

Luke/New products from forest		Forest Indicator scenario service Requirement specification		1 (11)
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Forest Indicator Service

Requirement specification

Version management

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1 INTRODUCTION

1. Purpose of requirement specification

This document describes the Forest Indicator scenario service – a web based application. It defines the functional and non-functional requirements, interfaces and restrictions of the application for implementation. The Luke department “Forest resources and Forest planning” is responsible for generating the scenarios for the application. Generating the scenarios using the large-scale forest planning system MELA or data transfer is not included in this document.

The Forest Indicator scenario service is named in this document shortly by Forest Indicator service.

2. Service Overview

The purpose of the Forest Indicator service is to promote the multiple and sustainable use of forests by producing information about the effects of forest use at regional level for the planners and other users. The potential user works for example in Forest Centre or in the new county organization, which needs regional level scenarios in their processes of preparing different programmes and strategies.

In the Forest Indicator service the users can analyze ecosystem services based on regional forest use scenarios by studying the relative values illustrating ecosystem services. The user may compare the scenarios s/he has chosen visually or as a table in varying periods. The user may load/save the results for further needs. The Forest Indicator service presents/produces only relative values, whereas the user can find the actual values in MELA TuPa –service. The Forest Indicator service transfers the user’s choices for MELA TuPa – service.

The researchers in Luke produce the indicators for the scenarios and variables using the MELA planning system. The information in the Forest Indicator service is public and it is available for everybody.

The Forest Indicator service is available on the direct internet address or on the portal Met-samittari.fi. The link will appear on the relevant web pages of Luke. The Luke department “Forest resources and Forest planning” will be maintaining the service when the project *New products from forest* ends.

3. Functional processes

Process 1 Data retrieval of scenarios and related ecosystem services from Forest Indicator service.

The customer (the user) searches for data about scenarios and related ecosystem services from Forest Indicator service. The user can load the data for further needs.

4. Definitions and abbreviations

Definition, term or abbreviation	Description
Scenario	Regional calculation produced by MELA system.
Indicator	A relative value (index) generated using the variables in MELA system.

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Variable Quality description	Variable in MELA calculation. A description of the indicators in Forest Indicator service.
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5. References

Reference	Description of the document
The project plan of New products from forest 27.4.2016 TP.docx	A project plan
Metsämittari-MELATuPa.doc	MELATuPa as potential implementation of Forest Indicator service.
Requirement specification template Metsämittari 0.4.docx	Forest Indicator Requirement specification for overall system of Forest Indicator service.

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2 SYSTEM SPECIFICATION

1. System architecture

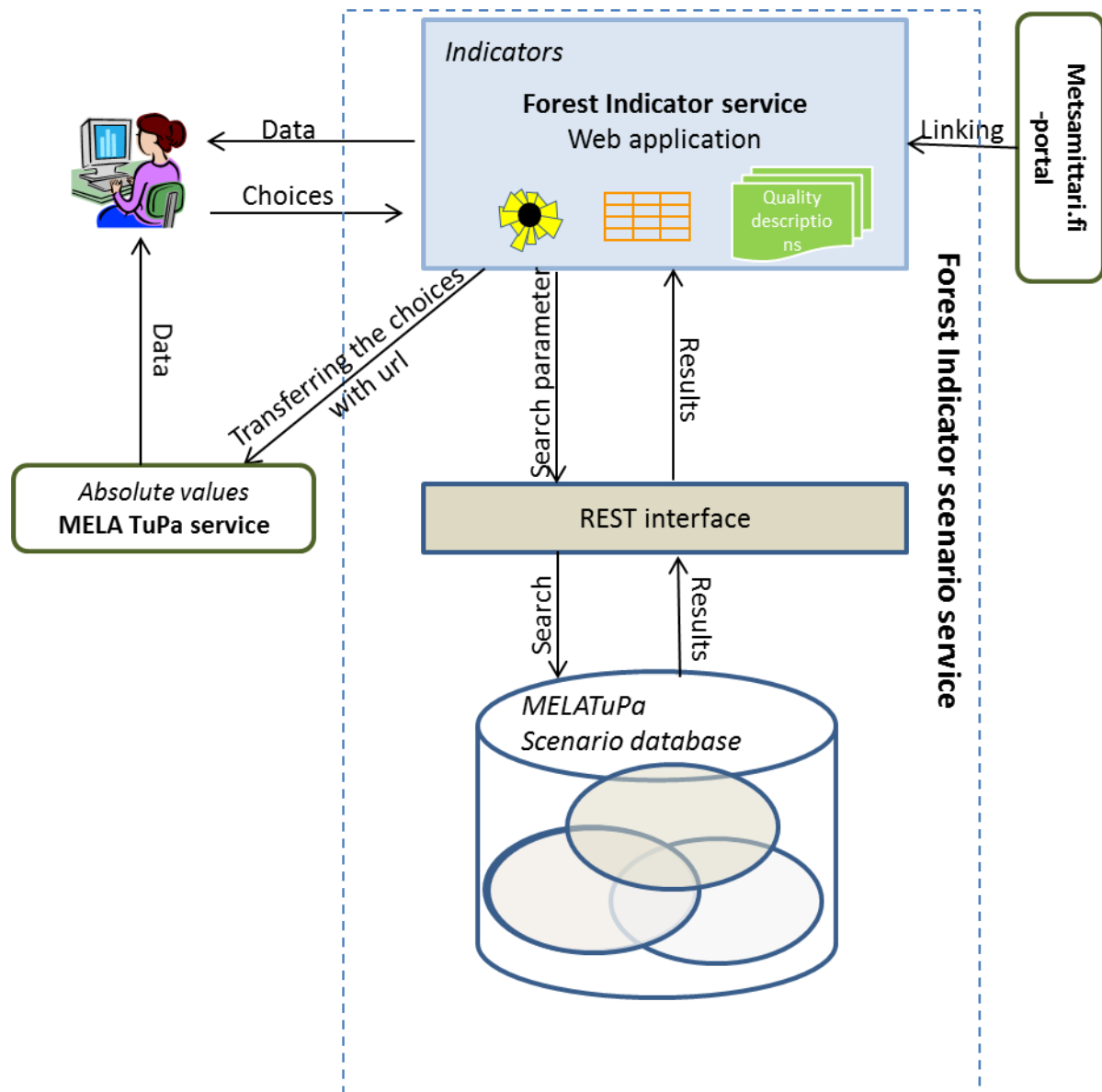


Figure 1. Web application of Forest Indicator scenario service and its connections with Luke's MELATuPa –service.

2. System components

- **Component 1 Web application Forest Indicator scenario service**
 - Processes the user's choices, asks for the necessary data from the MELATuPa database of scenarios and produces figures and tables based on it.
 - Specification: Luke
 - Implementation: OUAS

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- **Component 2 REST database interface**
 - Provides the interface for data transfer from the MELATuPa database to Forest Indicator service.
 - Specification: Luke + OUAS
 - Implementation: Luke + OUAS

3 REQUIREMENTS

1. Catalogue of requirements

ID	Requirement	Pe- forme r	Date	Im- port ance	Reasoning
1	The user can compare visually the scenarios and the indicators based on his/her choice.	RL	4.4.17	1	Core feature of Forest Indicator service.
2	The user can compare in tables the scenarios and the indicators based on his/her choice.	RL	4.4.17	1	Core feature of Forest Indicator service.
3	The user can record/save in his/her computer the results as figures and tables	RL	4.4.17	1	Core feature of Forest Indicator service.
4	The user can print the results as figures and tables	RL	4.4.17	1	Core feature of Forest Indicator service.
5	The user can see the short description of a single indicator	RL, AT		2	Easily available information for the user to interpret indicators.
6	Background material (text, figures, tables, links) of calculations, the calculation assumptions of the scenarios, the variables and the quality description of the indicators are available for the user.	RL	4.4.17	1	Background information available for the user to interpret the results of Forest Indicator service.
7	The user can examine/study the absolute values of the indicators in MELA TuPa service, i.e. the choices the user has made in Forest Indicator service will be transferred to MELA TuPa.	RL, AT, TP	8.6.17	1	Core feature of Forest Indicator service.
8	The user can get a short description of the options to guide his/her choices.	RL	4.4.17	2	Further information about the options.
9	Guides for the functions of the service are available.	RL	4.4.17	2	Simplifies the use of Forest Indicator service.
10	The user can change the language of the scenario service.	RL	4.4.17	3	Forest Indicator service also achieves other than Finnish-speaking user groups.
11	The follow-up data of the scenario service is recorded.	RL	4.4.17	3	To monitor the number and contents of the searches via Forest Indicator service.
12	The interface is adapting the screen size (responsive).	RL	4.4.17	3	Fluent use with different devices.
13	The user can give feedback concerning the service (remarks, suggestions, error messages) by email to metsamittari@luke.fi	Metsä keskus	26.5.17	1	Basic feature of web services.

Importance: 1 = Obligatory, 2 = Useful, 3 = Desired

2. Users

- **Basic user**
 - **interest group:** End user of Forest Indicator service, for example authority, researcher, student, other interested parties
 - **description:** Searching for information about effects of forest utilization/use on ecosystem services.
 - **rights to use:** Searching for public information in Forest Indicator service, recording the information on a computer

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- **skills/competency:** Experienced in computing
- **number:** Hundreds
- **using/operating density:** Couple of times per year → estimated instance of use about 20 / day
- **authorization:** Open for all

3. Use cases

3.3.1 Use case 1: Visualization of indicators

1. The user makes choices

- **Regional level:** For example county or municipality
 - *Alternatives:* Various regional levels (from scenario database)
 - *Running order:* Getting the alternatives from scenario database in running order.
 - *Default:* The first alternative.
 - *Number of allowed choices:* 1
 - *Estimated number of alternatives:* 2
 - *Maximum number of alternatives:* 5
 - Choosing the type of region → alternatives for the choice: region
- **Region (1):** For example Northern Ostrobothnia.
 - *Alternatives:* Regions which have generated scenario (from scenario database)
 - *Running order:* Getting the alternatives from the scenario database in running order.
 - *Default:* The first alternative.
 - *Number of allowed choices:* 1
 - *Estimated number of alternatives:* 20 (counties)
 - *Maximum number of alternatives:* 320 (municipalities)
 - Choosing the region → alternatives for the choice: scenario collection
- **Scenario collection (1) :** the scenarios of a particular region
 - which are based on the same data
 - which have the same variables and indicators
 - which have the same time periods
 - For example. The scenarios based on the 11th National Forest Inventory (NFI11)
 - *Alternatives:* The scenarios of the chosen region (from the scenario database)
 - *Running order:* Getting the alternatives from the scenario database in running order.
 - *Default:* The first alternative.
 - *Number of allowed choices:* 1
 - *Estimated number of alternatives:* 3
 - *Maximum number of alternatives:* 10
 - If there is only one alternative, it is chosen automatically
 - Choosing the scenario collection → alternatives for choices: scenarios, period, categories for indicators and the indicators belonging there.
- **Scenarios:** For example Maximum net income scenario, Decaying wood scenario, Carbon sink scenario
 - *Alternatives:* The scenario of the chosen scenario collection (from the scenario database).
 - *Running order:* Getting the alternatives from the scenario database in running order.
 - *Number of allowed choices:* 1-20 Maximum number of scenario–indicator combinations (chosen scenarios * chosen indicators) is 20 (For example if 4 scenarios are chosen → maximum 5 indicators can be chosen).

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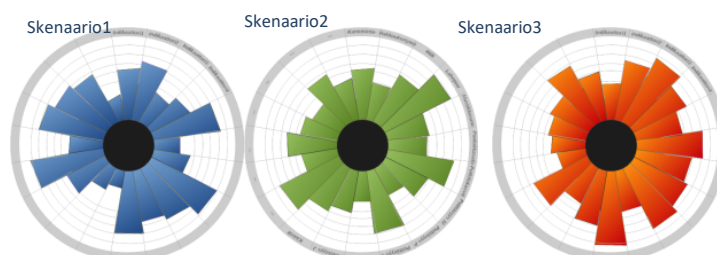
- *Estimated number of alternatives:* 10
- *Maximum number of alternatives:* 25
- *Default:* The first alternative.
- *The choices of Scenarios, Periods and Indicators* → The values in figures/tables.
- **Period:** The information in the scenario is generated for several periods. The user chooses one period to study. For example 2026 (-2030)
 - *Alternatives:* the periods of the chosen scenario collection (from the scenario database)
 - *Running order:* Getting the alternatives from the scenario database in running order.
 - *Default:* The first alternative.
 - *Number of allowed choices:* 1
 - *The estimated number of alternatives:* 6
 - *Maximum number of alternatives:* 10
- **Indicators (1-20)** Indicators are in groups of categories. A category may be compulsory. In that case the user must choose one indicator in that category and the default is the first indicator in the category. The user may also choose several indicators. The categories, the indicators in them and the compulsion are defined in the scenario database.
 - *Alternatives:* Categories of indicators and indicators in them (from scenario database)
 - *Running order:* Getting the categories and the indicators in them in running order.
 - *Number of allowed choices:* 1-20 The maximum number of scenario-indicator combinations (chosen scenarios * chosen indicators) is 20 (For example if the user chooses 4 scenarios → s/he can choose at a maximum 5 indicators).
 - *Estimated number alternatives:* 5 categories, each having 4-6 indicators
 - *Maximum number of alternatives:* 10 categories, each having max. 10 indicators
 - *Default:* The first choice of each compulsory category.
 - *Example:* Potential categories and indicators related to them. Compulsory categories where the user must choose at least one are underlined. Note: These are only examples, not the final contents of the service.

<i>Category</i>	<i>Indicator</i>
<u>Wood production</u>	Stump price
	Present value of net incomes
	Removal
	Volume
<u>Biodiversity</u>	Amount of decaying wood
	Number of vascular plants
	Coverage of bilberry
Natural products / Non-wood forest products	Bilberry crop
	Lingonberry crop
<u>Carbon</u>	...
Others	...

- **Type of graphs(1)**
 - *Alternatives:*

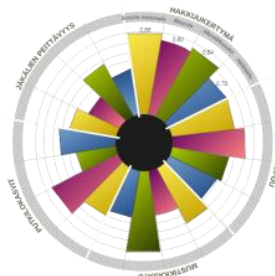
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- *Polar column chart, various scenarios in separate charts. The segments describe the values of various indicators (relative*

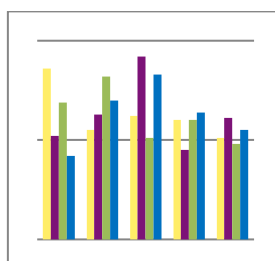


value).

- *Polar column chart, various scenarios in the same chart. The segments describe the values of indicators (relative values). The user may choose whether the segments are grouped by indicators (the values of one indicator in various scenarios together/side by side) or by scenarios (values of separate indicators together in one scenario). In the example chart the segments are grouped by indicators (various scenarios together), the colors represent various scenarios.*



- *Bar chart. Bars describe the values of indicators (relative values). The user may choose whether the segments are grouped by indicators (the values of one indicator in various scenarios together/side by side) or by scenarios (values of separate indicators together in one scenario). In the example chart the segments are grouped by indicators (various scenarios together), the colors represent various scenarios.*



2. The application displays the graphs the user has chosen (in accordance with user's choices)

- Title of figure (*defined later*)
 - Region
 - Period
- The source data of figure (*will be defined later*)
 - For example the Luke Forest Indicator service, date of calculation

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3.3.2 Use case 2: Presenting the indicators in a table

1. The user has made choices to visualize the indicators (user case 3.3.1) and chooses showing the results in a table.
2. The application prints out the table in accordance with the choices.
 - o The title and the source information are the same as in the user case 3.3.1
 - o The relative values of indicators are shown in the table.
 - o The structure of the table
 - Columns: The scenarios
 - Rows: The indicators
 - Example

	Scenario1	Scenario 2	Scenario 3
Indicator1			
Indicator2			
Indicator3			

3.3.3 Use case 3: User changes over to MELA TuPa service to review the absolute values

The user's choices will be transferred to MELA TuPa-service, where the absolute values of the chosen indicators can be seen.

3.3.4 Use case 4: User saves the figure/table in his/her computer.

The figure or the table produced using the user's choices (the user cases 3.3.1, 3.3.2), is saved in the computer.

- o The title and the source information are saved in the figure/table
- o The format of the saved figure: the common formats like. png, jpg, svg.
- o The format of the saved table is a common format such as tabulator delimiter (txt), comma separated values (csv), Excel workbook (xlsx)

3.3.5 Use case 5: User prints the figure/table

The figure or the table produced using the user's choices (the user cases 3.3.1, 3.3.2), is printed.

- o The title and the source information are printed in the figure/table

3.3.6 Use case 6: User sees the short description of the indicator

The user chooses the indicator in the figure or in the alternatives of indicators (see 3.3.1) and sees (gets) the short description of the indicator. The description is picked from the scenario database.

3.3.7 Use case 7: User reads the quality description

Viewing the quality description of the data based on the user's choices (user cases 3.3.1, 3.3.2) The quality description includes more detailed descriptions of the chosen indicators (from the scenario database) and a description of the calculations (static text) and the references (static text).

3.3.8 Use case 8: User needs help

1. The user gets guidance on the functions of the Forest Indicator service.
2. The user gets guidance on the contents of choices in the Forest Indicator service (for example a short description of a scenario or indicator). The contents of guidance are picked from the scenario database.

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3.3.9 Use case 9: User changes the language of the service

The language of the Forest Indicator service is Finnish by default (the interface and the contents of the scenario database). The user can choose English.

3.3.10 Use case 10: User changes over to Metsämittari.fi portal

The user can change from the Forest Indicator service to Metsämittari.fi portal.

4. Connections to other systems

The data for the scenario service is retrieved from Mysql database of Luke's MELATuPa service. There is the REST interface for the use of the database (see figure of the system, fig1).

4.1 Transferring the choices in the Forest Indicator service for MELATupa service in URL.

The user can change over to MELA TuPa service to review the absolute values of the indicators. The user's choices are transferred to MELA TuPa service in URL as follows:

The URL address of the MELATuPa service: <http://mela2.metla.fi/mela/tupa/index.php>
At the developing and testing phases there is a separate address of the MELATuPa development version which will be agreed upon.

Parameters of URL questioning part

In the questioning part the search parameters of the MELATuPA service are transferred.

Name	Value	Compulsory	Default	Description
lk	id	Yes		The id of a chosen scenario collection
ko	id	Yes		The id of a chosen region (for example 'Northern Ostrobothnia')
ty	id{id}	Yes		The ids of chosen scenarios
ka	id	Yes		The id of a chosen period
mj	id{id}	Yes		The ids of the absolute variables (absVar) corresponding the chosen indicators (transferred with the indicator data for the Forest Indicator).
la	fi/uk	No	fi	Language selection of MELATuPa. fi=Finnish, uk=English.

(id= corresponding key in the table of the MELATuPa scenario database)

Example (fictive id): <http://mela2.metla.fi/mela/tupa/index.php?lk=3&ko=10&ty=6,4&ka=12&mj=1,5,8,9>

5. Data security requirements

No confidential data.

6. Other requirements

- data transfer character code is UTF-8
- response time in all user interface functions: 1 sec

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- the system can be used anywhere
- https must be used
- scenario database is at lukedb1.ns.luke.fi server
- the implementation tool of the scenario service interface and visualization must enable maintenance and development in Luke