KREIS
Versorgung durch Entsorgung

Methodology of cost survey and economic feasibility studies of a new sanitation system

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NaWaM
Nachhaltiges Wassermanagement
INIS

Intelligente und multifunktionelle Infrastruktursysteme für eine zukunftsfähige Wasserversorgung und Abwasserentsorgung

Framework of the study:

- Part of the project KREIS
- Working package 5: Economy and transferability
- Interaction with all other working packages and project partners

Objectives of Investigation:

- Identification of methods for feasibility studies
- Investigation of different levels of economical viability
- Identification of economical feasible scales for decentralised systems
- Effects of non economical impacts of decentralised systems
- Decision tool for decentralised sanitation systems

Problems:

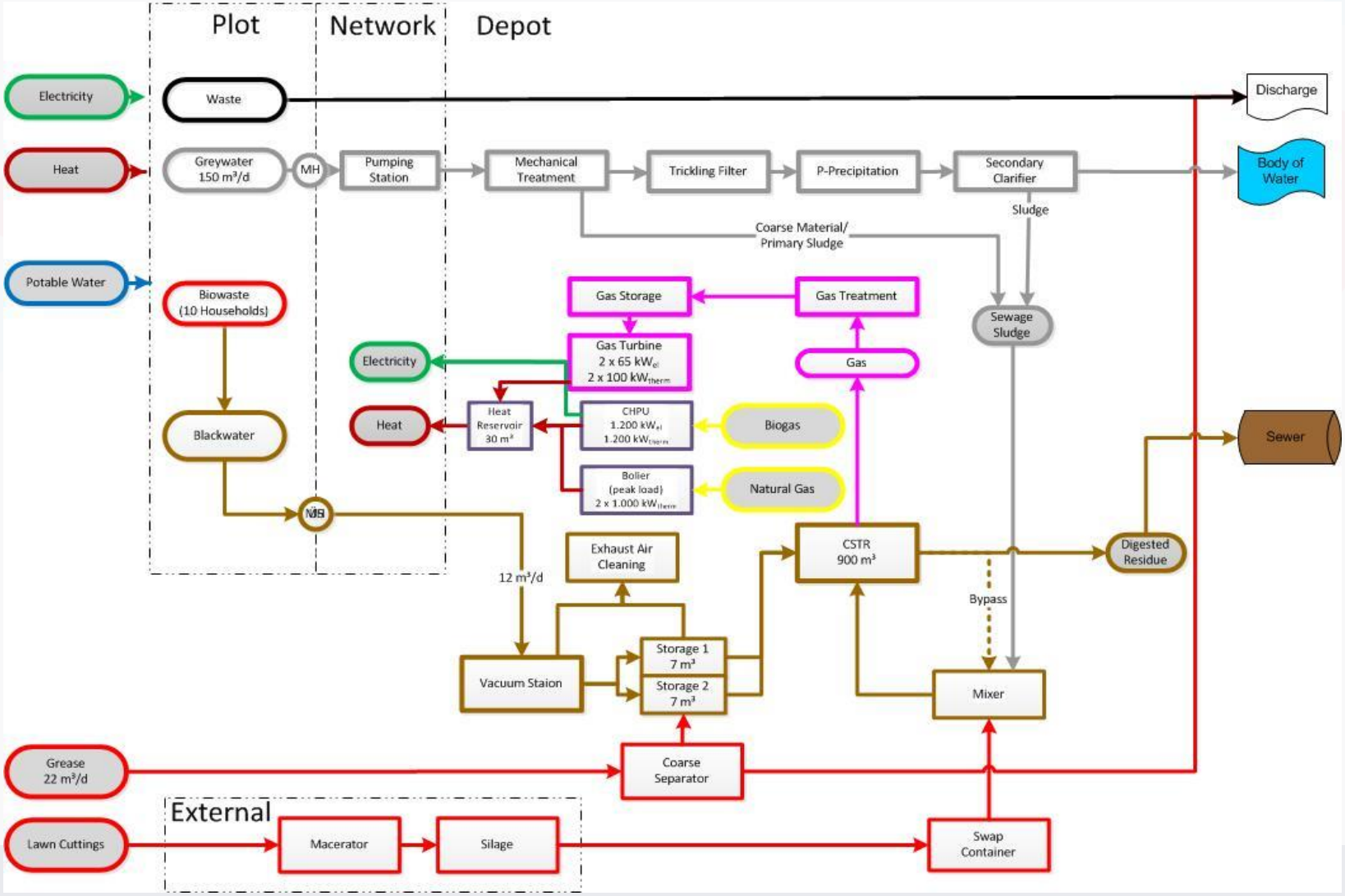
- Economic investigations on new sanitation approaches are mainly made on pilot or small scale levels
- Economical assessments are often based on assumptions less than on experiences
- Number of projects realised is very small and technologies are often in developing processes
- Knowledge pool is very poor today

Methodology of cost acqusition:

- Definition of systems used for feasibility studies
  1. Conventional infrastructure system
  2. Hamburg Water Cycle as built in Jenfelder Au
  3. HWC incorporating results of R&D of KREIS

- Systems are mandatory for other partners in the project (ecological, sociological and technical investigations)

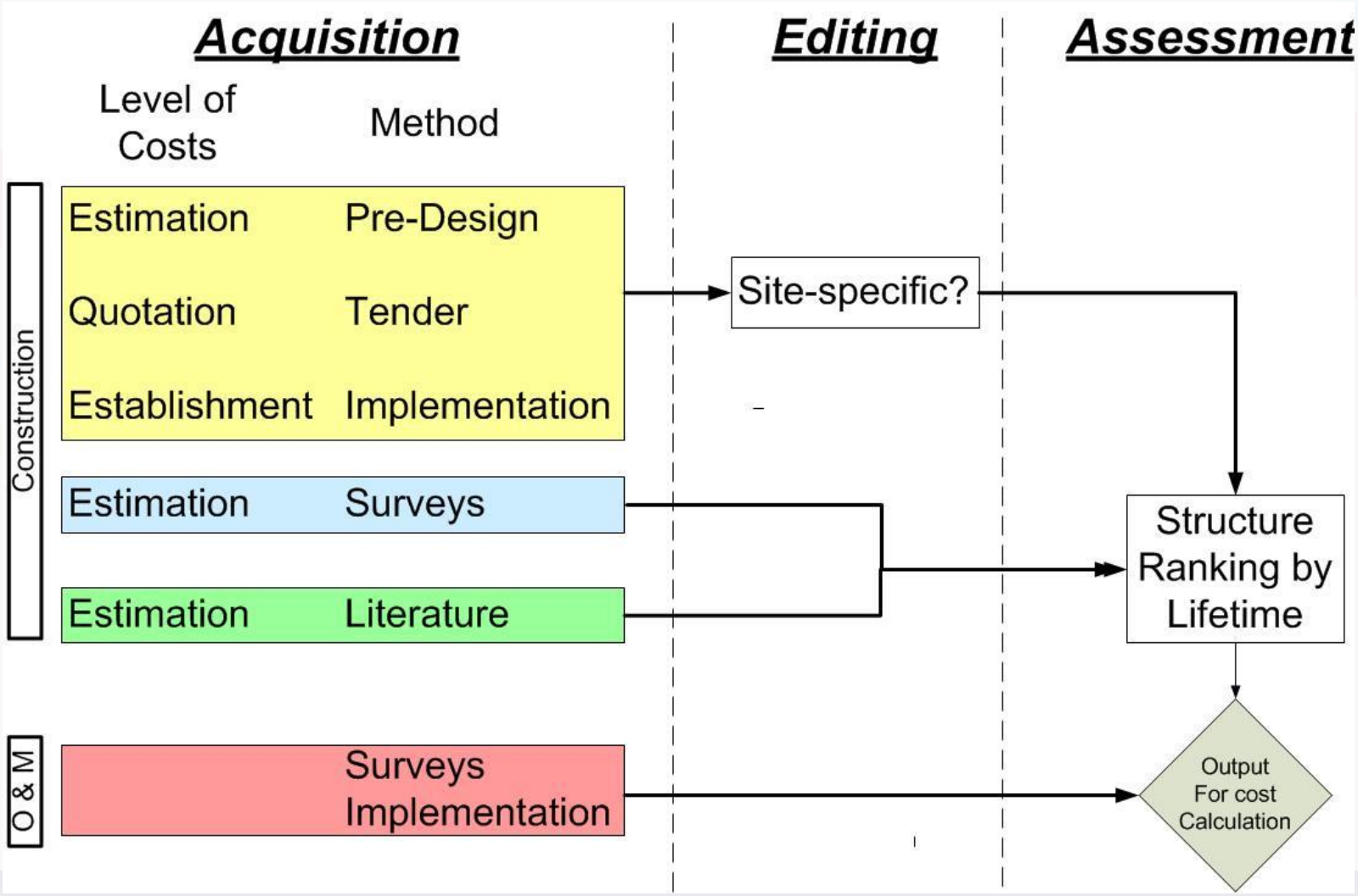
System 2: HWC realised in Jenfelder Au



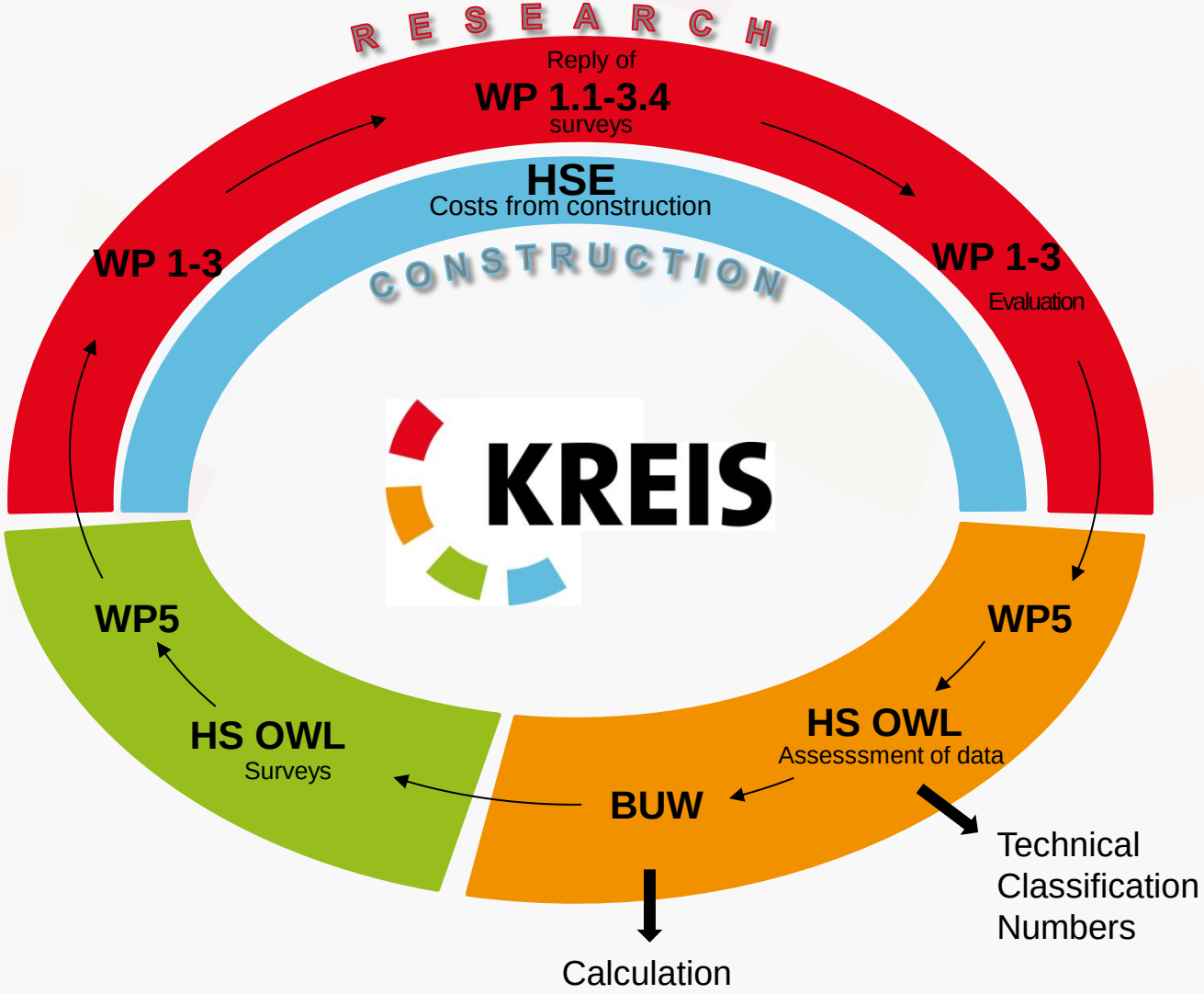
Methodology of cost acquisition:

- Definition of systems used for feasibility studies
  1. Conventional infrastructure system
  2. Hamburg Water Cycle as built in Jenfelder Au
  3. HWC incorporating results of R&D of KREIS
- Tool for acquisition of costs from other partners

Steps of cost acquisition and processing



Method of cost assessment



Methodology of cost acquisition:

- Definition of systems used for feasibility studies
  1. Conventional infrastructure system
  2. Hamburg Water Cycle as built in Jenfelder Au
  3. HWC incorporating results of R&D of KREIS
- Tool for acquisition of costs from other partners
- Editing of costs
- Structuring in accordance to
  - DIN 276
  - GEFMA 200
- Transfer for further calculations

Transfer file

Kostenübergabeblatt	**Investitionskosten**										
Schwarzwassersiele - Vakuum	**3.240.541.1.1**						Kostenberechnung 2013				System 2
Schwarzwasserableitung											
Block1-4											
Lebens-zyklus-phase	Prozess	Sach-bezug nach DIN 276	Teil-gebiet	Vorgang	Anlagen-teil	Bauab-schnitt	Nutzungs-dauer	Investitionskosten **NICHT standortspezifisch**	Investitionskosten **standortspezifisch**	Investitionskosten **standortspez. in %**	Investitionskosten **Gesamt**
3	240	541	1	1	1	1-4	7	0,00	0,00	0	0,00
3	240	541	1	1	1	1-4	10	486.395,00	0,00	0,0%	486.395,00
3	240	541	1	1	1	1-4	20	0,00	0,00	0	0,00
3	240	541	1	1	1	1-4	30	158.680,00	0,00	0,0%	158.680,00
3	240	541	1	1	1	1-4	50	1.217.008,02	11.030,00	0,9%	1.228.038,02
							Summe	***1.862.083,02***	***11.030,00***	***0,6%***	***1.873.113,02***

Economic feasibility studies - Motivation

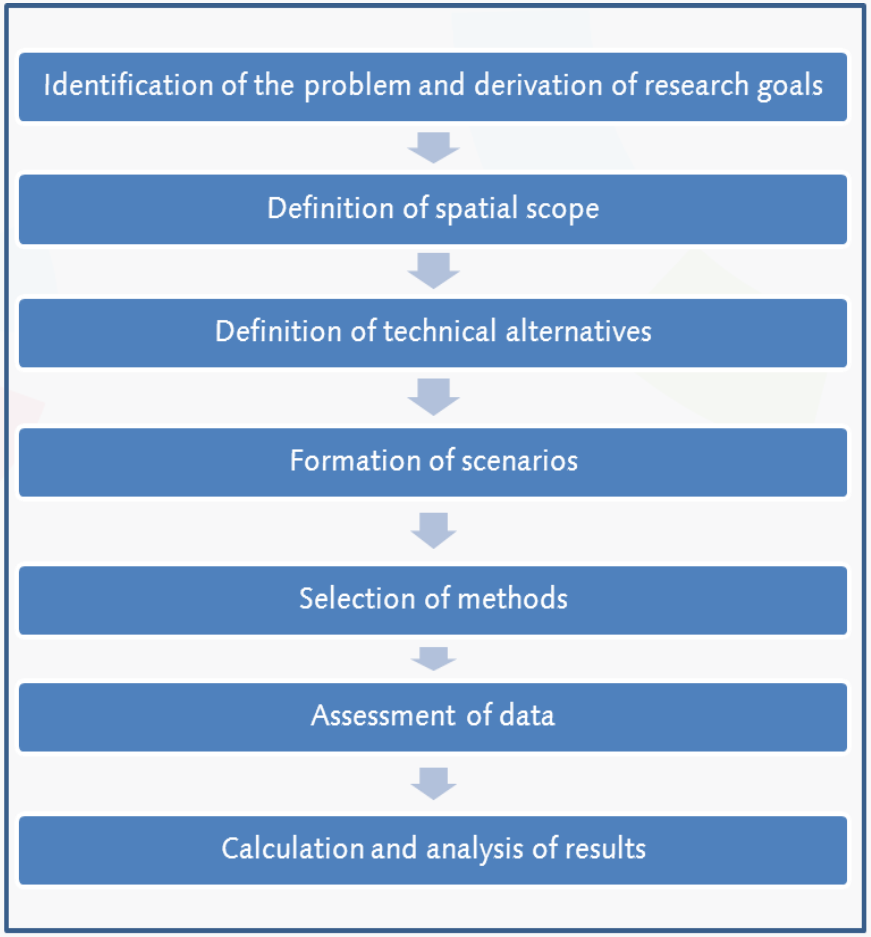
Leading question:

"Are the funds invested in the most economical way?"

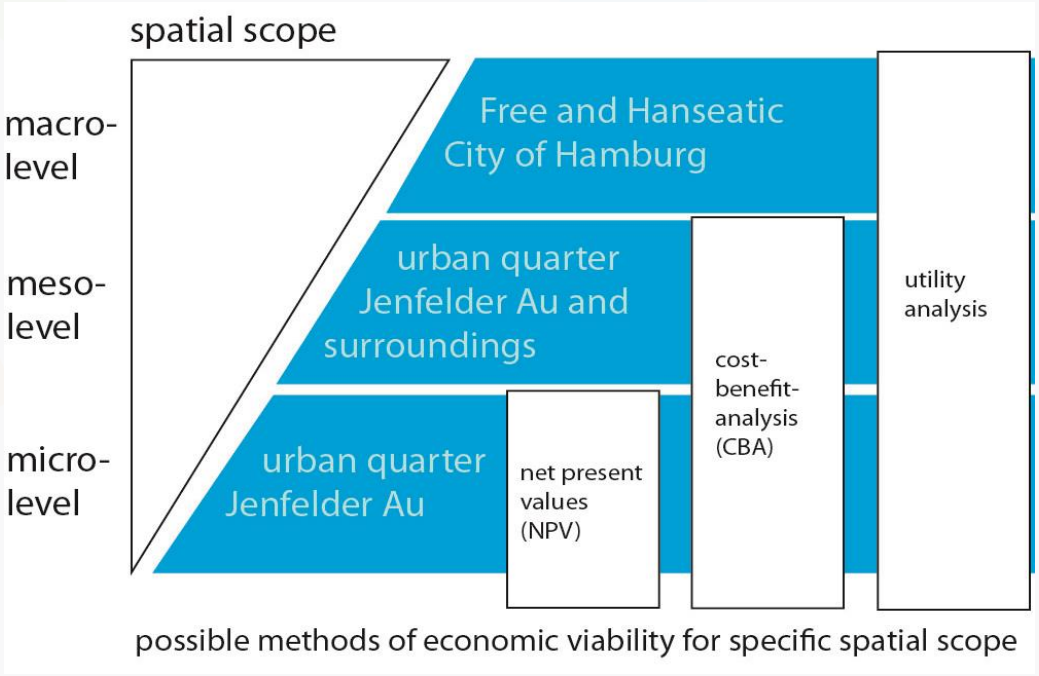
→ One main goal of research in KREIS is comparing

several potential technical alternatives in order to identify the **most economical option** from **different perspectives**

Approach


Identification of the problem and derivation of research goals
Definition of spatial scope
Definition of technical alternatives
Formation of scenarios
Selection of methods
Assessment of data
Calculation and analysis of results

Definition of spatial scope



Formation of scenarios

Alternatives and scenarios	Scale		
	Smaller	As realized	Bigger
Alternative 1: Conventional infrastructure system			
1.1 Best Case Scenario	1.1.1	1.1.2	1.1.3
1.2 Standard Scenario	1.2.1	1.2.2	1.2.3
1.3 Worst Case Scenario	1.3.1	1.3.2	1.3.3
Alternative 2: Hamburg water Cycle as built in Jenfelder Au			
2.1 Best Case Scenario	2.1.1	2.1.2	2.1.3
2.2 Standard Scenario	2.2.1	2.2.2	2.2.3
2.3 Worst Case Scenario	2.3.1	2.3.2	2.3.3
Alternative 3: Hamburg Water Cycle KREIS Research Results			
3.1 Best Case Scenario	3.1.1	3.1.2	3.1.3
3.2 Standard Scenario	3.2.1	3.2.2	3.2.3
3.3 Worst Case Scenario	3.3.1	3.3.2	3.3.3

Selection of methods

- Within KREIS three perspectives are going to be investigated in order to conduct a holistic view on the economic viability
  - Net present value (NPV) method
  - Cost-benefit-analysis (CBA)
  - Utility analysis

Selection of methods

- Net present value (NPV) method
  - Comparing the projected life cycle costs of alternatives
- Cost-benefit-analysis (CBA)
  - Investigating (in addition to the costs) the specific benefits of the alternatives
  - Incorporating ecological and socio-economic aspects into the analysis.
- Utility analysis
  - Assessing individual perceptions of benefit as perceived by different stakeholders
  - Considering both non-monetary and monetary aspects as well as societal parameters

Alternatives and scenarios combined with economic feasibility studies

Alternatives and scenarios	Scale		
	Smaller	As realized	Bigger
Alternative 1: Conventional infrastructure system			
1.1 Best Case Scenario	1.1.1	1.1.2	1.1.3
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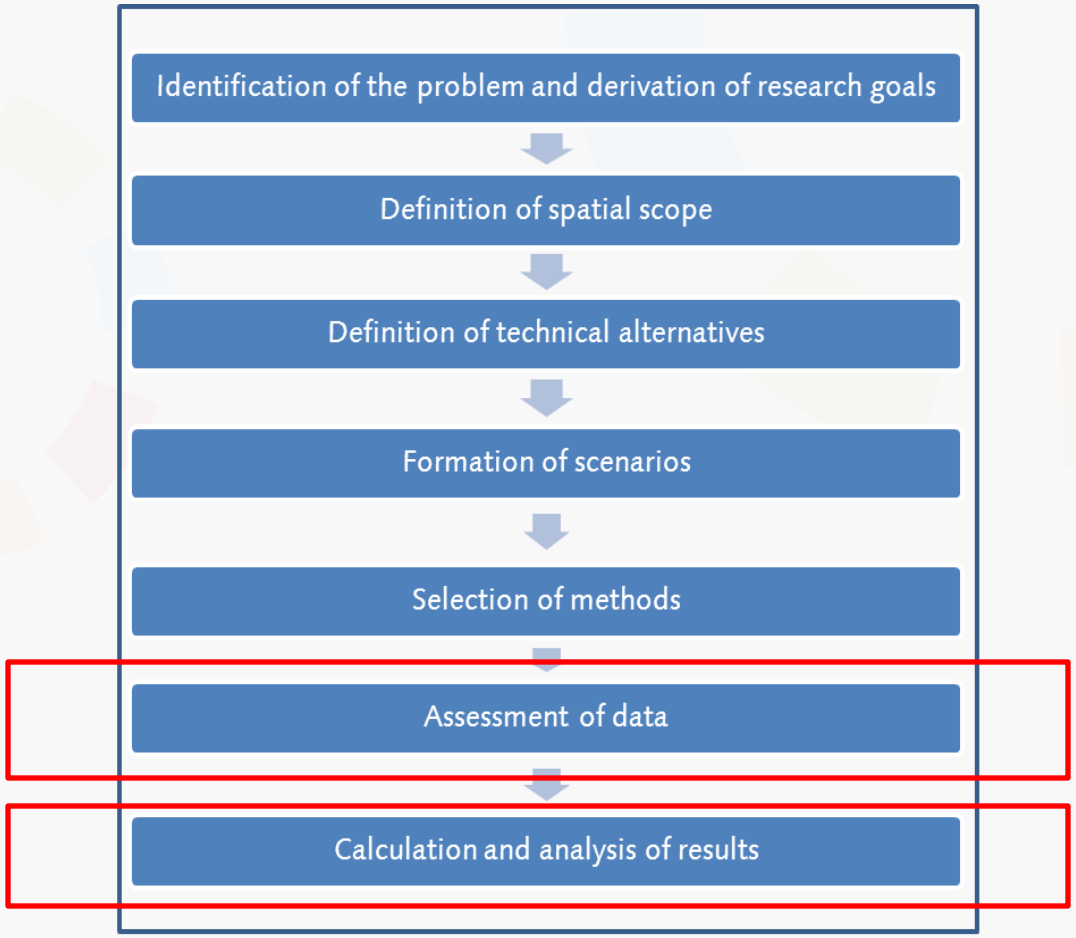
Economic feasibility study 1 (NPV & CBA)

Economic feasibility study 2 (NPV & CBA)

Economic feasibility study 3 (NPV & CBA)

Economic feasibility study 4 (utility analysis)

Further steps



Calculation and analysis of results

- Executing a sensitivity analysis
- Identifying the technical elements having the highest and lowest impact on the ranking of the technical alternatives
- Analysing on consequences of changes in scale, environmental parameter and input parameter
- Deriving economic viability as a uniformly continuous function or occurrence of leaps
- Identifying of objectives by different stakeholders

Outlook

- One holistic model for measuring the economic viability does not exist for new sanitation systems
- The presented methodology of economic feasibility studies for a new sanitation system will deliver a vital input for future implementations
- A combined model shall incorporate the mentioned perspectives and facilitate the process of comparing conventional and new respective innovative infrastructure systems
- For the further implementation of the stated approach the detailed data assessment is very crucial