Ouvrir la science !

Criteria grid for the selection of an Electronic Lab Notebook

Carried out by members of the
French Committee for Open Science Working Group
on Electronic Lab Notebooks

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1. Background and objectives

The report produced by the French Committee for Open Science Working Group on Electronic Laboratory Notebooks [1] presents lists of assessment criteria, scoring grids for the solutions considered, and graphical representations - all of which are intended to help select a solution.

This document and the associated file (*ELN WG – Tools – Criteria Grid.ods*) set out each of these items, describe them and provide guidance on their use.

Although the proposed criteria can be used as they are, it is strongly recommended that you draw on them and tailor them to your own needs; so feel free to:
- remove criteria,
- reformulate them,
- split them,
- group them together,
- etc.

2. General information

1) Difference between feature and technical characteristic (or constraint)

- A **feature** is required by the user to meet a functional requirement.

- A **technical characteristic** or constraint is required by the regulations in force or the laboratory's operating routines.

2) Research approach *(*see paragraph 2.2.2 of the report)

- Predominantly **experimental** research: the research is primarily based on controlled and deliberate testing, whether under laboratory or real-world conditions.

- Predominantly **analytical** research: mainly focused on computer analysis and processing of data, whether of an observational or experimental origin.

- Predominantly **observational** research: where the main focus of the research is observing objects, phenomena and behaviours outside of a controlled setting.

3) There is no point in refining your criteria if you cannot get detailed information on the solutions being compared.

4) NB: the values presented in the different tabs are simple representations of the calculation methods; they do not reflect the opinion of the working group.

5) The fields you will have to fill in are highlighted in yellow in the different tabs.

6) Taking advantage of these tools requires some knowledge of how to use spreadsheets; this

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[1]Gilles Mathieu, Dominique Pigeon, Tovo Rabemanantsoa, Christophe Chipeaux, Simon Duvillard, et al.. Working Group on Electronic Lab Notebooks. [Research report] Committee for Open Science. 2021, 68 p. DOI: 10.52949/30

document is not intended to help you do that. Nevertheless, Annex 2 gives examples of the calculation formulas used.

3. Preliminary steps and selection criteria

The use of tools takes place during the selection process, after a number of steps have been completed:
- Feasibility study
- Identification of the Project Owner
- Steering group composition
- etc.

In addition to the functional assessment, presented here, other selection criteria should be considered, for example:
- The overall cost of the solution
- Ease of adoption and available support
- Subjective suitability criteria specific to the target users,
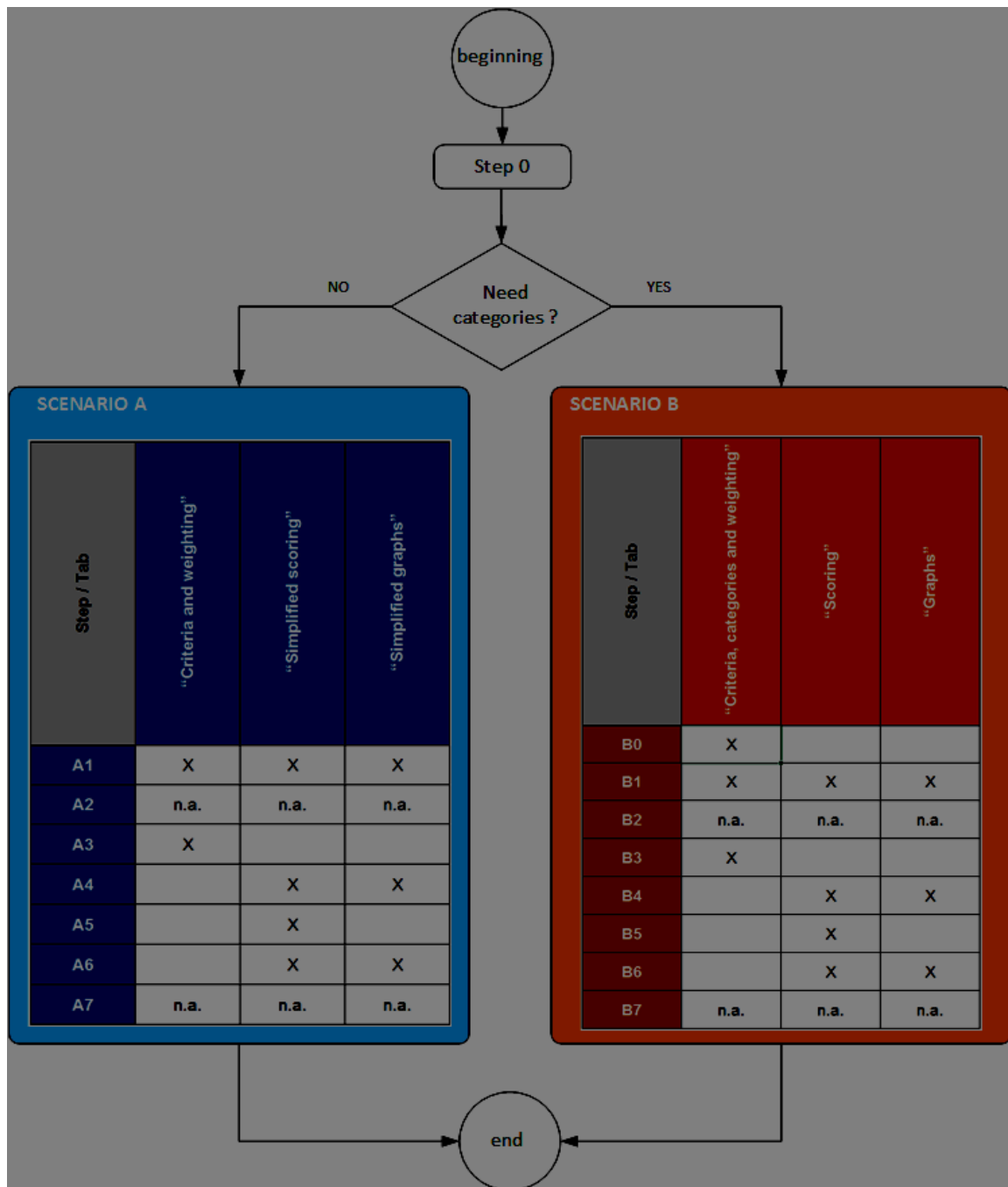- etc.

see paragraph 4.2.2 of the report

4. Steps of the functional assessment

Below is a step-by-step guide on how to use the tabs in the "*ELN WG - Tools - Criteria Grid.ods*" file during the tools' functional assessment phase.

Step 0: Consider the **category concept** for weighting purposes. The report proposes categorisation by research approach (see paragraph 4.2.1) but any other division is possible; a simpler and more general approach may also be preferred when the category concept is not used.

Working with categories makes it possible to refine the analysis of different options to find the most appropriate one for a particular demographic or use.

Depending on this first choice, the steps to take and the tabs to use are determined by the following flowchart:

X = to be used
n.a. = not applicable

Step / Tab	"Criteria and weighting"	"Simplified scoring"	"Simplified graphs"
A1	X	X	X
A2	n.a.	n.a.	n.a.
A3	X		
A4		X	X
A5		X	
A6		X	X
A7	n.a.	n.a.	n.a.

Step / Tab	"Criteria, categories and weighting"	"Scoring"	"Graphs"
B0	X		
B1	X	X	X
B2	n.a.	n.a.	n.a.
B3	X		
B4		X	X
B5		X	
B6		X	X
B7	n.a.	n.a.	n.a.

Scenario A: if you DO NOT want to use the category concept

Step A1: Draw up the **list of criteria** based on the proposals in the report.
→ if you made any change (addition, removal modification), update the tabs:

- "Criteria and weighting": column A if the criteria categories have been changed; column B.
- "Simplified scoring": column A if the criteria categories have been changed; column B.
- "Simplified graphs":
  ↘ column A if the criteria categories have been changed;
  ↘ column B if the number of criteria per category has changed (modify the calculation

ranges; `=SUM('Simplified scoring'.D32:D34)` for example);

↘ column C if the number of criteria per category has changed (replace 23 in the formula " `=10*23`", for example).

Step A2: Decide on criteria weighting and scoring **scales**.

1) The granularity of the <u>weighting</u> scale depends on the final objective; it allows the difference between solutions to be emphasised.

Example for the weighting:
        1 = useless
        2 = secondary
        3 = important
        4 = essential

The analysis can be refined by moving to a scale from 0 to 10 (or more), as presented in the "Criteria..." tabs; in this case, it is not always possible to have an expression correspond to each value.

2) The granularity of the <u>scoring</u> scale depends on the ability to study the solutions in detail: if one has access to a lot of information, experimentation, etc.

Example for scoring:
        0 = Does not meet requirement or information unavailable
        1 = Partially meets requirement
        2 = Meets requirement
        3 = Exceeds requirement

Step A3: Decide on the **weighting** per criterion;
        → update the "Criteria and weighting" tab ("Weighting" columns).

Step A4: Identify **solutions** to be assessed, as well as sources of information;
        → update the tabs:

- "Simplified scoring": add 2 columns per solution,
- "Simplified graphs": add 1 table per solution and check that the calculation formulae are transferred.

Step A5: **Score** each solution;
        → update the "Simplified scoring" tab: fill in the "Raw score..." columns according to the chosen scale; this automatically fills in the "Simplified graphs" tab.

Step A6: **Compare** the functional scores in the "Simplified scoring" tab (weighted scores, with subtotals) and the "Simplified graphs" tab.

Step A7: Add the functional scores into the **selection grid**, together with the other criteria (see beginning of chapter 4 of the report).

Scenario B: if you want to use the category concept

Step B0: Identify the **categories** for the weighting.
→ update the "Criteria, categories, and weighting" tab: create the columns *ad hoc*

Step B1: Draw up the **list of criteria** based on the proposals in the report.
→ if you made any change (addition, removal modification), update the tabs:
- "Criteria and weighting": column B,
- "Scoring": column B,
- "Graphs":
  ↘ column A if the criteria categories have been changed;
  ↘ column C if the number of criteria per category has changed (replace 23 in the formula " =10*23", for example).

Step B2: Decide on category weighting and scoring **scales** (see step A2).

Step B3: Decide on **weighting** per category, making sure to have the same total for each category (Features part on the one hand, Characteristics part on the other);
→ update the "Criteria, categories and weighting" tab.

Step B4: Identify **solutions** to be assessed, as well as sources of information;
→ update the tabs:
- "Scoring": addition of 2 columns per solution and per category,
- "Graphs": add 1 table per solution and check that the calculation formulae are transferred.

Step B5: **Score** each solution;
→ update the "Scoring" tab, "Raw Score" column; the weighted scores will be calculated automatically.

Step B6: **Compare** the functional scores in the "Scoring" tab (weighted scores, with subtotals) and the "Graphs" tab.

Step B7: Integrate the functional scores into the **selection grid**, together with the other criteria (see beginning of chapter 4 of the report).

Appendices

Appendix 1: correspondence between tabs and steps

Tab \ Step	0	A1	A2	A3	A4	A5	A6	A7	B0	B1	B2	B3	B4	B5	B6	B7
"Criteria and weighting"	n.a.	X	n.a.	X				n.a.			n.a.					n.a.
"Simplified scoring"	n.a.	X	n.a.		X	X	X	n.a.			n.a.					n.a.
"Simplified graphs"	n.a.	X	n.a.		X		X	n.a.			n.a.					n.a.
"Criteria, categories and weighting"	n.a.		n.a.					n.a.	X	X	n.a.	X				n.a.
"Scoring"	n.a.		n.a.					n.a.		X	n.a.		X	X	X	n.a.
"Graphs"	n.a.		n.a.					n.a.		X	n.a.		X		X	n.a.

X = to be used
n.a. = not applicable

Appendix 2: examples of the calculation formulae used

1) "Simplified scoring" tab
- cell D3: `=C3*'Criteria and weighting'.D6`

The raw score (C3) is multiplied by the weighting (D6) found in the previous tab (Criteria and weighting).

- cells C26 and C64: `=SUM(C3:C25) and =SUM(C28:C63)`

The contents of the cells between the two bounds are summed.

2) "Simplified graphs" tab, part 1
- cell B5: `='Simplified scoring'.D26`

We take from the previous tab (Simplified scoring) the total scores for the features (D26); similarly below for the criteria categories.

- cell C5: `=10*23`

We multiply the maximum value of the scoring scale (here 10) by the number of criteria in the category (here 23).

- cell D5: `=5*B5/C5`

We multiply by 5 the ratio between the score obtained by the solution (B5) and the maximum score (C5), in order to facilitate the representation.

3) "Simplified graphs" tab, part 2
- cell B31: `=D5`

We use the score out of 5 calculated in part 1 of the tab (cell D5).

- "Scoring of solutions 1 and 2" diagram:

Right-clicking on the area of the graph gives access to the specifications of the processed data, so that data for other studied solutions can be added.