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Workshop # 2

Exercise on

Creativity and Innovation

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Creativity and Innovation

STENUM Ltd.

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Creativity

Creativity: lat. creare - create, generate, bear

- Creativity is the capability of people to bring forth thinking results which are principally new and have been unknown to the one who has come to them.
- Creativity can be the forming of new systems and new combinations of already known informations as well as the transformation of known relations to completely new situatuions.
- A creative action has to be intentional and must have an aim. It must not be useless and phantastic.

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Creativity and thinking processes

- Convergent thinking is a fixed, narrow but also logical way of thinking, which proceeds well planned in systematic steps.
- Divergent thinking is a free, disordered and phantastic way of thinking, which can not be followed logically.
- Productive creativity is controlled divergency. Creative thinking is a kind of divergent thinking which is adapted to reality. Creativity is a synthesis of divergent and convergent thinking.

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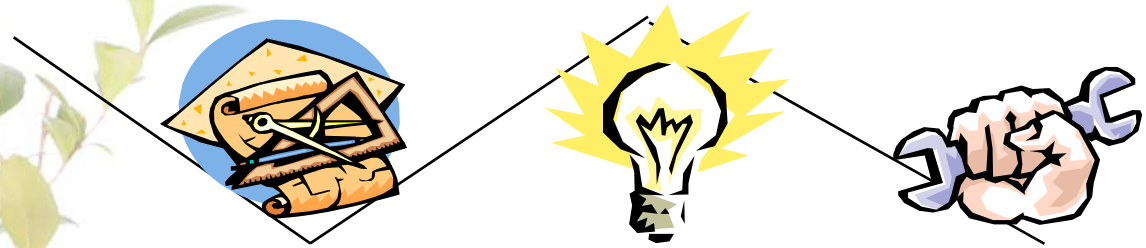
Phases of creative problem solution



Problem raising → **Problem analysis** → **idea finding** → **evaluation** → **realisation**

concentration ← **checking**

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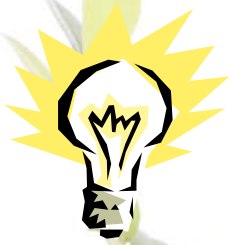

Factors of creative efficiency

Individual factors

- Personality characteristics
- Age
- Knowledge and Intelligence
- Motivation, stress

Organisational factors

- Hierarchy
- Autonomy
- Style of leadership
- Information, communication
- Safety, openness
- Standardisation

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Methods of idea finding

- Breaking up:
  - Morphological analysis
  - Progressive abstraction
- Linking up:
  - Brainstorming
    different ways like classical, imaginary, anonymous, stop and go
  - Brainwriting
    Analogy
  - Synectic, Bionik (techn.sol. based on nature)

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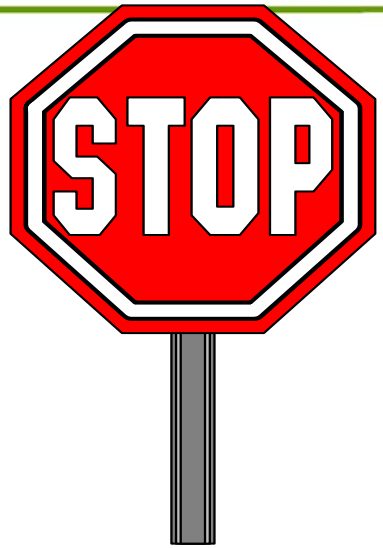
Thinking barriers



- Usual "Sets"
  - It simply is like that; it is right ; ...
- Wrong categories
  - generalisations, wrong pre-conditions
- Premature evaluation
  - Too early critics, typical idea killers
- Emotional insecurity
  - Fear of making a fool of ourselves
- Pressure of conformity
- Culturally determined barriers
  - Culture of logics and conclusions, no intuition
- Environmentally determined barriers
- Barriers of intellect

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Implement envntl. projects: 2 ways

Measure oriented

- Quickly realisable ideas
- Reasons of the envn. Problems are well known
- improvement possibilities are known

↓

Quick implementation

Problem oriented

- complex envn. problems or approaches
- reasons and measures are not clear, a better analysis is necessary
- Setting goals is necessary

↓

Take the problem at its root

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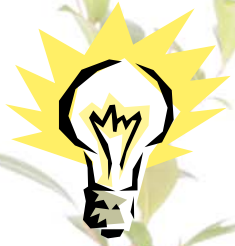
Take envntl. problems at the root



Phase 1: Check the necessary actions

Phase 2: Plan the environmental project

Phase 3: Implement

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Check the necessary actions

Phase 1

Decision for envn. protection

Acute envn. problem

Define the environmental profile

Identify starting points

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Phase 2

Plan the envn. project

Envn. problem / describe the starting point/approach

↓

Find out the reasons

↓

Set goals and measures: project plan

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Implement the envn. project

Implement the project plan

Controlling of the success

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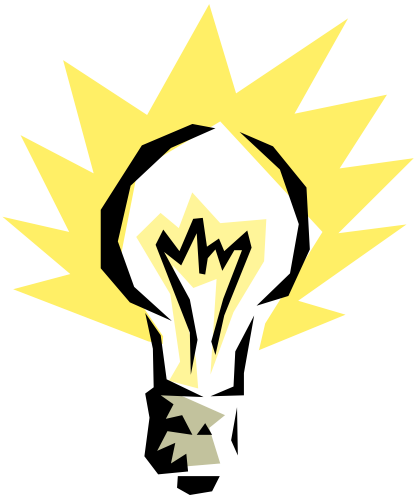
Find starting points: What

Reduce the Input?

1. Big quantities
2. Expensive materials
3. Hazardous materials



Output (waste & emissions):

1. avoid?
2. reduce?
3. recycle?

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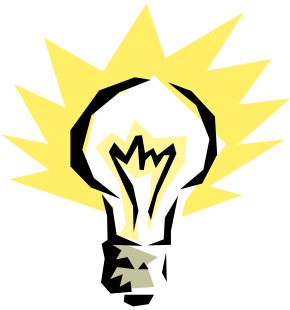
Find starting points: Where?

Sources

- **Analysis of the collected data (I/O-balance, waste management,...)**
- **Take into consideration acute envn. problems**
- **potential evaluation**
- **Collection of ideas**



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Describe the problem

Which envn. problem, which starting point/which approach do we use?

- **Common understanding in the environmental team**

What are the consequences of the problem?

- **On the environment**
- **financially**
- **on our customers**
- **on our clients**
- **on our organisation**

Relevance of the problem

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Brainstorming

4 principles

- Any kind of criticism is strictly forbidden!!
- Phantasy are not set any limits.
- Quantity comes before quality.
- Take up the ideas of the others and develop them further.

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Asking the right analysing questions

- Why is the problem important?
- Who is influenced by the problem?
- How did the problem came up?
- When turned the situation into a problem?
- What is the main reason/focus?
- What makes it so difficult?
- What further effects does the problem cause?
- How many further problems are caused?
- Over which approach did we earlier try to solve the problem?

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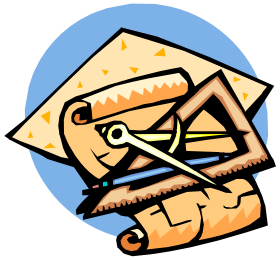
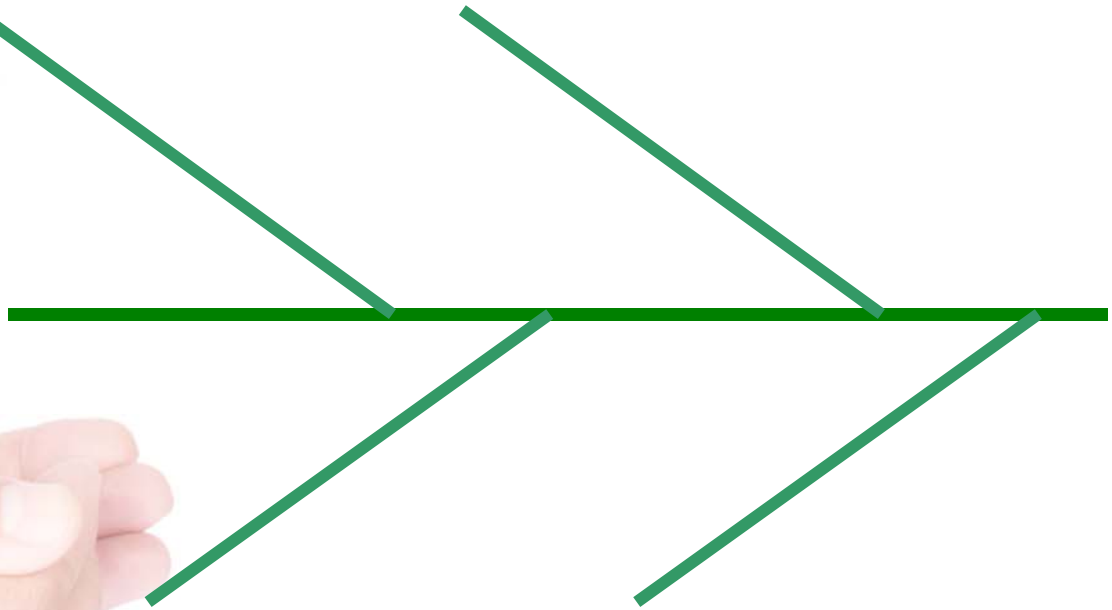
Order reasons: Fishbone-diagramme





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Order reasons: Fishbone-diagramme

people

machine

Way of driving

Bad maintenance

High gasoline consumption

High gasoline consumption

Old city maps

Bad tyres

Bad route planning

material

method

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Advantages of group working

- Cognitive effects: exchange of ideas, mutual inspiration
- Motivational effects: stronger identification of the single person with the team
- Communicational advantages: team - experts from differents departments-intensive exchange of information
- Team as responsible unit: common responsibility and tasks of the group members: team spirit
- Methodical advantages: most creativity techniques are only possible in groups

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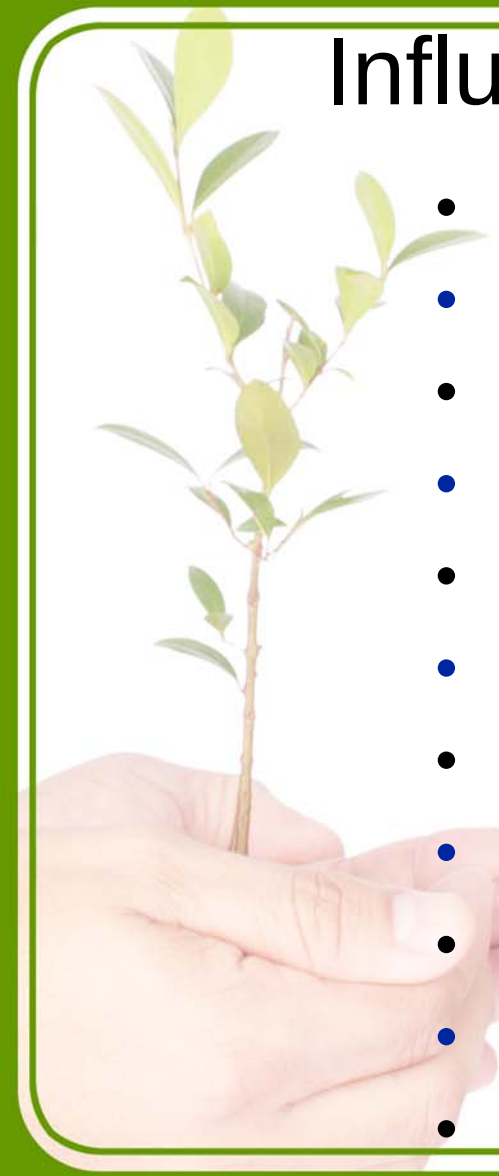
Influence factors on the group



- heterogenity/homogenity of expert knowledge
- age structure
- knowing each other from the beginning
- coming from different hierarchical levels
- „language“ barriers
- organisational structure of the group
- fluctuation of the member
- task
- leading the group
- internal change of roles
- group training

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Successful idea finding group

- 3-8 members from different areas
- social homogenity of the group
- co-ordinator (not necessarily: the chief!)
- informal and nice atmosphere
- a mixed group (men and women)
- not too long or too often meetings
- clear tasks with clear role definitions
- discussion: always objective, open!
- Critics should be open and objective!

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Creativity meeting

- **Rules of moderation**
- **Rules of discussion**
- **Techniques of visualisation**

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Creativity meeting
Planning and procedure

Organisation of the meeting

- Preparation
- Which participants?
- Infrastructure
- Definition of the roles
- Definition of the duration of the meeting

Realisation of the meeting

- Introduction, definition of the problem
- Definition of the working results
- Clearing the working method
- Common development of solutions
- Thank for the common work

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Creativity meeting
Evaluation and continuation

Checking the results

- Discussion of the results
- Evaluation
- Definition of open aspects
- Discussion of possible new approaches
- Agree on the next meeting

Taking the minutes

- Summing up all the possible solutions
- Take note of everything
- Pointing out the most interesting possible solutions!

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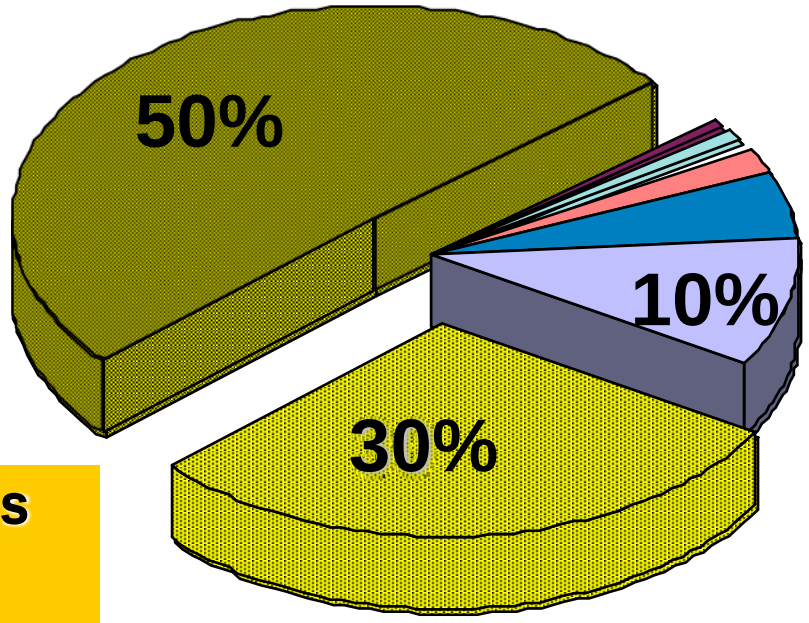
Evaluate reasons : 80/20 rule

Share of the reasons found for the environmental problem:



20 % of the reasons cause 80 % of the problems!

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Evaluate reasons: 80/20-rule

Find out the main reasons!!