



ETSI III LCE

Computer Program for Evaluating
“**Bridge Aesthetics and Cultural Values**”

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Question:

How to measure and express aesthetical values so that they would be commensurable with other values like life cycle cost C_{LCC} or environmental values C_{LCA} ?

Naturally, **money** is the only thinkable unit.

Answer:

By introducing a *reduction coefficient* k_{rel} .

This coefficient relates aesthetical values to the construction cost.

Consequently, the *total cost*

$$C = k_{rel}C_{LCC} + C_{LCA}$$

The current computer program is developed to calculate the value of the *reduction coefficient* k_{rel} using equation

$$k_{rel} = 1 - a \frac{\sum_{i=1}^n p_i w_i}{p_{imax} \sum_{i=1}^n w_i}$$

For calculation, *scaling factor* a based on *bridge site class*, *weights* w_i and *points* p_i are needed.



Classification of the bridge site is based on a system developed by the *Finnish Road Administration (Finnra)*.

Class I	Very demanding
Class II	Demanding
Class III	Remarkable
Class IV	Ordinary



The non-dimensional *scaling factor a* defines generally, how much value is given to aesthetical aspects.

Theoretically it varies between 0 and 1.

The higher value, the more aesthetics is appreciated.



Weights w_i consider, how important different evaluation *items i* in relation to each other are.

The higher value, the more important *item* is in question.

The items, like for instance transparency or slenderness etc., can be freely chosen.



Finally, *points* p_i indicate,
how well the requirements of *item i* are fulfilled
by the design or bridge being evaluated.

The higher score, the better.



The system described above enables comparison among different design proposals, existing bridges and bridge types as well as evaluation of even different construction methods.

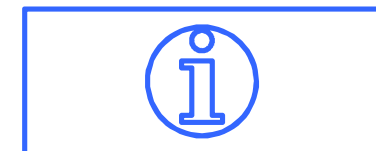
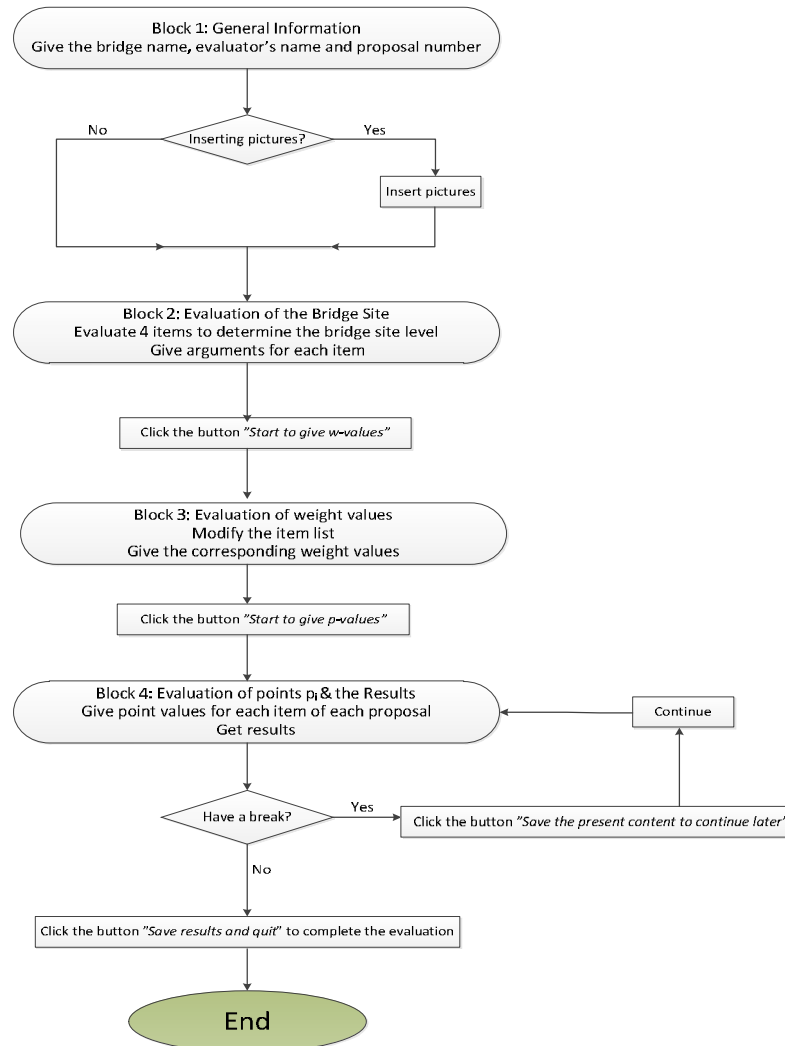
**Thank you for
your attention!**





ETSI

BRIDGE LIFE CYCLE OPTIMISATION





The whole program is divided into 4 blocks

Block 1: General Information

- **bridge name**
- **evaluator**
- **date**
- **proposal number**



Block 2: Evaluation of Bridge Site

Four aspects should be considered:

- location of bridge site**
- value of the landscape**
- cultural value of the bridge site**
- aesthetical demands set to a bridge at this particular site**



Block 3: Evaluation of weights w_i

Recommended 11 items are listed,

but the evaluator is able to edit items, for example:

- delete content of the existing item,**
- edit content and**
- add items**

Block 4: Evaluation of p_i & Results

Five p_i -values are accepted, namely -2, -1, 0, +1 and +2, i.e., “poor”, “modest”, “medium”, “good” and “excellent”, respectively.

Finally, the relative coefficient k_{rel} will appear at the bottom of Block 4.

In order to compare the *points* p_i given by different evaluators, the content of Block 4 is copied into a new sheet in the same Excel file.

Later, those sheets can be collected into an Excel file, whose name is "*Summarize All Results*".

**Thank you for
your attention!**

