

## Sustainable Management of Natural Resources

**Introduction.** This paper describes in a summarised form the content of the workshop. The objectives were threefold:

1. To learn about the dynamics of natural resource management and the tragedy of the commons by means of a direct experience in the simulation game «NEW COMMONS GAME».
2. To acquire an insight into the methodology of simulation and gaming in respect to natural resources and sustainable development.
3. To know which factors are relevant if a commons resource should be preserved from destruction, with examples from different countries.

Content of the workshop:

1. Simulation Game Baregg-Tunnel: Interactive introduction with short simulation game.
2. Introduction to the tragedy of the commons in relation to the management of natural resources and success factors of their management.
3. Simulation game «NEW COMMONS GAME» (briefing, simulation, debriefing).
4. Methodology of simulation and gaming (short theory).

**1) Simulation Game «Baregg-Tunnel».** This simple simulation game, created by the author of this article, illustrates – despite its simplicity – in a lucid manner the dynamics that arise when a group of anonymous users exploit a common resource. It is fully documented in [1]. The name refers to a highway tunnel close in the suburbs of Zurich, Switzerland, where regular traffic jams occur.

Theme: Direct experience of the «Tragedy of the Commons» (over-exploitation of common goods, such as traffic system, fishery, air quality, etc.).

Subjects: Natural sciences, economics.

Time/participants: 15-20 minutes; up to 30 participants and more.

Material: For every participant: a red and a blue card, size 10x15cm envelope; paper and pencil.

Room: Can be played in all types of rooms.

Rules:

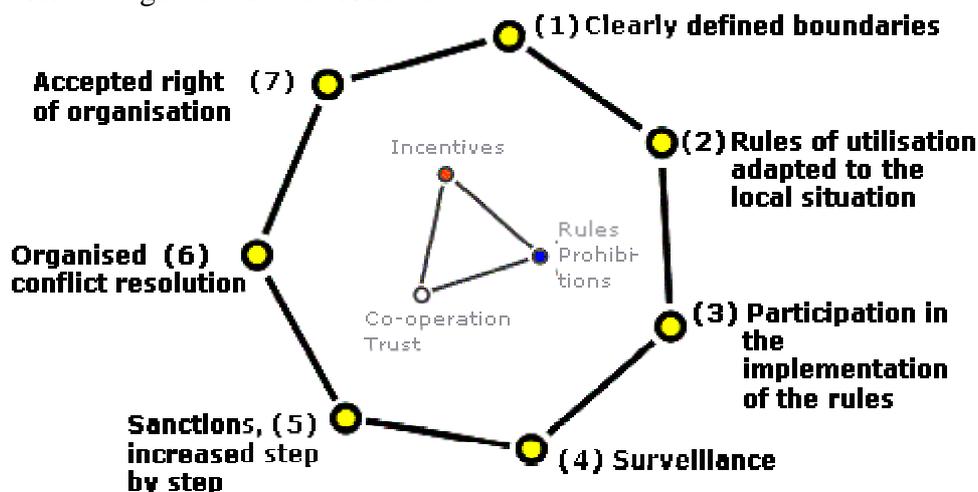
- The participants, in the role of commuters, decide in every round whether they go to work by train (red card) or by car (blue card), and, they gain points depending on the results. The points signify «time-savings» or «life-quality».
- As soon as a new round starts participants take their decision, without talking to the others. After 30 seconds they «go to work», i.e. they hold up the card in the colour of their selection.
- The facilitator counts the cards. If more than 50% of the commuters took the car, there is a traffic jam at Baregg-Tunnel. (The %-limit can be varied).
- Points: train: 5 points; car, no traffic jam: 15 pts; car, jam: 0 pts.
- After 3-5 rounds debriefing starts.

**2) Tragedy of the commons and management of natural resources.** Users of natural resources are often confronted with system characteristics known as «tragedy of the commons». It can be summarised as:

«The rational decisions of all individuals result in an irrational dilemma for the entire group. The freedom ends tragically.»

This «social trap» is the theme of the simulation game «New Commons Game». Elinor Ostrom [2] explored the dynamics of numerous commons (the Alps, fisheries, groundwater

systems, irrigation systems). She identified seven factors that are crucial for a long term sustainable management of the resource:

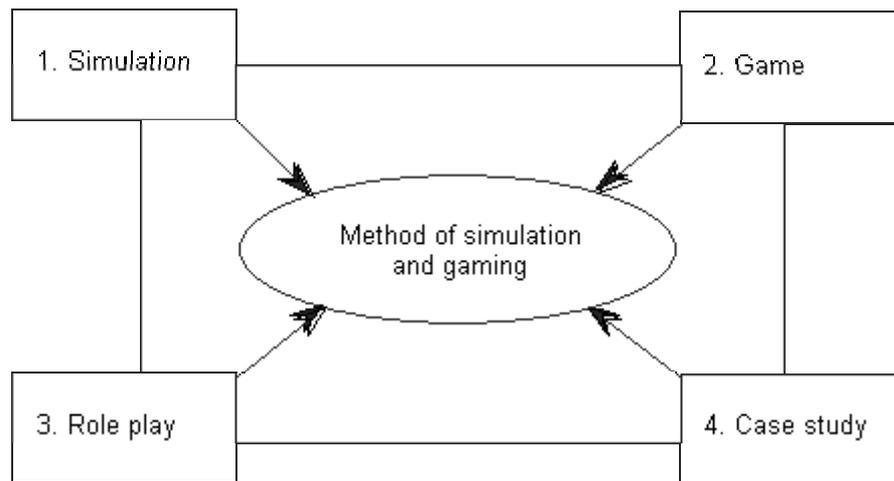


3) «NEW COMMONS GAME». The theme of the New Commons Game is the dilemma between short-term profits and sustainable management of resources, shown with the example of ocean fishery. Specifications of the simulation game:

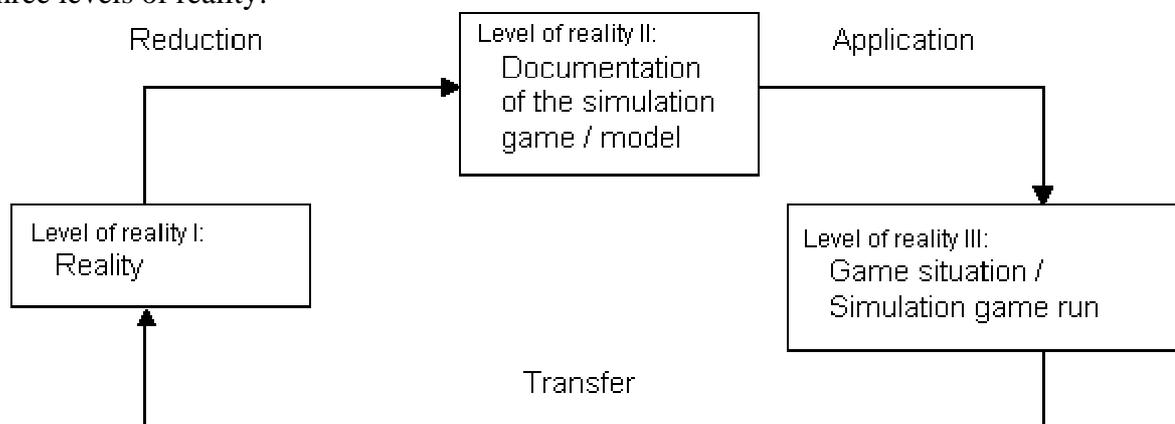
- 6-24 participants, duration: 2-6 hours.
- Content:
  - system thinking (ecological and social systems, free / public resources);
  - egoistic vs. altruistic behaviour;
  - strategies for the sustainable management of resources: incentives; prohibition/rules; communication/co-operation/trust.
- Subjects:
  - natural sciences, economy, social skills.
- Objectives:
  - every team tries to maximise its number of points; however:
    - the more points, the faster the depletion of the resource;
    - realise profits in such a way, that points can be gained over many rounds of play;
  - to experience the tragedy of the commons in a direct, personal way;
  - to develop and test strategies that can overcome the tragedy of the commons;
  - comparison of the simulation game experience with reality.

All participants took part in a run of the New Commons Game. The simulation game was followed by a short debriefing on the dynamics of the tragedy of the commons and natural resource management. After the simulation game, the methodology of simulation and gaming was addressed.

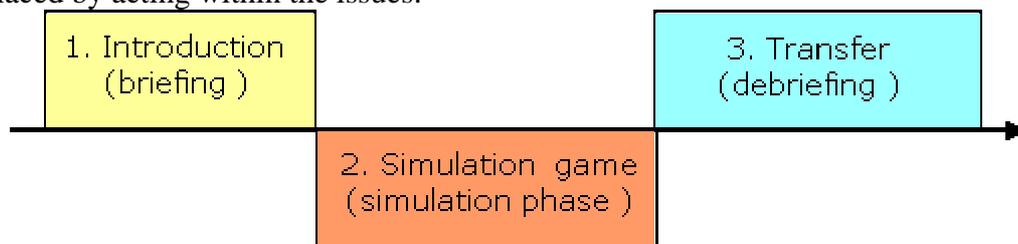
4) **Methodology of simulation and gaming.** The methodological origins of the method of simulation and gaming are fourfold, as indicated by the graph below. Some of the simulation games show elements of all of the four basic methods while others emphasise only one or two of the basic methods.



The basic didactical principle of simulation & gaming lies in the close combination of three levels of reality:

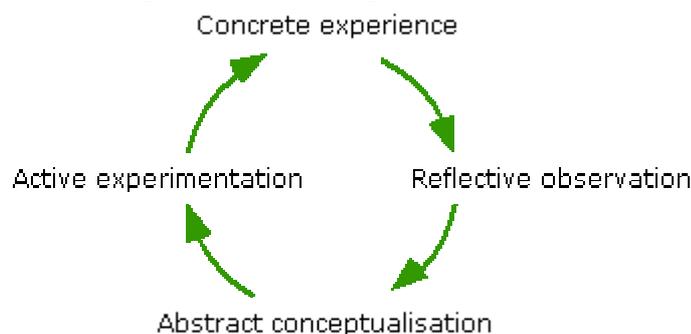


There are three phases that take place during simulation games. During the simulation phase, the participants enter („dive») into a simulated reality, and the discussion about issues is replaced by acting within the issues:



The debriefing links the experience of the game to the real world. It is this phase that is most crucial for learning through simulation games. It closes the loop of experiential learning [3] by a systematic reflective observation and abstract conceptualisation.

Experiential learning (David Kolb):



***Literature:***

[1] Roman Capaul / Markus Ulrich: PLANSPIELE – Simulationsspiele für Unterricht und Training. Mit Kurztheorie: Simulations- und Planspielmethodik (in German). Tobler Verlag Altstätten, 2003, ISBN 3-85612-151-X. Further information: [www.ucs.ch](http://www.ucs.ch)

[2] Elinor Ostrom: Governing the Commons: The Evolution of Institutions for Collective Action. New York: Cambridge University Press, 1990. Also available in German: Elinor Ostrom: Die Verfassung der Allmende. Mohr Siebeck, 1999, ISBN 3-16-146916-X.

[3] Kolb, David A. (1984) Experiential Learning – Experience as the Source of Learning and Development. Prentice Hall.