

SW2: Problem

Situation analysis

- Method to understand how different elements of an intricate scenario interact and influence one another over time
- Made for the mitigation of a project without implementations

Problem = Difference

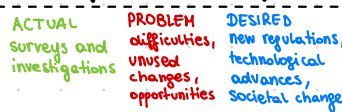


Questions for problem solving:

- How is the actual state?
- What are the difficulties or the unused chances?

Actual vs. desired state

- Evolution in short/mid/long time!
- Which are the opportunities and threats for the actual state?
- Is an urgent solution necessary?



Tasks in a project

- Situation analysis:
 - Recognize aims and tasks
 - Structure and design
 - Set out intervention for the solution search
- Information base for the solution search

1) Task analysis

- Strength and weakness + interests
- System delimitation + system consideration

2) Actual state analysis:

- Development and trends
- Opportunities and threats

3) Future analysis (of task 2)

- How it develops if no intervention?
- Urgency for a solution
- Change of environment
- Opportunities and threats

4) Summary problem definition

- Opportunity and new changes
- Synthesis of AS and DS
- Strength, weakness, threat

SWOT

Strengths: Weakness:

- Advantages: Disadvantages
- Capabilities: Vulnerabilities
- Resources: Limitations

Opportunities: Threats:

- Chances: Obstacles
- Developments: External effects
- Benefits: Risks

SW3: DELIMITATIONS

Actual state analysis.

- System delimitation (intervention + environ.)
- Strength/weakness analysis

System delimitation (1/2)

- Intervention system** - shows where interventions and modifications related to the problem can be made
- Surrounding system** - all parts of the system outside the intervention system
- Environment** - the parts of the surrounding system relevant to the interventions assessed
- Area of investigation** - intervention system and environment together are the area of investigation
- Area of solution** - part of the intervention system that is used for the solution (determined when finding Sol.)

Tips for system delimitation:

- The obvious delin. (eg. geographical, organisational, spatial,...) may not be the right choice, as often:
 - important interrelation of effects are not taken into account
 - they impede investigation of the actual state status
 - development of innovative solutions
- Central question for delimitate an intervention system:
 - Where are the modification and interventions possible?
 - Which are the degrees of freedom?
 - Where is the system open for solutions?

Future analysis:

- Prognosis regarding environmental behaviour
- Effects on the uninvolved system
- Recognizing opportunities + threats

Main questions regarding future developments:

- Which factors of a changing environment have an effect on the unchanged system?
- What trends in the environment should be considered?
 - technology, politics, competition, ecology, economy, ...
- What changes can be predicted that have an effect on the system?
- Which are the biggest uncertainties? Can these uncertainties be qualified?

Area of investigation:

- Wider → high possibilities to find effective solutions to the problem
- Narrower → effective solutions to the problem

Examples:

- Prices of rare metals are high
- Recycling of metal from slag is introduced

Opportunity:

- Waste heat from incineration process is sold to utility
- Incentives to connect to district heating grid are high

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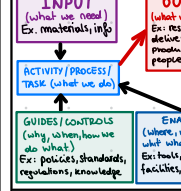
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- Developments: External effects
- Benefits: Risks

SW4: STRUCTURING

Complexity of relationships:

- single step, linear relationships
- single step, interconnected relat.
- multi step, interconnected relat.
- complex, interconnected relat. + feedback
- fishbone diagram (cause-effect)

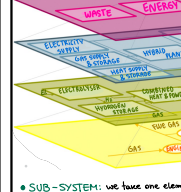
Visualisation of systems:



Reasons to subdivide systems:

- System thinking should avoid the danger to delimit problems too narrowly
- expanding the area of investigation is, however, associated with the risk of losing the overview → because the set of elements and relations is no longer manageable

Hierarchy system



Build-up of process

- How to build up process
- How to build up process

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SW5: DESCRIPTION

Environment-oriented view

- What is the system's environment?
- What are the external influences?
- What are the external constraints?

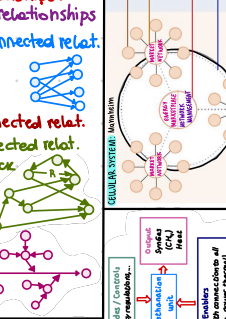
Effect-oriented view

- What is the system's effect?
- What are the internal influences?
- What are the internal constraints?

Structure-oriented view

- What is the system's structure?
- What are the internal influences?
- What are the internal constraints?

Renegia example



SWOT

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SW6: COMPLEXITY

Complexity

- non-linear behaviour
- complex system
- time delays

Complexity

- big net of diverse elements
- non-linear interactions
- dynamic system

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SW8: SYSTEMS

Systems

- SC process overview
- Stakeholder engagement

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SW9: STAKEHOLDERS + REQUIREMENTS

Stakeholders + Requirements

- Technical constraints
- Environmental requirements

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SW10: SYSTEM ARCHITECTURE

System Architecture

- Functional architecture
- Physical architecture

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