



Experiences from applying and using KPIs within DISCERN

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3rd external Workshop DISCERN
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Agenda

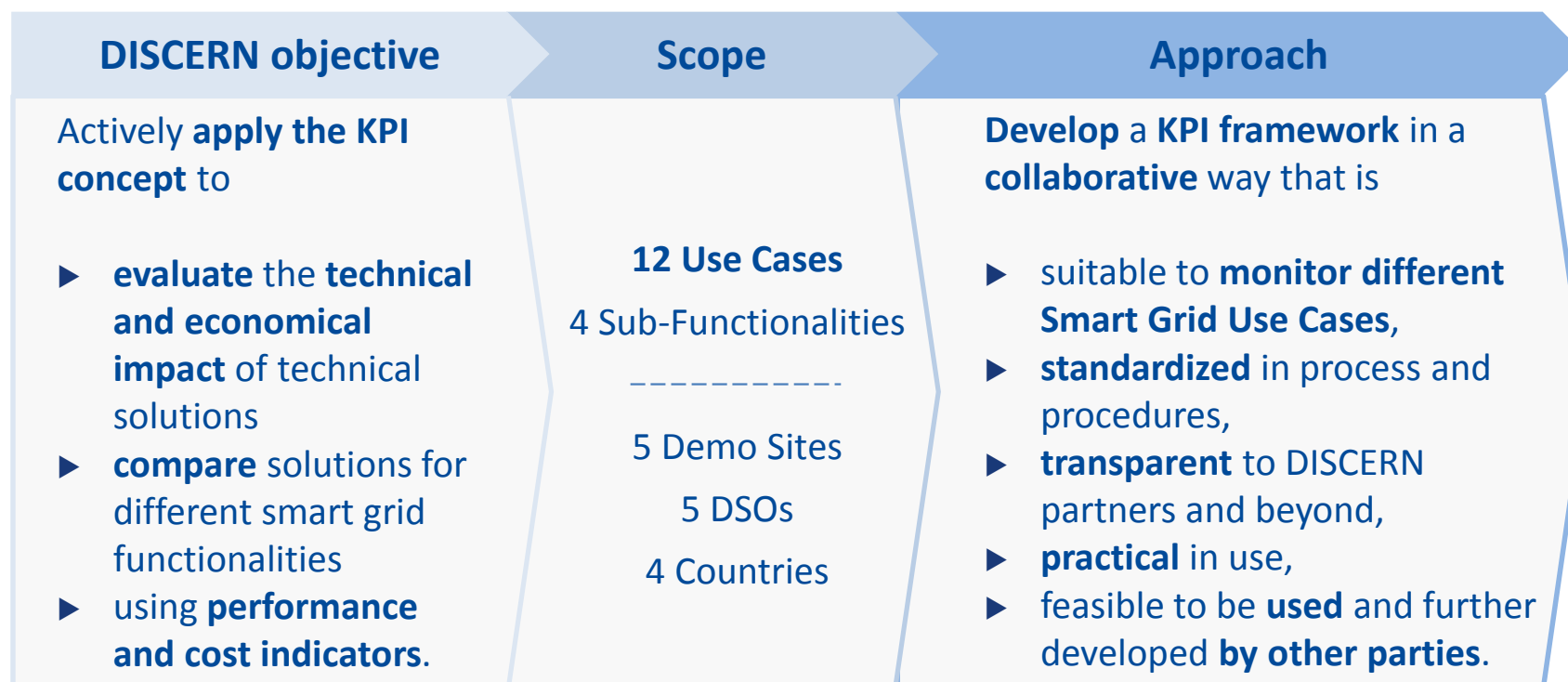


- DISCERN Scope and Objectives
- Selected Approach
- Application of KPI Results
- Experiences and Lessons Learnt

DISCERN Scope and Objectives



DISCERN envisaged KPIs as main means to evaluate and compare different Smart Grid Use Cases.

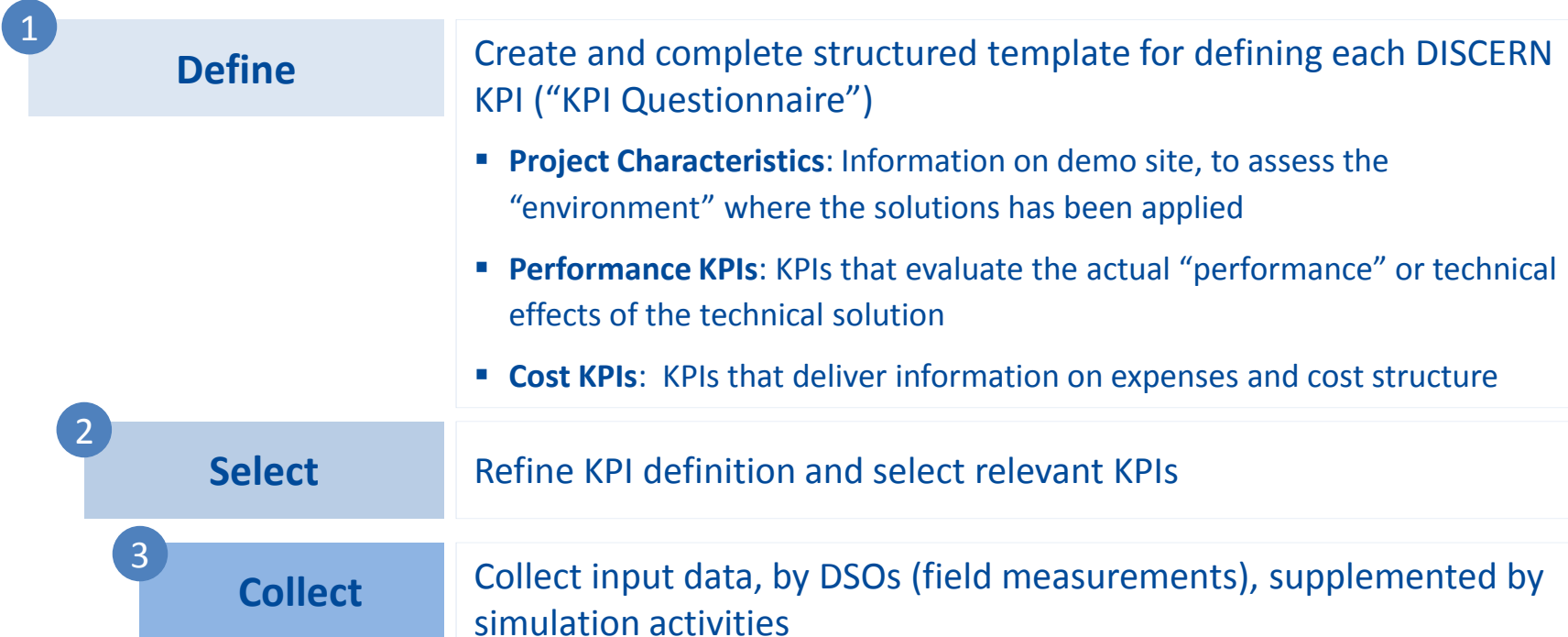


Selected Approach: 3-Steps - Define, Select and Collect



Firstly, performance and cost KPIs have been defined and selected per Use Case; then input data were collected and provided by DSOs and simulation parties.

3-Step Approach



Application of KPI Results: Presentation and Evaluation



KPI input data were collected and provided using the KPI Questionnaire. KPI results were presented and evaluated using a standardized template that includes context information.

Collection & Provision (KPI Questionnaire)

KPI Questionnaire* to collect input data and provide KPI results (i.e. calculate)

Sheets	
Guidelines	Notes and descriptions on how to use the questionnaire
Overview	Compilation of the KPIs, used as delivery sheet
Project characteristic	Sheet for data input describing the demo site's major grid characteristics
Performance KPI	Sheet for data input per KPI
Cost KPI	Sheet for data input on cost for technical solution
Matrix	Summary matrix for allocated KPIs per sub-functionality and leader/learner
Glossary	Explanation for applied abbreviations

*Part of D1.2 Intermediate KPI Fulfilment Report

Result Presentation & Evaluation (Business Case Descriptor)

Standardized template ("Business Case Descriptor"*) to compile KPIs results with context to evaluate technical and economic performance

3.1.1. Use Case DISCERN_< DSO>_<ti>_<Sub-Functionality>																	
<p>Objective: Introduce the Reader into the Business Case by giving an overall description.</p> <p>Intention: Please fill in the following five sheets that provide the structure of this section "A. General Overview on the Use Case".</p> <ul style="list-style-type: none"> High-level Background on DSO <ul style="list-style-type: none"> Provide background information relevant to Use Case Apply information provided by D4.1 & 7.7 Relevant Regulatory Framework <ul style="list-style-type: none"> Provide regulatory aspects relevant to the Use Case and their influence on the selection, implementation and operation of the Use Case Apply information provided by the Regulatory Workshop Description of Grid Environment <ul style="list-style-type: none"> Describe the problem to be solved Give a general overview on the Demo Site Apply information provided by D1.1, D4.2, D4.3 & posters Basic Information on Technical Solution <ul style="list-style-type: none"> Provide the available information on the technical solution of the Use Case Apply information provided by D1.1, D4.2, D4.3 & posters 																	
<p>A. General Overview on the Use Case</p> <p>1. High-level Background on DSO</p> <p>Information required on:</p> <ul style="list-style-type: none"> Company Size: <in number of metering points LV level / number of customers> Grid Size: <operated voltage levels, covered area (sqm), type of area covered (mainly urban / mainly rural)> Service Portfolio: <Services provided to customers / third parties, etc. relevant to the Use Case> Legal Aspects: <relevant to Use Case> DSO Internal Guidelines: <relevant to Use Case, with respect to quality of supply / Service level, etc. > 	<p>2. Relevant Regulatory Framework</p> <p>Relevant regulatory aspects and their influence on the selection / implementation / operation of the Use Case</p> <table border="1"> <thead> <tr> <th>Regulatory Aspect</th> <th>Influence</th> </tr> </thead> <tbody> <tr> <td><input></td> <td><input></td> </tr> <tr> <td><input></td> <td><input></td> </tr> <tr> <td><input></td> <td><input></td> </tr> </tbody> </table> <p>3. Description of Demo Site / Grid Environment (per Use Case)</p> <table border="1"> <thead> <tr> <th>Project</th> <th>Demo Site</th> </tr> </thead> <tbody> <tr> <td> <ul style="list-style-type: none"> Name of Demo Site: <input> Lead Organisation: <input> Main Objective of the Demo Site: <input> Planned Project Duration: <non-going / finished> Why part of DISCERN: <input> </td> <td><input label></td> </tr> </tbody> </table> <p>4. Technical Solution</p> <p>Objective: <objective of the technical solution></p> <table border="1"> <thead> <tr> <th>Applied Solution</th> <th>Assessment</th> </tr> </thead> <tbody> <tr> <td><input></td> <td><input></td> </tr> </tbody> </table>	Regulatory Aspect	Influence	<input>	<input>	<input>	<input>	<input>	<input>	Project	Demo Site	<ul style="list-style-type: none"> Name of Demo Site: <input> Lead Organisation: <input> Main Objective of the Demo Site: <input> Planned Project Duration: <non-going / finished> Why part of DISCERN: <input> 	<input label>	Applied Solution	Assessment	<input>	<input>
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*Part of D8.1 Business Case per Use Case



Application of KPI Results: Presentation and Evaluation



► Economic evaluation

► Performance KPI

1. Measured Benefits (Performance KPIs)

► Overview of KPI Values (measured and simulated)
 Measured values are provided in column DSO, simulated values indicate which performance indicator and value has been used

KPI 01: Increased Hosting Capacity

KPI 17a: Availability of ICT components

KPI 27a: Change in Voltage Variation on MV

► Comments:

- No simulations have been performed for this Use Case
- KPI 1:** KPI value is only illustrative. The real and used added capacity depends on the real and used added capacity (i.e. the real and used added capacity). However, DSO values are sufficient to represent the Use Case on hosting capacity. The Use Case is simulated with 100%. Overall, an average of 99.16% of the Use Case is simulated.
- KPI 17a:** All components are available 99.16% of the time. If the connection to all measuring devices is not available at that point in time, the conventional supported grid.
- KPI 27a:** Even at increased infeed power, the voltage variation is within the limits of the conventional supported grid.
- KPI 1 is reflected within the economic evaluation, technical performance indicator, which indicate to be transferred to monetary values.

5. Economic Evaluation

- NPV results**

NPV (base)	Positive
NPV (expected value)	Positive, below NPV base
Cost-Benefit-Ratio	> 9

Discounted Cash Flow

► Qualitative description:

- Investment and benefit in year 1 dominate discounted cash flow.
- Due to avoided investment (calculated as benefit), the cumulated discounted cash flow is positive at any time.
- Payback period is below 1 year.
- Re-investments are weighted significantly lower due to economies of scale.

Monte Carlo Simulation (NPV)

► Qualitative description:

- Monte Carlo Simulation reveals that probability of a negative value is almost zero, as 99.99% of all simulations result in a positive NPV.
- The probability of the NPV being negative is very low.
- The maximum NPV is more than twice as high as the base NPV.
- The average (expected value) is above the base NPV, indicating that the base scenario slightly underestimates the results. However, the difference is around 1% compared to the average NPV.
- The positive NPV very much driven by avoided investments for conventional grid reinforcement.

Initial investments per array, calculated for Demo Site:

	Cost (t=0)	Cost Driver
NOM, aut.	37.2%	Number of primary substation (grid area)
aggr.)	1.4%	Number of primary substation (grid area)
D, tab	61.4%	Measuring points
total cost (t=0)	100.0%	

C two different... , because different skill-

cost are involved.

included.

means for example if the measuring devices in the secondary fit in the existing casing an additional casing is needed.

structure refer to an example (reference case). In this example, a measuring points at secondary substations is used. In practice the number to be determined before the WAC solution is setup. This has an

io communication (GPRS) is applied at KPI 7 level (process – transferring measurements from zone “process” to “station”. A contract has been assumed, becoming effective within the year of installation

measuring values have been transferred. In future system it is the relevant medium voltage values are transferred to keep the LV-Values and LV-Current the MV-Values are calculated in the RTU.



Experiences in Applying and Using KPIs



Define KPIs, that are valid to different parties, as well as collect data input at DSO level is complex and requires significant time.

1. KPI Definition

- It has been **possible to adopt the EEGI framework** as a basis for the KPI development
- Developed a **way of working** and reaching agreement between multiple parties
- **Difficult to determine meaningful KPIs in the absence of BaU* values** in certain cases

2. KPI Selection

- **Limited data availability** (e.g. established or closed demos) **affected the KPI selection**
- **Different objectives of Use Cases within one Sub-Functionality** leads to **fewer common KPIs**

3. KPI Input Data Collection

- Provision of full data sets was even **more complex than foreseen**
- Input data collection requires **significant time and effort**
- **Additional challenges** in terms of data availability for **cost KPIs**

Lessons Learnt

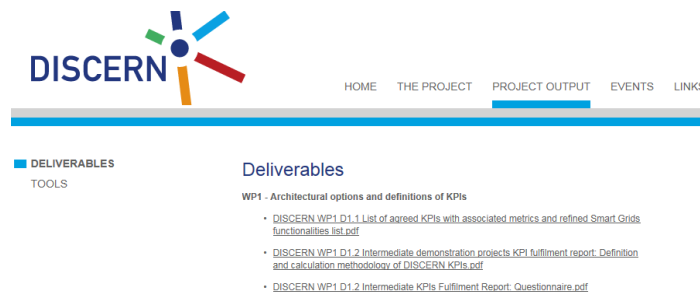


Carefulness is required in order to reach valid conclusions from evaluating and comparing Smart Grid Use Cases. Our findings suggest rather limited applicability for comparison.

- ▶ **Difficult** (but not impossible) **to apply KPIs to evaluate the impact of a single technical solution** within a demo site
 - To ensure high data availability from pilot projects, data requirements need to be defined right at the beginning and built into the project structure, company organizational and IT-architecture
 - Need to balance effort in the calculation and value added provided by the KPI
 - All parties need a detailed understanding of the KPI framework for successful data collection

- ▶ **Very subjective to apply KPIs to enable comparison of different Use Cases as KPI results very much depend on the context** of the Use Case / demo site
 - Context is essential in order to analyze and interpret KPI results appropriately; KPI results must not be provided without the appropriate context
 - The use of KPIs to compare projects increases in value where projects are similar in nature, e.g. in terms of the issues to be addressed by the technical solution, the maturity stage of the solution, and the scale of the project

THANK YOU



> DISCERN Information on the **WEB** > www.discern.eu

More information relating KPIs (> Project Output; http://www.discern.eu/project_output/deliverables.html)

- **WP1 D1.1** List of agreed KPIs with associated metrics and refined Smart Grids functionalities list
- **WP1 D1.2** Intermediate demonstration projects KPI fulfilment report: Definition and calculation methodology of DISCERN KPIs
- **WP1 D1.2** Intermediate KPIs Fulfilment Report: Questionnaire
- **WP1 D1.5** KPI fulfilment Report - Data Gathering and Evaluation of DISCERN KPIs (*not yet publicly available*)
- **WP8 D8.1** Business Case of Use Cases and Sensitivity Analysis (*not yet publicly available*)

KPI Questionnaire (1/2)



Sheets

Guidelines

Notes and descriptions on how to use the questionnaire

Overview

Compilation of the KPIs, used as delivery sheet

Project characteristic

Sheet for data input describing the demo site's major grid characteristics

Performance KPI

Sheet for data input per KPI

Cost KPI

Sheet for data input on cost for technical solution

Matrix

Summary matrix for allocated KPIs per sub-functionality and leader/learner

Glossary

Explanation for applied abbreviations

KPI Questionnaire (2/2)



► KPI Overview
(for evaluated period)

► Project Characteristic
(for evaluated area)

► Performance & Cost
KPIs

Company Information		
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Company name	XXX-XXXXXX	XXXXXXXXXX
Company name	XXXXXXXXXX	XXXXXXXXXX
Date of submission	Date of submission	
Type of KPI	Type of KPI	
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Reported year	Reported year	
Performance and		
KPI ID	Value	Unit
KPI_01	100	%
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