

Course: Economics of Innovation

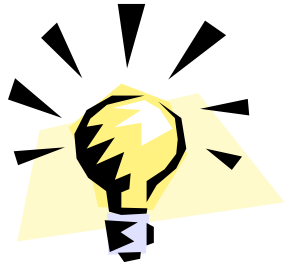
Topic: Can Nations Overcome the Barriers to Innovation?

PhD Bobur Tursunov



Creativity

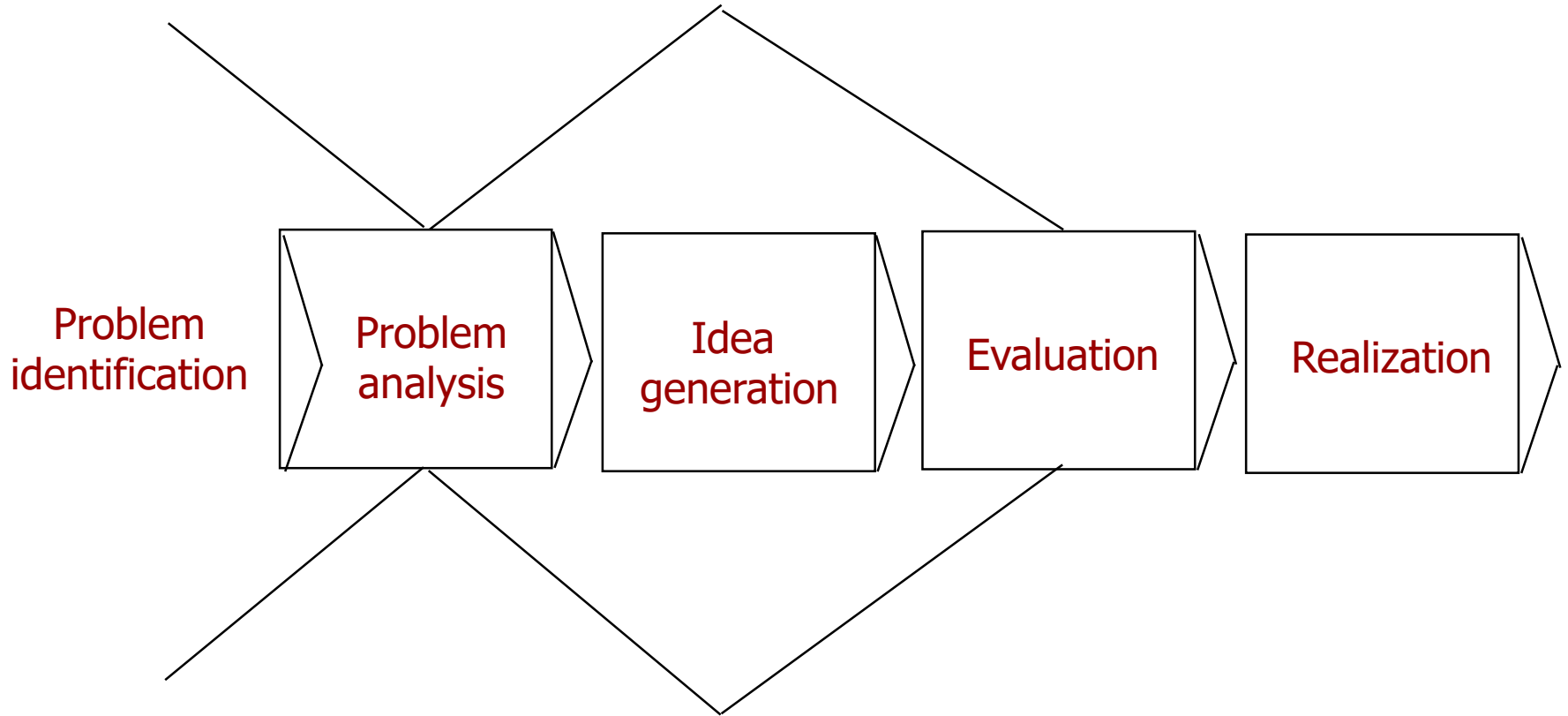
- Creativity is the ability to bring something new into being, something that did not exist before.
- Creativity comprises the development of entirely new systems, the combination of already known information as well as the transfer of known relations to completely new situations.
- A creative action has to be intentional and must have a purpose.



Creativity and the thought process

- Convergent thinking is a fixed, structured and logical way of thinking divided into systematic steps.
- Divergent thinking is a free, disordered and imaginative way of thinking which cannot be followed logically.
- Productive creativity is controlled divergence. Creative thinking is a type of divergent thinking which is adapted to reality.

Stages of creative problem solving



Factors of creative efficiency



- Personality
- Age
- Qualification
- Intelligence
- Motivation
- Stress
- Willingness to take risks

- Hierarchy
- Autonomy
- Management style
- Information, communication
- Working environment
- Uniformity of procedures

Innovation – 1



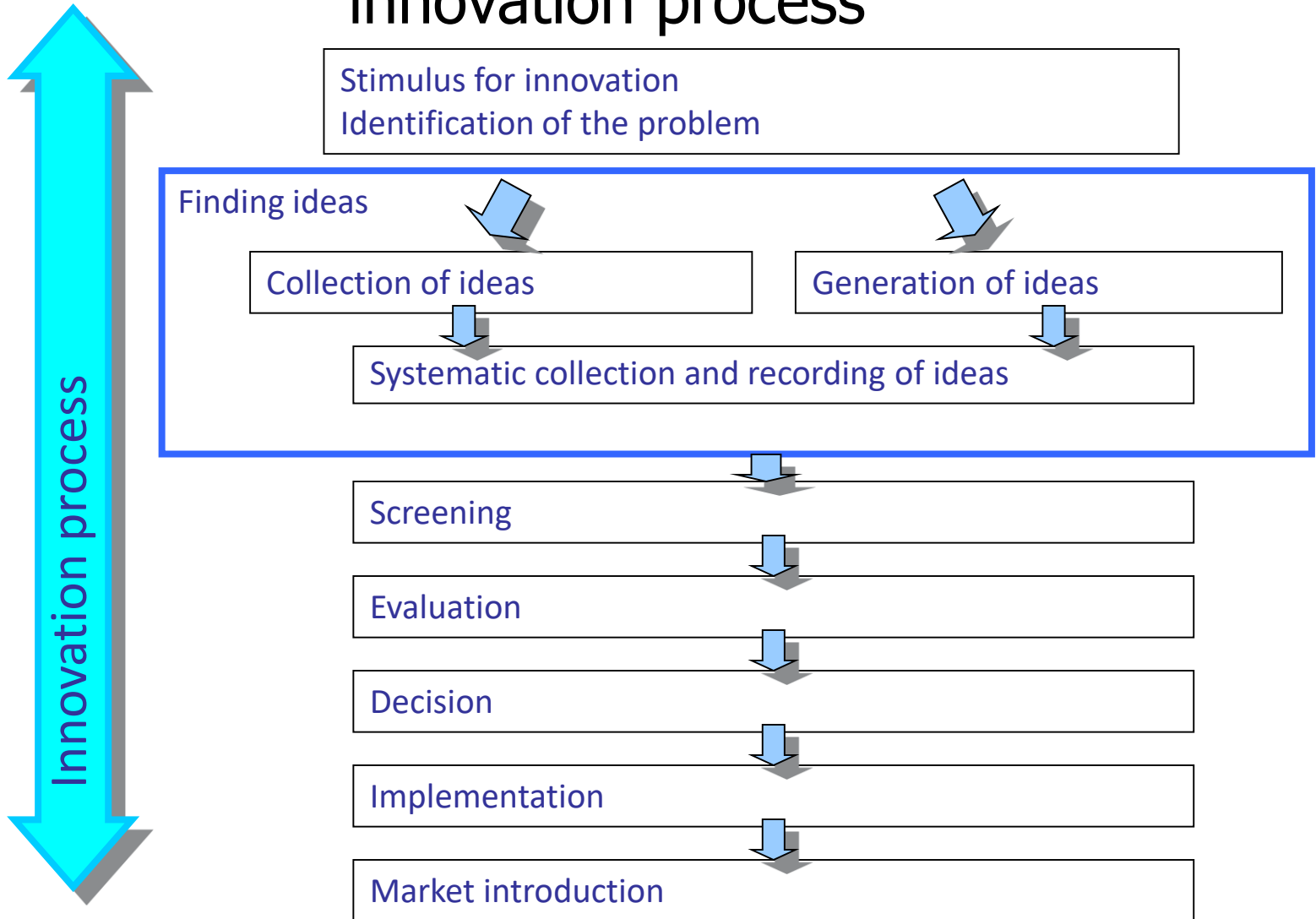
- Only the **economic implementation** of an idea can be called innovation. The innovation process comprises the generation of an idea, its acceptance (decision) and realization (implementation). Creative thinking is required particularly during the first stage of this process.
- A new idea is not inevitably the result of creative thinking but can be based on modification or imitation. What is more, not every creative process is followed by the implementation of an idea.

Innovation – 2



- Innovation includes any type of change performed on a process. At the beginning it is irrelevant, whether this change is new per se or if it is introduced in a particular company for the first time. Consequently the successful transfer of previously known solutions to new applications has to be considered an innovation.

Basic scheme of the innovation process



Methods of idea generation

- Splitting up:
- Linking:
- Analogy:



Thinking barriers

- Routines and habits
- Wrong categories
- Premature evaluation
- Emotional insecurity
- Pressure of conformity
- Cultural barriers
- Working environment
- Intellectual barriers



Brainstorming

Four principles



- Any kind of criticism is strictly forbidden!
- There are no limits to imagination.
- Quantity comes before quality.
- Take up the ideas of others and develop them.

Working group – your tasks



- Form groups of 3 – 5 persons.
- Describe your problem in the company. Use the W-questions.
- Use brainstorming techniques and consider the tips for moderation, visualization, etc.
- Evaluate the ideas using Worksheet 5-1.



Possible tasks – 1



1. A lighting manufacturer wants to develop a new work light, especially in view of a new target group of environmentally conscious customers (material, light sources).
2. A car repair shop wants to extend its services and is looking for new opportunities in the field of “mobility”.
3. A big shopping centre has problems with traffic congestions, especially at the weekends. Parking spaces are rare and cost a lot. The company looks for a solution which is not too expensive.



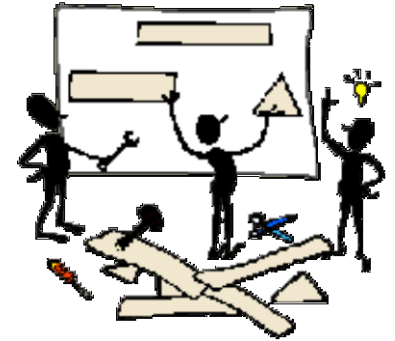
Possible tasks – 2

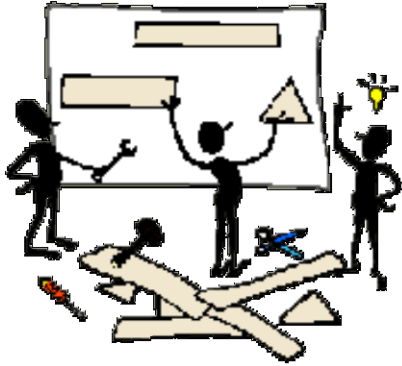


4. An interest group would like to introduce an environmental model administration.
5. A company responsible for waste disposal at an airport would like to discuss with the airlines how to separate waste in the aircraft. Which possibilities can you think of?

Successful idea generation group

- 3 – 8 members from different areas
- Social homogeneity of the group
- Coordinator (not necessarily the manager)
- Informal and pleasant atmosphere
- Mixed group (men and women)
- Meetings should not be too long or too frequent
- Clear tasks with clear definitions of roles
- Discussion: always objective, open
- Criticism should be open and objective





Creativity meeting

- Rules of moderation
- Rules of discussion
- Techniques of visualization





Creativity meeting Planning and procedure



- Preparation
- Participants
- Infrastructure
- Definition of the roles
- Definition of the time frame

- Introduction, definition of the problem
- Definition of the objectives
- Selection of working method
- Joint development of solutions

Creativity meeting

Evaluation and continuation

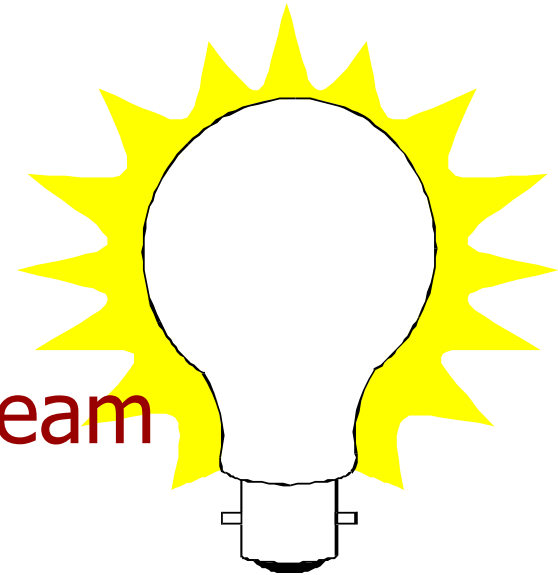


- Discussion of the results
 - Evaluation
 - Definition of remaining aspects
 - Discussion of possible new approaches
 - Definition of the next meeting
- Sum up all possible solutions
 - Take note of everything
 - Point out the most interesting possible solutions

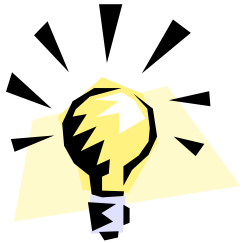


New, creative CP options

- Apply the CP methodology consistently
- Ask questions
- Brainstorming with staff in a team
- Adapt CP options from other sectors (i.e. cooling, compressed air, motivation of employees, etc.)
- ...



CP option generation



- Standard options
- New, creative options

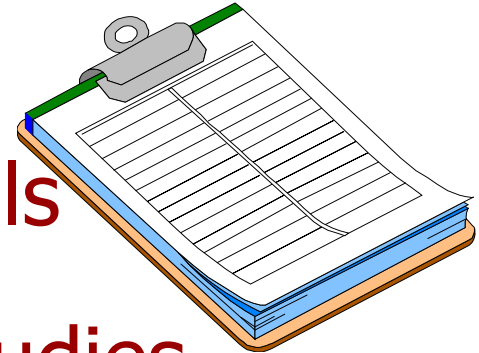
Evaluation of CP options



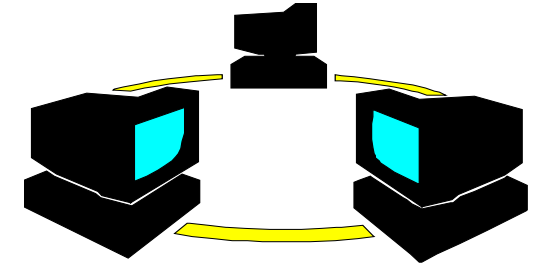
- Technical
- Environmental
- Economic

Standard CP options and information sources

- General checklists from manuals
- Sector-specific manuals and studies,
other information sources
- Information from suppliers
- ...

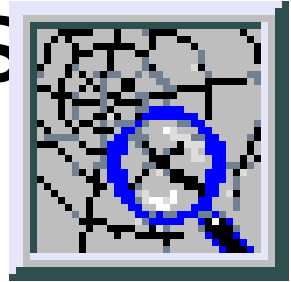


CP information sources



- Manuals, sectoral information
- UNIDO/UNEP/other NCPCs
- Suppliers
- Internet/homepages
- Universities, research centres
- Databases
- Seminars, roundtables, congresses
- Own experience
- Counterparts
- Chamber of Industry and Commerce
- Government, ministries
- Other companies
- Company staff

Useful internet addresses



- Cleaner production
www.unep.org
www.unido.org/cp
www.epa.gov/p2
www.es.epa.gov
- Technical information
www.es.epa.gov/techinfo
www.ecodesign.at
www.acfcp.org.au/case-studies
- Companies
www3.volvo.com/environment
www.sulzer.com/environment
www.nokia.com/environment

Useful addresses

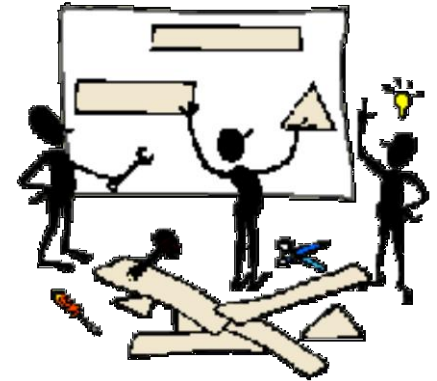
CP case studies



- Training course www.epa.gov/oia/itc/cpnote/index.htm (now to search on the Internet for CP)
- www.unido.org/cp
- www.unep.org
- www.emcentre.com/unepweb/tec_case/index.htm
- www.unido.org/ssites/env/sectors
- www.cleanerproduction.com/industries
- www.es.epa.gov/techinfo/case/case.html
- www.es.epa.gov/studies

Ten ways to option generation

1. The waste box
2. Close the shop
3. "Why, why, why?"
4. Learn from contradiction
5. Indicators and benchmarking
6. Super-super-ideal
7. Method -10%
8. Leave it out
9. Keep it separate



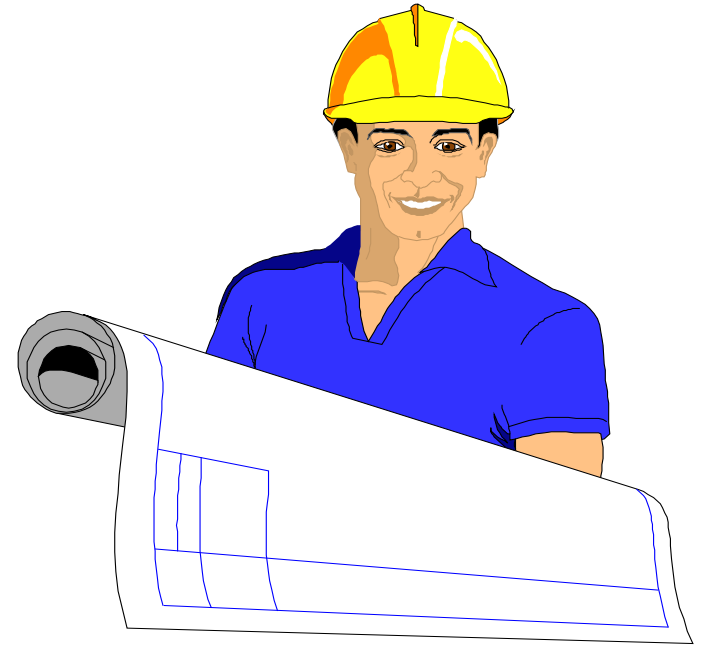
When to carry out CP option generation and evaluation?

- Within a full CP assessment project
- First company visit: convince the company to participate in project with the NCPC
- EMS initial review
- Enquiries to the NCPC from other companies, consultants associations
- Within a cost reduction audit
- Within continuous improvement
- ...



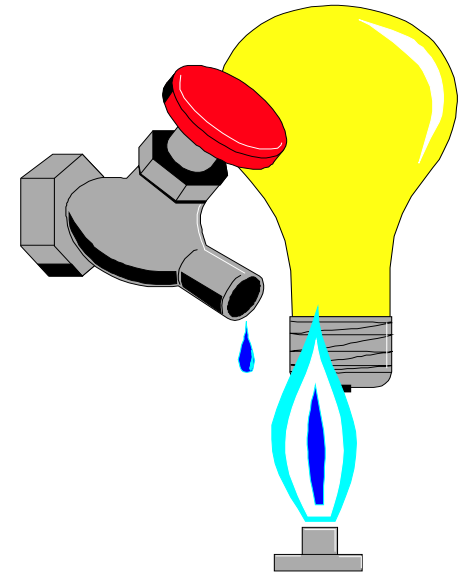
Technical evaluation

- Influence on product quality
- Influence on productivity
- Material consumption
- Energy consumption
- Influence on maintenance
- Safety
- Flexibility
- ...



Environmental evaluation

- Material consumption
- Energy consumption
- Emissions to air, water, soil
- Shift of environmental problems to other media
- Replacement of substances
- Health and safety
- ...



Economic evaluation

- Payback period
- Other financial profitability calculations
- Determine all affected cost factors



Implementation of environmental projects

Solution-oriented

- ◆ Quick implementation
- ◆ Well known causes of the problems
- ◆ Possibility of improvement is known



Quick implementation

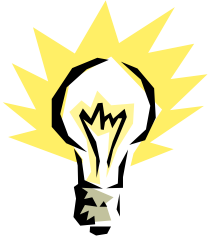
Problem-oriented

- ◆ Complex environmental problems or approaches
- ◆ Causes and measures are not clear, a better analysis is necessary
- ◆ It is necessary to set goals



Solve the problem at its root

Solve problems at their roots



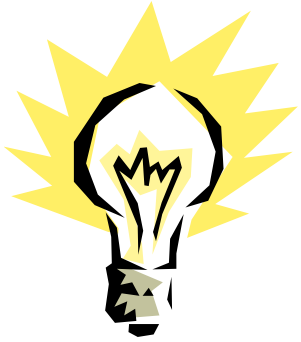
Stage 1: Determine the necessary measures



Stage 2: Plan the environmental project

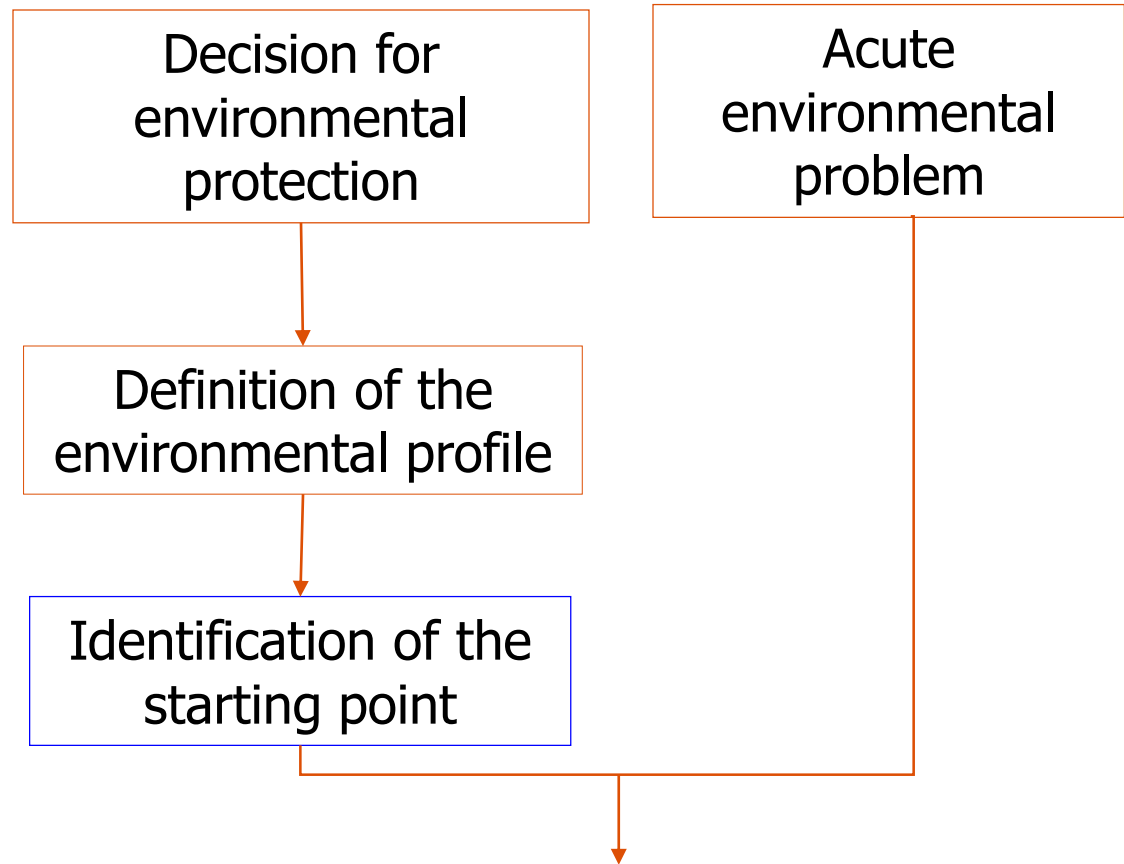


Stage 3: Implement



Determine the necessary measures

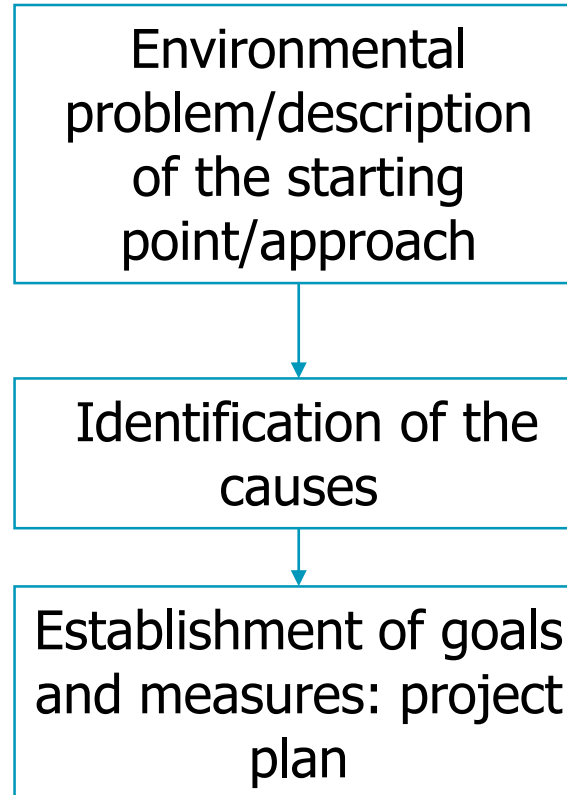
Stage 1





Plan the environmental project

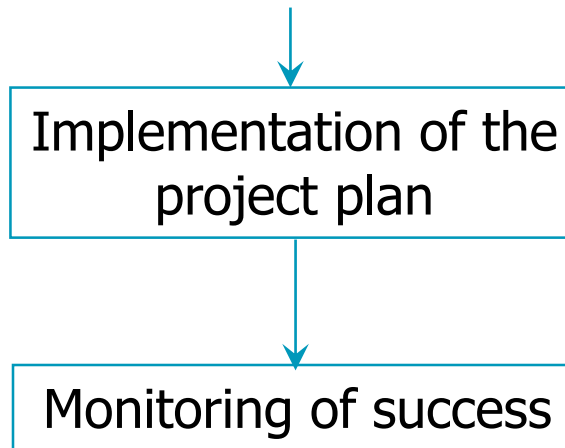
Stage 2





Implement the environmental project

Stage 3



Reference and source

- The Radical Innovation Playbook: A Practical Guide for Harnessing New, Novel or Game-Changing Breakthroughs by Olga Kokshagina and Allen Alexander | Oct 12, 2020
 - Innovation Economics: The Race for Global Advantage by Robert D. Atkinson and Stephen J. Ezell | Sep 4, 2012
 - Handbook of the Economics of Innovation (Handbooks in Economics 1) by Bronwyn H. Hall and Nathan Rosenberg | May 14, 2010
 - Economics of the Fourth Industrial Revolution: Internet, Artificial Intelligence and Blockchain (Innovation and Technology Horizons) Part of: Innovation and Technology Horizons (8 Books) | by Nicholas Johnson and Brendan Markey-Towler | Oct 25, 2020
 - Doing Capitalism in the Innovation Economy: Reconfiguring the Three-Player Game between Markets, Speculators and the State by William H. Janeway | May 17, 2018
 - WIREFRAMED: Simplifying Digital Innovation for Business Leaders by Vivek Sharma | Sep 19, 2020
- 