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IMPLICATIONS OF DIFFERENT MONITORING DATA SCENARIOS FOR THE COST-EFFECTIVENESS OF COUNTERFACTUAL-BASED ENVIRONMENTAL EVALUATIONS

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Objectives of the cost-effectiveness analysis

- To develop a framework for evaluating the cost-effectiveness of indicators and methodological approaches for environmental evaluations
- To estimate the cost of the required resources for evaluation and to analyse determinants of costs
- To assess the effectiveness of developed indicators and evaluation methods based on WP6 case studies
- To assess the implications of improved monitoring data scenarios for the cost-effectiveness of environmental evaluations

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Framework of the performance assessment

- Quality criteria
  - Based on a framework developed by the EC
  - Responsiveness, analytical soundness, measurability and ease of interpretation
- Operationalisation through judgement criteria for each quality criteria
  - Integration of evaluation challenges as seven judgement criteria: e.g. establishing robust cause-effects relationships and assessment of net impacts
- Clearly defined performance levels for each judgement criteria
  - Qualitative approach: high, medium and low

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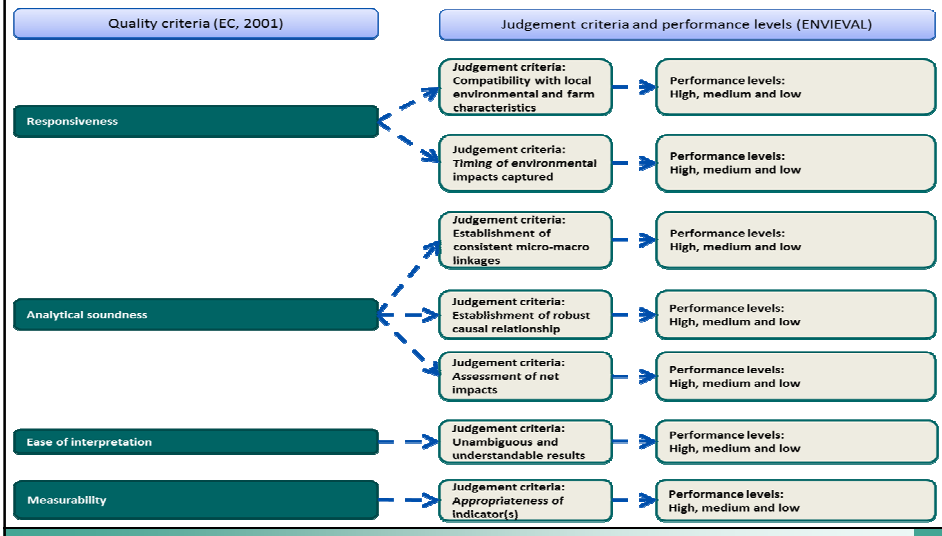
Framework for the performance assessment



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Framework for the performance assessment

- **How to define the different performance level for each judgement criteria?**

Responsiveness	Compatibility with local environmental and farm structural characteristics	Low	Applicability at the local level **is assumed, common sense models** are used to consider local environmental characteristics in the interpretation of the results.
		Medium	A **generalized typology** of environmental characteristics is used. Local characteristics are placed within this typology and addressed accordingly.
		High	Local environmental characteristics are **specifically considered and incorporated into the evaluation approach.**
	Timing of environmental impacts captured	Low	Temporal dimensions of environmental impacts **are not incorporated** and only considered in the interpretation of the results
		Medium	Temporal dimensions of environmental impacts are incorporated in the methodological / evaluation approach through **external assumptions**
		High	Temporal dimensions of environmental impacts are directly incorporated in a **dynamic modelling framework**

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Data gaps and environmental monitoring

- **Data gaps constrain the effectiveness of environmental indicators and application of "advanced" methods**
- **Data issues are the most important factor influencing the effectiveness of the evaluation approaches**
- **Role of environmental monitoring programmes to improve cost-effectiveness of evaluations – if quantification of impacts is the ultimate goal**

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Key questions

- How can the data availability and access be improved to fully utilise the potential of evaluation methods and to improve their cost-effectiveness?
- What are realistic and feasible scenarios for improved future environmental monitoring programmes to improve data availability and access?
- Which cost/efforts are associated with the scenarios and what are the improvements in the performance of the evaluations?
- Stakeholder judgement: Is the improved performance and more robust impact assessment worth the higher cost?

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Monitoring cost scenarios

- Assessment of scenarios for future environmental monitoring programmes
- Based on the results of the case study testing, three key types of scenarios are examined:
  - Additional efforts to increase the sample size and to improve the spatial coverage of the monitoring programme
  - Strategic sampling design of monitoring programmes, exploring options to reduce monitoring efforts while, at the same time, improving the spatial targeting of participants and non-participants
  - Better integration of existing monitoring data from different sources or / and better integration of environmental monitoring data with farm structural data

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Introduction of the three scenarios (HU, DE, IT)

	Hungary	Italy	Germany
Public good	Biodiversity wildlife	Climate stability	Water quality
Indicator / method	Farmland Bird Index (FBI)	Carbon footprint	Mineral nitrogen content in autumn (Nmin)/ Pairwise comparison
Scenario	Integration of spatial explicit biodiversity data	Collection of additional monitoring data	Strategic sampling approach
Targeted improvement	Access to existing data enables improved sampling	Increased sample size	Targeted sampling for better coverage of participants
Targeted methodological improvement	More robust quantification of net-impacts through strategic sampling	More robust quantification of net-impacts through application of advanced statistic-based counterfactuals, e.g. PSM	More robust quantification of net-impacts through application of advanced statistic-based counterfactuals, e.g. PSM
Change of data environment	Spatial explicit information on participants/non-participants	Surveys on add. farm types and add. point in time	Sufficient sample size for all relevant sub-measures
Counterfactual aspects	Improved coverage of participants	Improved coverage of participants/ Difference in difference analysis enabled	Improved coverage of participants

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Cost of the scenarios

- **Calculations of additional cost are based on assumptions and experiences of the case studies**
  - **Cost for additional data collection**
  - **Additional work load for data processing & analysis**
  - **Benchmarking of data requirements for advanced statistical methods – e.g. 100 samples for participants per sub-measure**

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Results of the scenario IT climate (carbon footprint) - cost

Evaluation phases	Baseline assessment	Opt_1 Re-processing monitoring data	Opt_2 Additional ad-hoc survey on livestock systems	Opt_3 Repetition of surveys at another point in time
Evaluation design	14,420	14,420	14,420	28,840
Data generation	83,080	83,080	107,080	214,160
Database development	21,780	21,780	38,280	76,560
Application of method	9,410	13,260	15,780	31,560
Interpretation	5,830	8,280	9,960	19,920
Total cost	134,520	146,820	185,520	371,040
Additional cost		**12,300**	**51,000**	**236,520**

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Result of the scenario Italy - effectiveness

Judgement criteria	Previous performance level	New performance level & explanation		
		Opt_1	Opt_2	Opt_3
Compatibility with local env. and farm structural characteristics	Medium		Medium/high Increased sample size for livestock farms	Medium/high Increased sample size for livestock farms
Timing of env. Impacts captured	Low			High Integration of a second point in time (t1)
Assessment of net impacts	Medium	Medium/High Increases the chance to use statistics-based evaluation options	Medium/High Increases the chance to use statistics-based evaluation options	Medium/High Increases the chance to use statistics-based evaluation options
Establishment of micro-macro linkages	Medium		Medium/High Allows for a better representativeness of livestock systems	Medium/High Allows for a better representativeness of livestock systems

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Cost-effectiveness synopsis of scenarios

Judgement criteria	Hungary - FBI		Italy – Carbon footprint			Germany - Nmin
Scenario	Opt_1	Opt_2	Opt_1	Opt_2	Opt_3	Opt_1
Baseline cost	52,200		134,520			1,230,000
Additional cost (absolute)	-	1,500	12,300	51,000	236,520	21,095
Additional cost (share)	0%	3%	9%	38%	176%	2%
Number of improved effectiveness criteria	3	5	1	3	4	3
Number of improved performance levels	3	4.5	1	1.5	3.5	2.5
Increase of cost per performance level (%)	0%	0.6%	9%	25%	50%	0.7%

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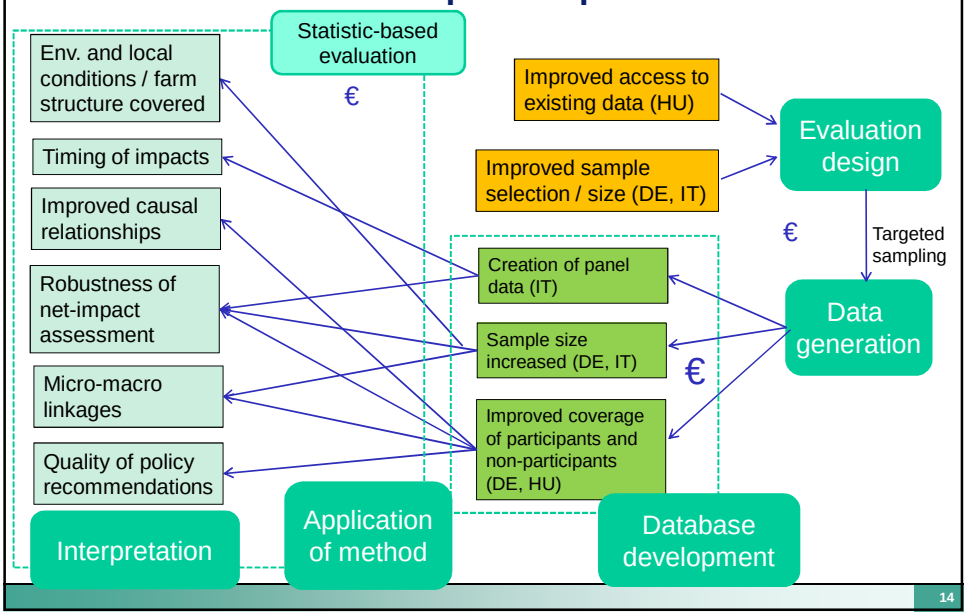
Impact on performance



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Comparison of results with stakeholder priority

Judgement criteria	Hungary - FBI		Italy – Carbon footprint			Germany - Nmin	
Scenario	Opt_1	Opt_2	Opt_1	Opt_2	Opt_3	Opt_2	Opt_1 & 3
Compatibility with local env. and farm structural characteristics	Medium	High	Medium	Medium/ high	Medium /high	Medium	Medium
Timing of env. impacts captured	High	High	Low	Low	High	Medium	Medium
Establishment of robust causal relationships	High	High	Medium	Medium	Medium	High	High
Assessment of net impacts	High	High	Medium/ high	Medium/ high	Medium /high	Medium	High
Establishment of micro-macro linkages	Medium	Medium	Medium	Medium/ high	Medium /high	High	High
Appropriateness of indicator	High	High	High	High	High	High	High
Unambiguous and understandable results and policy recommendations	High	High	High	High	High	High	High

Criteria that are improved by the scenarios are indicated in green
Criteria with highest stakeholder priority are indicated in **red**

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Conclusions

- **Improved effectiveness can be achieved with relatively low cost – in particular in relation to the relative cost of evaluation (evaluation ~0.3 % of cost of RD programme)**
- **Improvements meet the stakeholder priorities identified**
- **Improvements either enable the use of advanced counterfactual methods or increase the cost-effectiveness of using those methods**
- **Advanced counterfactual methods are crucial to be able to assess net-effects**

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Conclusions

- **Assessment of synergies between measures requires improved monitoring data to enable assessment of multiple comparison groups**
- **Type of scenarios and results are transferable to other cases – requires further validation**
- **Consideration of data requirements: monitoring should be developed jointly with the RD measures and consider evaluation needs**

- Thank you-