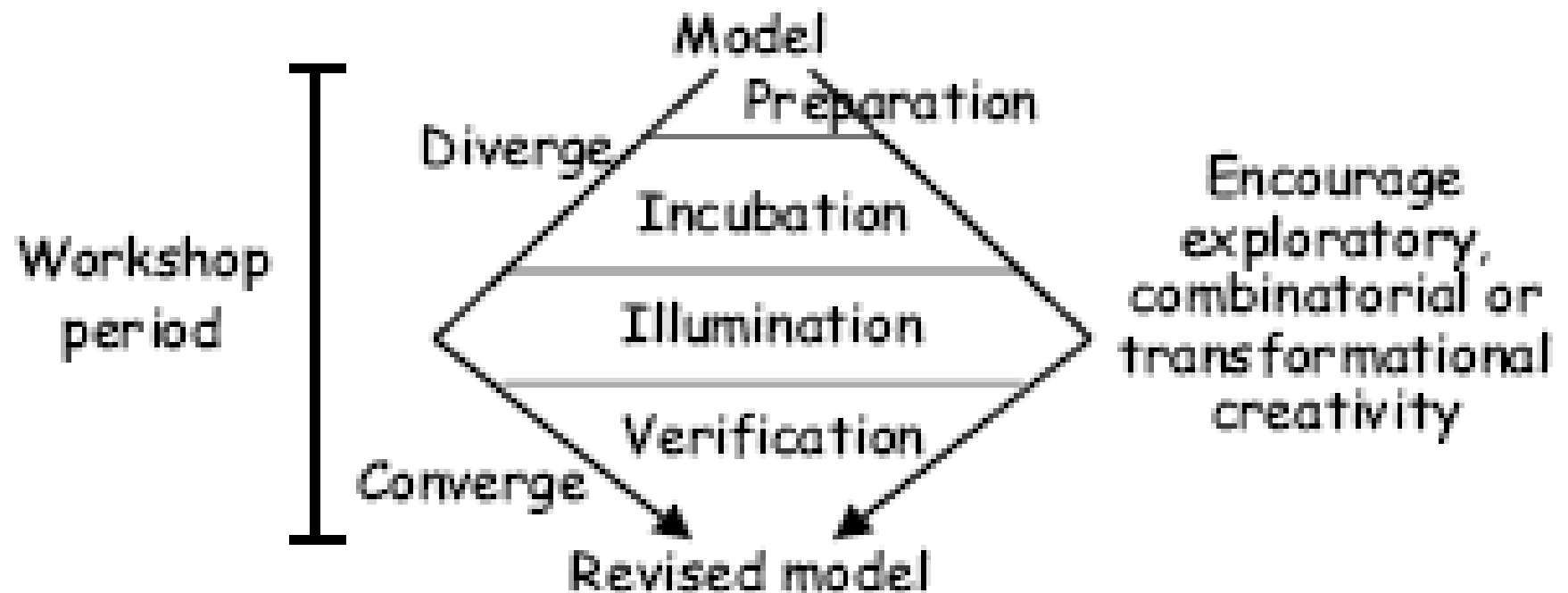
- **Transformational Creativity**

Change the solution space in a way, that things that were considered impossible are now possible

Creative Processes

- Preparation
- Incubation
- Illumination
- Verification

Creativity Period



Model of a creativity period applied in the creativity workshops.

CORA-2

Conflict **R**esolution **A**ssistant

Air traffic management System, which provides computer based assistance to air traffic controllers.

Approach

- Generating initial requirements by brainstorming and interviewing
- **Creativity Workshops** to generate requirements and design ideas for CORA-2

The First Workshop I

Exploratory Creativity

Invitation of a **textile expert** and a **musician** to find analogies between those domains.

ATM domain	Textile domain	Music domain	Generalization
Air Traffic Controller	Textile Designer	Music Composer	Human Agent seeking a solution to a problem
Conflict resolution	Textile pattern	Musical piece	The problem's solution

The First Workshop II

Illumination Phase: Transfer the analogies to the ATM domain and create requirements from those elements.

Example:

An elegant textile design: *simple, beautiful, symmetrical*

→

Elegant resolution strategy: *strategies that are simple (minimum maneuvers) and give pride to the controllers who implement them.*

The Second Workshop

Combinatorial Creativity

Develop **worst-case** scenarios in groups.

The groups randomly received objects to include in the scenario (for example binoculars, perfume or a flashlight).

This procedure leaded to unusual scenarios. These were used to create ideas how CORA-2 would handle those situations.

The Third Workshop I

Transformal Creativity:

Participants investigate pairs of existing CORA-2 requirements and ideas to create new ones from unforeseen combinations

The Third Workshop II

Example:

“Air traffic controllers should maintain an accurate mental model of the air space”

+

“CORA-2 shall offer new types of situational display to air traffic controllers”

→

“CORA-2 shall allow air traffic controllers to rewind and fast-forward aircraft movements to develop their mental models of the air space before taking responsibilities for decisions that they will make.”

MSP

Multi-Sector Planning
of aircraft movement within Europe.

The First Workshop I

Inputs: system context diagram, use case diagrams and use case précis for the MSP system

1st Day Activities:

- system-wide and use case-specific brainstorming
- constraint identification
- constraint removal
- group brainstorming assuming the removal of selected constraints.

The First Workshop II

2nd Day Activities:

- Expert presentation on intelligent highway systems
- Generate MSP ideas using analogical mappings between highway management and air traffic
- Integrate those ideas to storyboards to elaborate the priority MSP use cases

Outputs: use case précis that were elaborated with storyboards

The Second Workshop

Inputs: use case diagrams and précis that had been updated from the first workshop

Activities:

- Expert presentation on contract negotiation as a basis for generating new MSP ideas about airspace using analogical mappings
- fusion cooking (the innovative combination of ingredients from different cultures) to demonstrate combinatorial creativity

Outputs: use case précis that were again revised and elaborated with storyboards and a significantly revised system context diagram

The Third Workshop

Inputs: Outputs from the second workshop

Activities:

- expert presentation on information visualizations to generate candidate MSP representations of the scheduling space
- a professional scriptwriter presented the process for writing film scripts as a basis for developing rich MSP storyboards that integrated results from the previous workshop activity

Output: two 5m-long storyboards that structured ideas generated during the 3 workshops