DELIVERABLE 3.4
Evaluation Report
on Science Communication Guidelines

“ParCos – Participatory Communication of Science”
A HORIZON 2020 RESEARCH AND INNOVATION ACTION

Consortium: Lappeenrannan-Lahden teknillinen yliopisto (FI, coordinator), Katholieke Universiteit Leuven (BE), Vlaamse Radio- en Televisieomroeporganisatie (BE), and Knowle West Media Centre LBG (UK).

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DESCRIPTION OF THE DELIVERABLE

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SUMMARY

The ParCos Deliverable 3.4 shows the iteration process of the science communication guidelines framework in Deliverable 4.2 which is foundational to the ParCos training package Deliverable 4.3.

This iteration process consists of (1) face validity checks with the ParCos partners (KWMC, LUT, VRT) and (2) experiences and observations of students that used the guidelines to develop and evaluate their science story design. These insights during the iteration process will determine the final form and content of the future training package (D4.3).

Keywords: face validity check, science communication, science storytelling, evaluation criteria

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1 CONTEXTUALIZATION

This report is an evaluation and iteration of the Excel framework with quality guidelines for science communication as first communicated in the ParCos Deliverable D4.2 that was published in October 2022. This report was foundational to develop the first version of the Trainer Cards in D4.3 published in April 2022 (see Figure 1). The Trainer Cards set is a pedagogical training package for educating and guiding future content creators and curators on how to engage in reflective science communication efforts. This Trainer package is a first version of a reflexive evaluation tool.

Several activities were organized to translate the framework into the D4.3 Trainer package. An overview of the D3.4 process activities can be found in Figure 1. Within this report these different activities, and their implications for the translation of the framework into the Trainer Cards, will be discussed. In chapter 2, we will explore the internal activities within the ParCos consortium. In chapter 3, we will discuss how the framework was used in educational activities in a postgraduate in the University of Antwerp in which students train to become a cultural science intermediary.

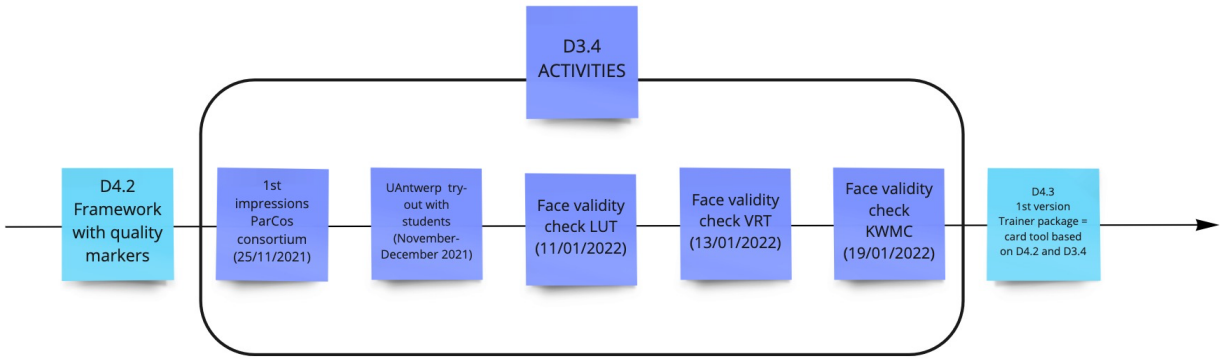


Figure 1: D3.4 timeline

The initial task description of this deliverable was to conduct interviews and surveys to include the perspectives of science dissemination stakeholders on the evaluation framework. The same outcomes were achieved through alternative methods that appeared to be more suitable throughout the WP3 development process. Instead of conducting interviews, we opted for face validity checks and try-outs with stakeholders to bring in the perceptions of stakeholders and combine them with observations. The evaluation framework was the result of a systematic review, and it is common practice to combine these reviews with face validity checks. Face validity is an efficient and simple method for evaluation because the participating stakeholders don’t need to be an expert in testing or measuring to answer the questions that are asked by the researcher.

2 (PARCOS) IMPRESSIONS AND FACE VALIDITY CHECKS

To improve and finetune the Excel framework with science communication quality guidelines of Deliverable 4.2, face validity checks were held with the ParCos partners, who are experts in science storytelling. The participants were VRT (Sandy Claes Lead – Design Researcher & Catho Van Den Bosch – Innovation User Researcher), LUT (Antti Knutas – professor software construction & Annika Wolff – assistant professor User-centered software engineering) and KWMC (Penny Evans – Director KWMC factory & Lorraine Hudson – director KWMC Bristol Living Lab). These face validity checks happened in two stages.

In a first stage, the framework was presented during a workshop on the online ParCos consortium at 25/11/2021. During this stage, the general impressions by all the ParCos members (VRT, KUL, KWMC, LUT) were generated on a Miro board (see Figure 2).

Figure 2: First Impressions

These first impressions generally raised concerns about the low accessibility and lack of clarity of language (such as the use of difficult academic jargon), the overwhelming number of criteria, and the lack of concreteness (no illustrative examples, no clear practical application of the framework).

Some positive reactions included the relevance and clear structuring of the framework, as well as the revelation of new dimensions in which to operate or think as a science communicator.

In addition, the participants were asked for ideas for improvement related to approach, structure, labels, and absent relevant criteria. Take away suggestions from the participants to improve the framework (see Figure 3) were adding visual representations, step by step guidelines, examples (which can be visual), and guiding questions to the cards.

Figure 3: First ideas for improvement

In the second phase we held separate online brainstorm sessions with the ParCos project partners via an online Miro board on 11/01/2022 (LUT), 13/01/2022 (VRT), 19/01/2022 (KWMC). In these sessions, the participants of the brainstorm sessions were asked to jointly select one of their own science stories to apply the framework to. More particularly, the participants were invited to share their main experiences, their thoughts concerning language and terminology, their ideas on how to translate the theoretical framework into a useable tool, and their suggestions on how to enrich or adapt the criteria during the brainstorm activity. Their feedback and suggestions were collected in an overview table on the next page (Table 1). The source figures taken from the Miro board can be found in the Appendix (section 5.1).

The most important take-aways from these sessions that led to the further development of the Trainer tool can be summarized as follow. A new version of the framework can be presented in a user-friendly and playful card format with different taxonomy levels for different audience groups, guided by a user manual. Difficult concepts should be simplified or clarified. Since the current framework is perceived as overwhelming, a selection of the most relevant and foundational criteria should be made in the next iterations of the framework.

ParCos partner	Science Story	Main experiences	Language & Terminology	Theory → Practice	Criteria	Additional suggestions
LUT Date: 11/01/2022	a Finnish lake pollution case (Fig. 3 in Appendix)	-the criteria seem to be relevant -the criteria are confusing. It seems they are aimed at different roles/persons (Fig. 4)	Suggestion: should be translated depending on focus group (the public, researchers, museum professionals, …) (Fig. 5).	Suggestions: -distinguish the different user groups (“audiences”) -combine several clusters of questions -create a workbook -adapt standard methods: cognitive walk through (Fig. 6)	-suggestion to add relevant helpful HCI sources to expand the design criteria (Fig. 7)	Suggestions for framing: -normative criteria: relevant to the content -substantive criteria: tap into local knowledge which is absent in HCI standard -performative criteria: focus on the audience and receive feedback (Fig. 8).
KWMC Date: 19/01/2022	Recycle case study (Fig. 9 in Appendix)	-not user friendly, unclear -participatory lens is missing -feels overwhelming -unclear for which audience this is -scientific criteria section is not accessible (Fig. 10)	-complex language (suggestion for simplification of terms or clarify concepts to the audience) -very academic: what about practitioners? (Fig. 11)	Suggestions: -identify audience and goals -make the tool fun and engaging (no practical examples) -create short course or MOOC (Fig. 12)	- suggestion to select most relevant criteria (Fig. 12)	-suggestion to learn from existing two-way science communication teaching -suggestion to test specific elements (Fig. 13)
VRT Date: 13/01/2022	Astrosounds Expo (Fig. 14 in Appendix)	-tension between complexity of the story and engaging translation -aimed at different target groups (Fig. 15)	-abstract and overwhelming -suggestion to avoid buzzwords, clarify concepts (Fig. 16)	Suggestions - card format - add manual -drill down technic, different levels - tree taxonomy (Fig. 17)	-suggestion to start from clarifying the 3 main categories (Fig. 18)	- suggestion to check the journalist toolbox site (Fig. 19)

Table 1. Overview of the face validity checks

3 (STUDENTS) SCIENCE STORY PRESENTATION DESIGN

To translate the framework into a practical trainer tool for science storytellers (D4.3), we also tested the framework of D4.2 in an educational context in the period of November 2021 to December 2021. Within a relevant postgraduate programme at the University of Antwerp, nine students used the framework as a supportive checklist tool in their co-design process of visual literacy tools. Furthermore, these students used the framework as a design guide checklist to develop and evaluate their own science story presentation on sensorial knowledge. During these activities the students were observed and evaluated based upon the same framework by three members of the didactic team, including one ParCos member. As a final activity, the students presented their science stories and visual tools during a seminar class. After the science story presentations of the students, we discussed their main experiences with the framework quality guidelines during a collective reflection session in class. These main impressions of the students concerning the use of the framework as a design support are noted in this report, as well as the observational remarks of the didactic team concerning the process of the students and the evaluation of the science story presentations.

3.1 STUDENTS’ EXPERIENCES

In general, the students from the University Antwerp perceived the large list of quality criteria as overwhelming and consequently they found the framework, which is in essence a form of checklist of all these criteria, difficult to use. The three main categories (normative, substantive, and performative) seemed helpful for the students, but the subcategories were too abstract to them, especially the normative criteria. The students suggested to slim down the subcategories. They wondered whether all the criteria in the subcategories were necessary to qualify for the main criterion category.

The students perceived the terminology as difficult and suggested visualizations to capture the essence of the different concepts behind the criteria. They believed that visualizations would provide support to translate theory into an illustrative practice.

Some students used the framework actively as a support during the design of their science story, whereas others developed their story first without the framework and only used it as a checklist to evaluate and adjust their designs afterwards.

Overall, the use of the framework led to feelings of insecurity, since the students felt they lacked the necessary competences to successfully apply all the different criteria to their design. The students indicated that the framework with its different criteria is not a one-size-fits-all tool and that there should be a way to diversify these criteria into different communicator profiles or audience groups.

3.2 GENERAL OBSERVATIONS BY THE DIDACTIC TEAM

The didactic team that evaluated these science story presentations remarked that even though the students managed to develop entertaining and engaging science story designs, some designs lacked a fundamental scientific grounding. Some students thus found it hard to grasp what makes a story scientific. The criteria in the framework related to the scientific grounding of the story (normative criteria), did not seem to provide sufficient support and guidance. A possible reason is that the terminology and the scientific concepts within the normative criteria were too difficult to grasp for these students with a background in the arts and humanities. Another issue related to the lack of scientificity of a story is that some students reinforced a very specific narrative. These students tried to persuade other students with their story narrative by evoking emotions and sensations. The thin line between communicating a science story and ‘propagating’ certain ideas was still difficult to balance despite that the framework encourages contextuality, openness, and ethical reflection.

We further observed that most science story presentations lacked an element of interactivity and engagement. There was little attention for the audience, despite that the students had a list with performative criteria at hand. Due to the excessive criteria (check)list, some students forgot the essence of their science story, namely that it should be an interactive act of dissemination that engages an audience.

Some presentations lacked an element of creativity. This happened when students talked about sensorial dimensions in their science story presentation without actually offering sensorial experiences or activities to the audience.

An important insight that follows from the above, is that the students experienced difficulties in balancing different elements in the design of their science story presentation. By focusing too much on the scientific grounding of the content of the story, the creativity and interactivity of the presentation became neglected. By focusing too much on engagement and sensations, the scientificity of the story became neglected.

4 GENERAL TAKE-AWAYS TO TRANSLATE THE GUIDELINES INTO A TRAINER PACKAGE

Tthe pilot testing and face validity evaluations of the framework with the ParCos partners and students lead us to incorporate the following elements in the ParCos Training package:

- To make the D4.2 framework less overwhelming, a next iteration will put forward the main key criteria only namely the three basic criteria groups (normative, substantive, performative) and their first subcategories.
- The framework will be translated into a card format. This card format will be divided into different ‘difficulty’ layers and account for different expertise profiles and roles in the science translation process. How to diversify between a scientist, media professional and art curator, for example.
- When transforming the framework into a card set, special attention will be paid that the language and content is accessible and meaningful for practitioners without an academic background. In doing so, we aim to balance between safeguarding its scientific grounds and complexity while at the same time also communicating the content in an engaging and user-friendly way. Visual illustrations will be considered to clarify and grasp the textual content. The card set will be part of a training package that includes a step-by-step approach and/or a manual as a helpful support.

5 APPENDIX

5.1 OVERVIEW OF THE MIRO-BOARDS

5.1.1 LUT

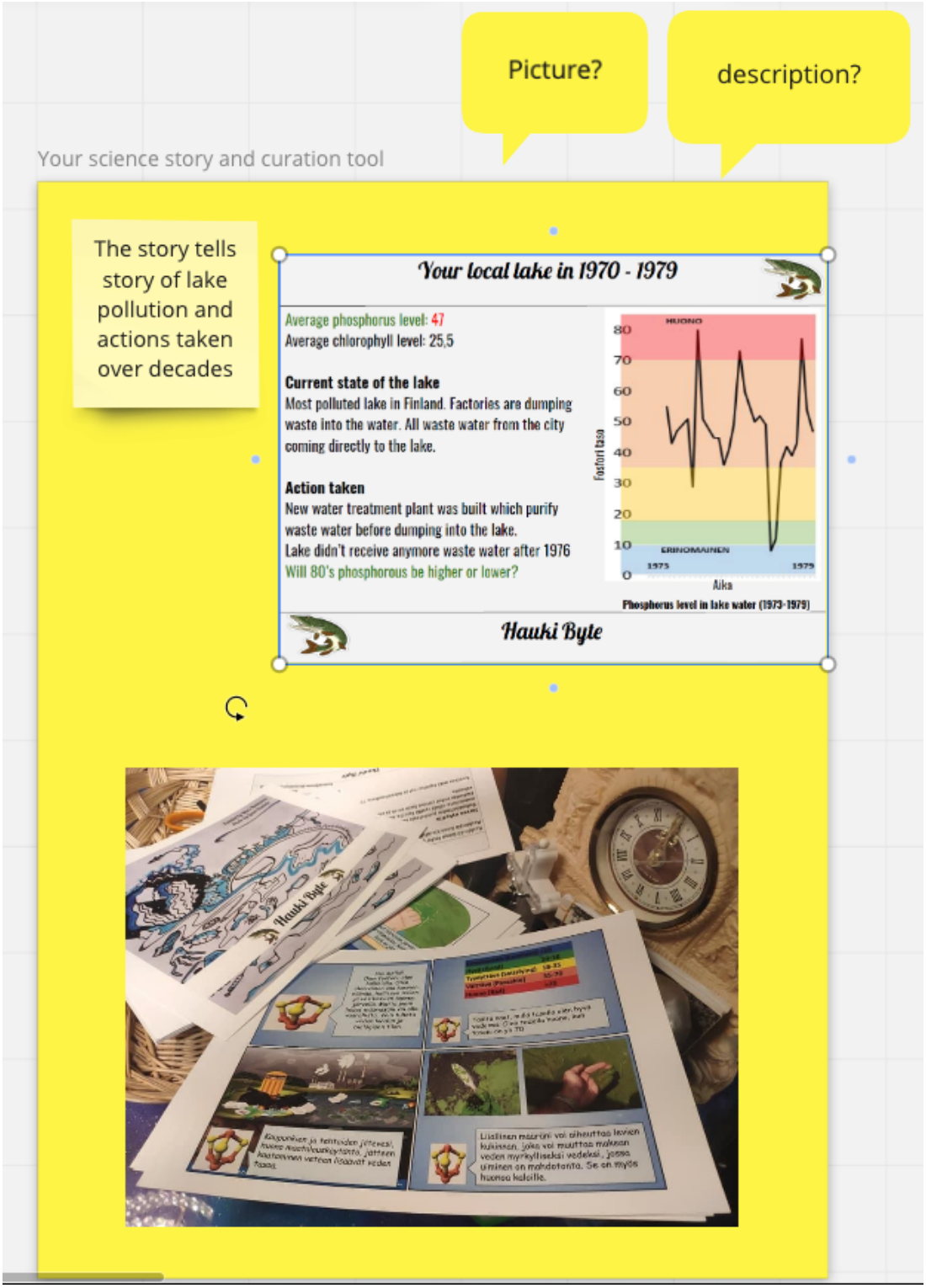


Figure 1

Figure 2

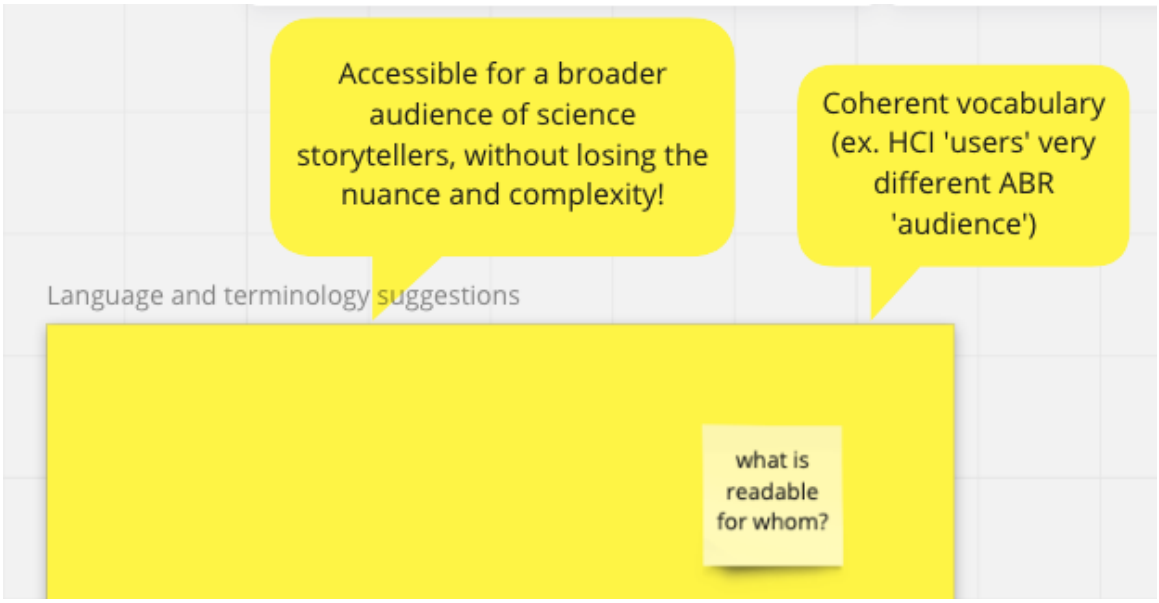


Figure 3


example user-friendly tool you like?
How to turn it into a user-friendly tool?
How would the framework best be taught? Format?
Visual terminology/ concepts
Working examples?
Translating this theory into something practical
carve the framework up
distinguish steps and different audiences
form it into a workbook, independent
https://www.designkit.org/
Adapting standard methods like cognitive walkthrough, heuristic evaluation and usability questionnaires but including the science story specific aspects
form questions into different categories
andybudd.com
Heuristics for Modern Web Application Development | Andy Budd
Heuristic evaluation is usually done either to augment usability testing, or where usability testing is impractical or cost prohibitive. Heuristic evaluation is considered slightly more objective than a simple "expert review" as the results are based up...
10 Usability Heuristics
for User Interface Design
www.nngroup.com
10 Usability Heuristics for User Interface Design
The design should always keep users informed about what is going on, through appropriate feedback within a reasonable amount of time. When users know the current system status, they learn the outcome of their prior interactions and determine next steps....
56%

Figure 4

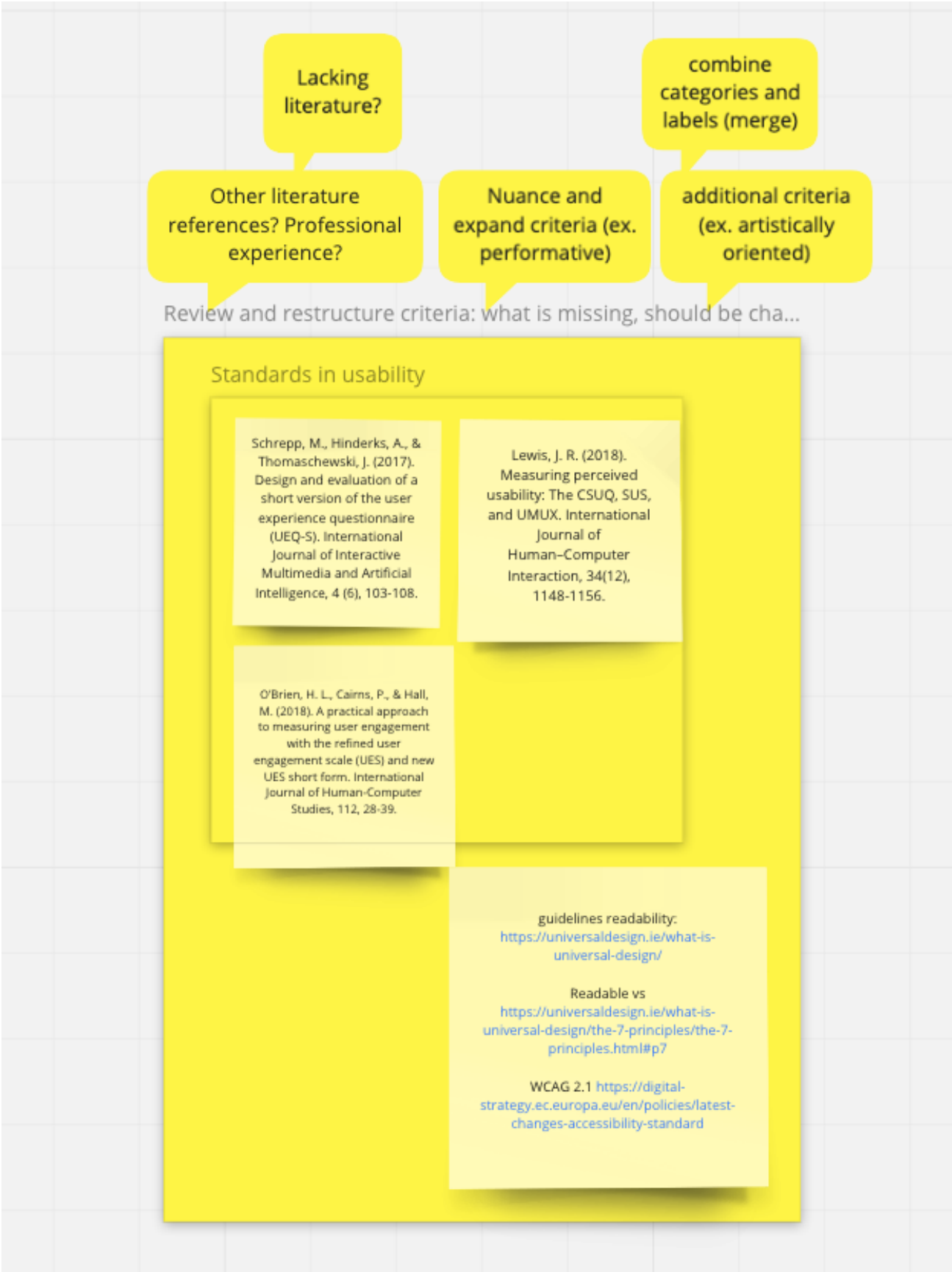

Lacking literature?
combine categories and labels (merge)
Other literature references? Professional experience?
Nuance and expand criteria (ex. performative)
additional criteria (ex. artistically oriented)
Review and restructure criteria: what is missing, should be cha...
Standards in usability
Schrepp, M., Hinderks, A., & Thomaschewski, J. (2017). Design and evaluation of a short version of the user experience questionnaire (UEQ-S). International Journal of Interactive Multimedia and Artificial Intelligence, 4 (6), 103-108.
Lewis, J. R. (2018). Measuring perceived usability: The CSUQ, SUS, and UMUX. International Journal of Human–Computer Interaction, 34(12), 1148-1156.
O'Brien, H. L., Cairns, P., & Hall, M. (2018). A practical approach to measuring user engagement with the refined user engagement scale (UES) and new UES short form. International Journal of Human-Computer Studies, 112, 28-39.
guidelines readability: https://universaldesign.ie/what-is-universal-design/
Readable vs https://universaldesign.ie/what-is-universal-design/the-7-principles/the-7-principles.html#p7
WCAG 2.1 https://digital-strategy.ec.europa.eu/en/policies/latest-changes-accessibility-standard

Figure 5

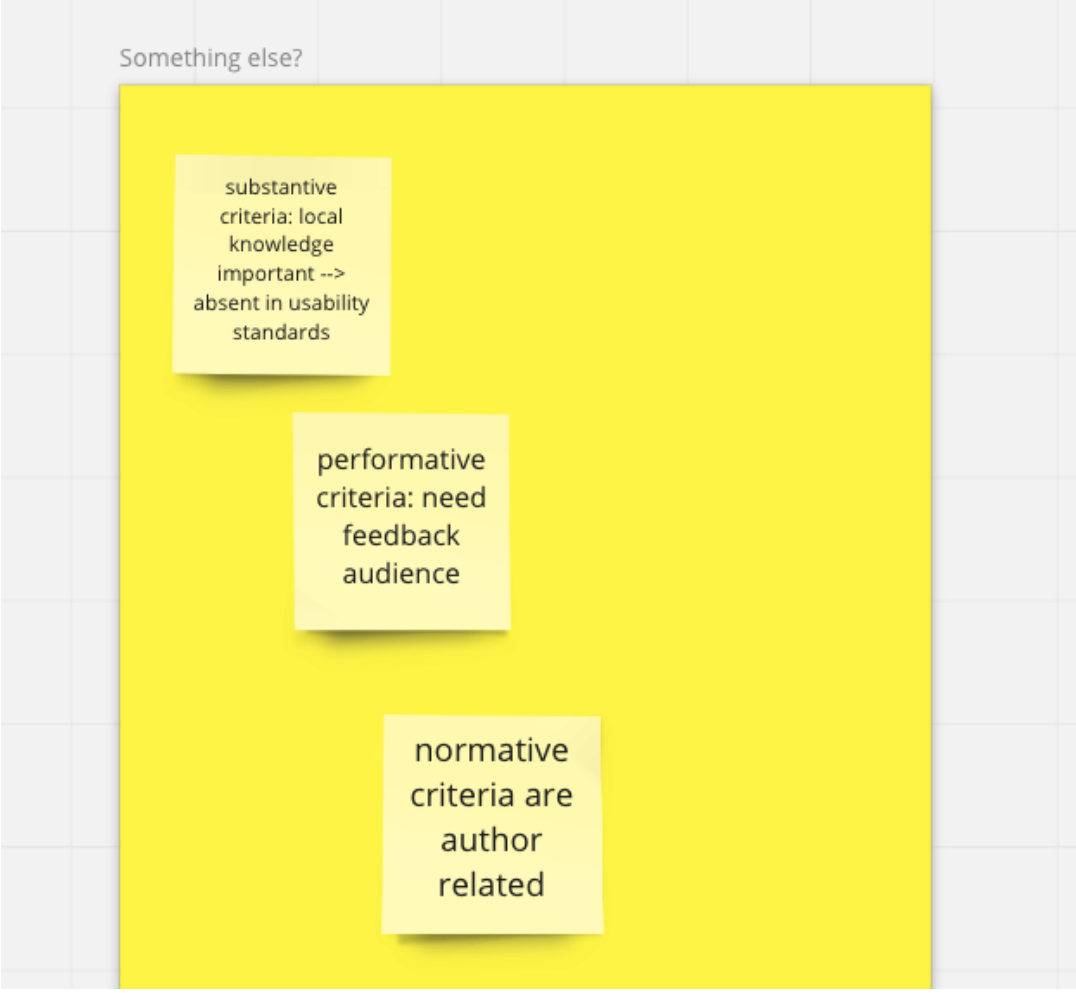

Something else?
substantive criteria: local knowledge important --> absent in usability standards
performative criteria: need feedback audience
normative criteria are author related

Figure 6

5.1.2 KWMC

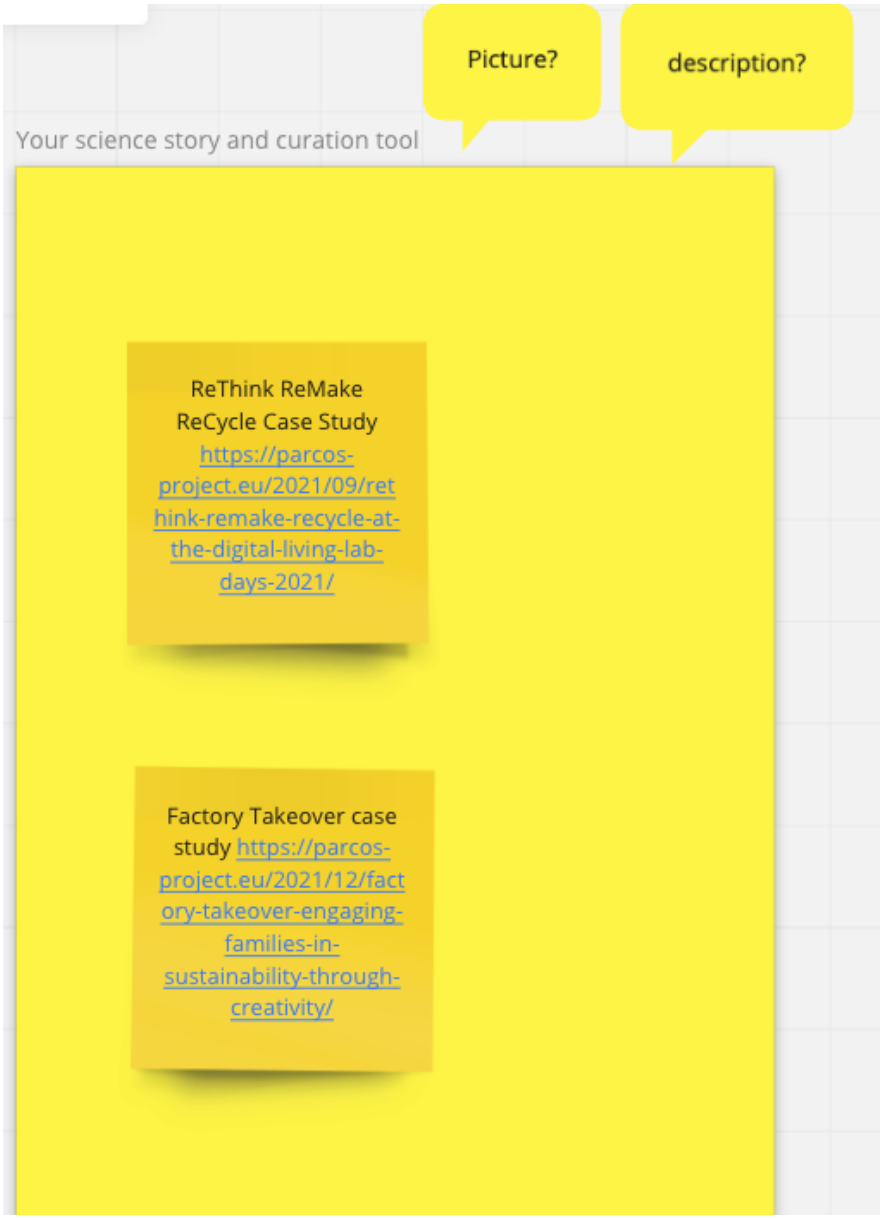


Figure 7

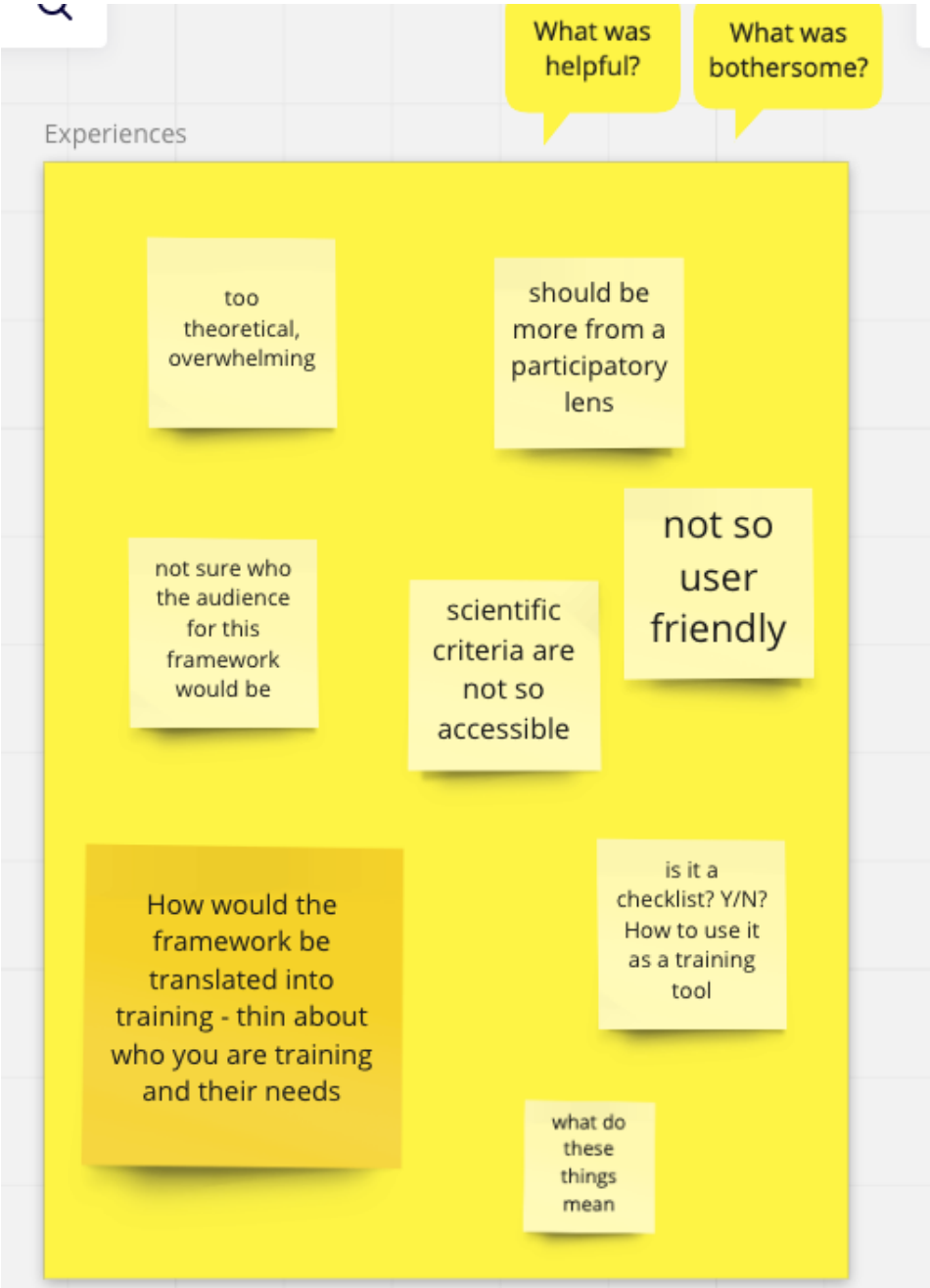

What was helpful?
What was bothersome?
Experiences
too theoretical, overwhelming
should be more from a participatory lens
not so user friendly
not sure who the audience for this framework would be
scientific criteria are not so accessible
How would the framework be translated into training - thin about who you are training and their needs
is it a checklist? Y/N? How to use it as a training tool
what do these things mean

Figure 8

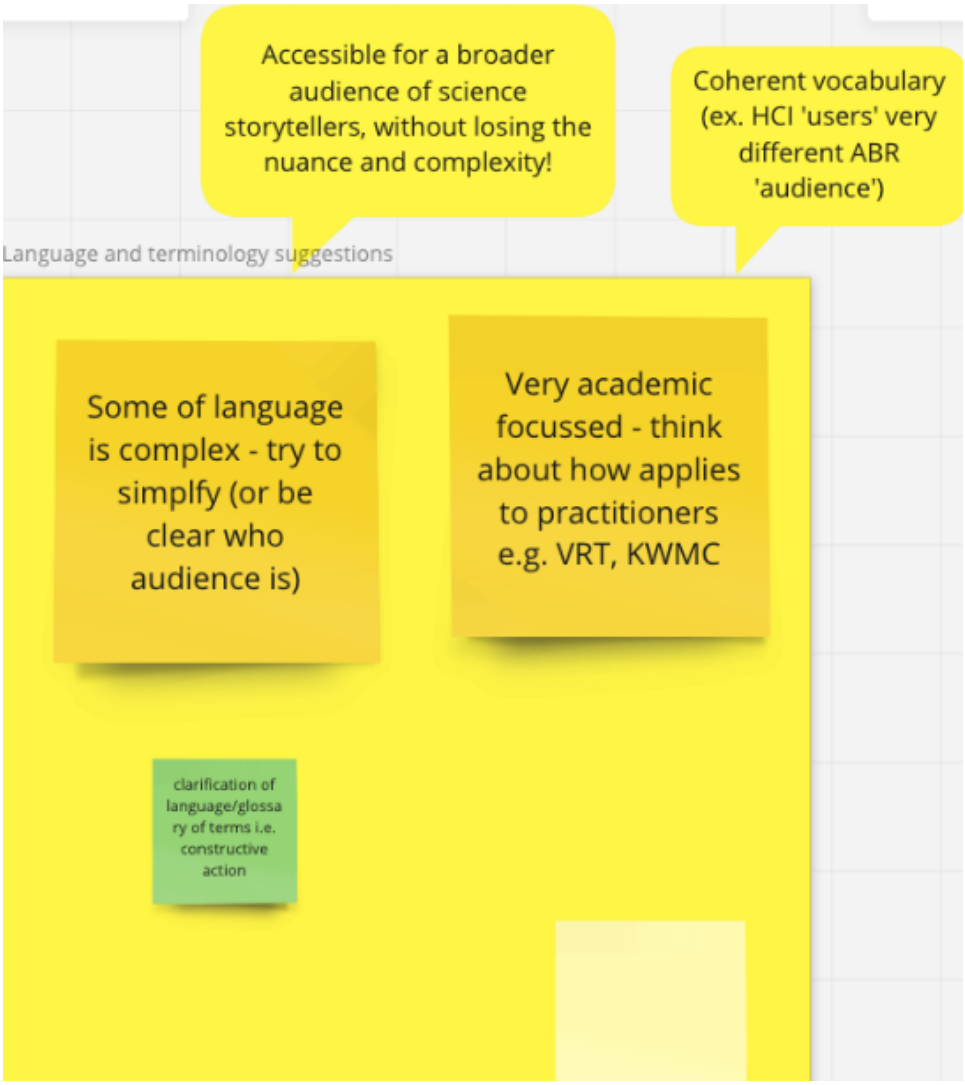

Accessible for a broader audience of science storytellers, without losing the nuance and complexity!
Coherent vocabulary (ex. HCI 'users' very different ABR 'audience')
Language and terminology suggestions
Some of language is complex - try to simplfy (or be clear who audience is)
Very academic focussed - think about how applies to practitioners e.g. VRT, KWMC
clarification of language/glossary of terms i.e. constructive action

Figure 9


example user-friendly tool you like?
How to turn it into a user-friendly tool?
How would the framework best be taught? Format?
Visual terminology/ concepts
Working examples?
Translating this theory into something practical
Identify what you want to achieve through training + your audience + then the mechanism to deliver e.g. workshop, online course
make learning fun + engaging - show rather than tell with practical examples
Have a look at other ways science communication is taught e.g. short courses, MOOC (there is one on FutureLearnhttps://www.futurelearn.com/courses/science-communication-for-researchershttps://www.futurelearn.com/courses/science-communication-for-researchers
Perhaps pick a few key things to communicate / test through training

Figure 10


Lacking literature?
combine categories and labels (merge)
Other literature references? Professional experience?
Nuance and expand criteria (ex. performative)
additional criteria (ex. artistically oriented)
Review and restructure criteria: what is missing, should be changed, should be ...
Interesting elements but need a plan for how to translate into training - maybe pick a couple of elements and test some training on them
look at how science communication is already taught (in a non 1-way)

Figure 11

5.1.3 VRT

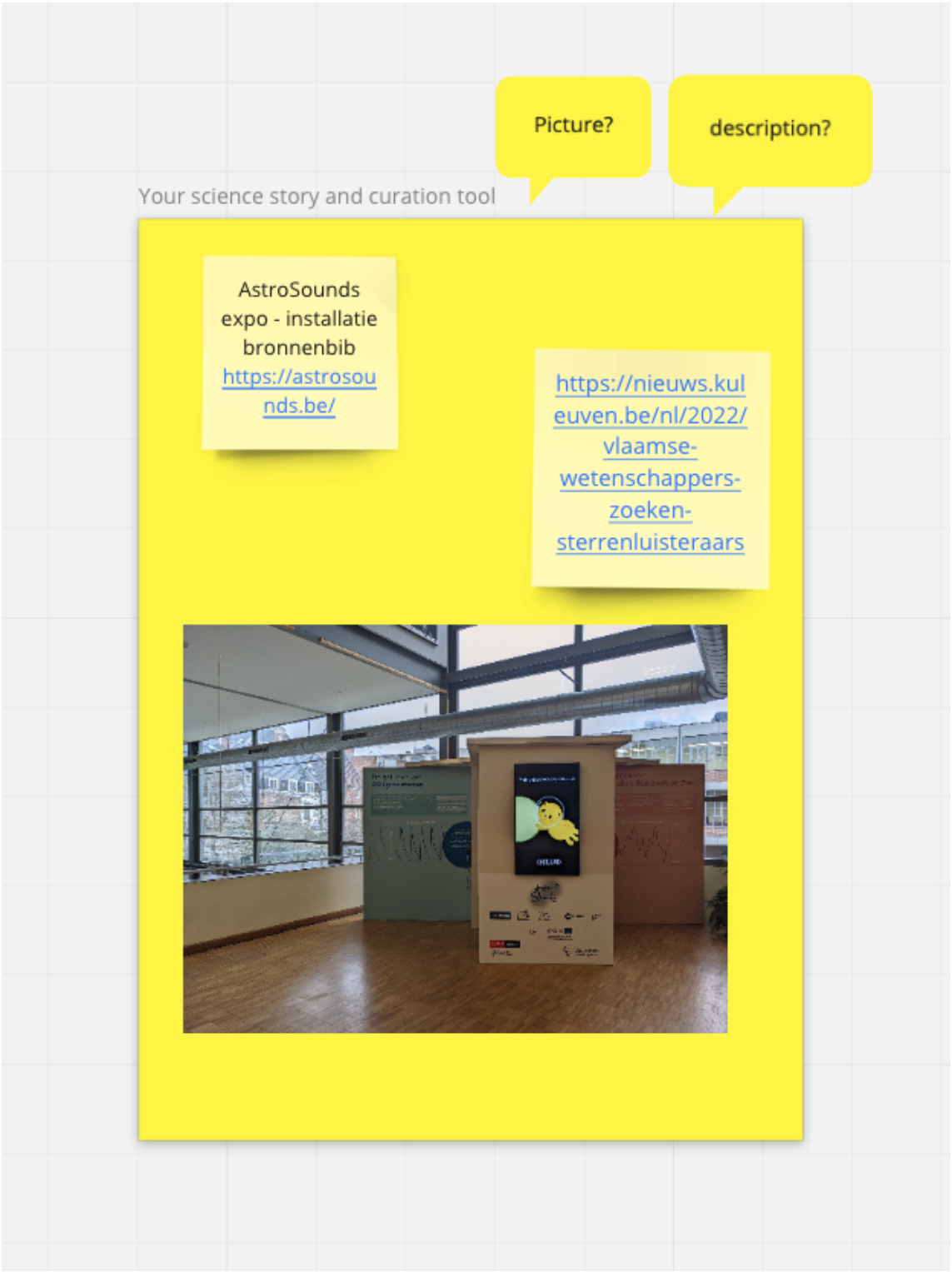


Figure 12

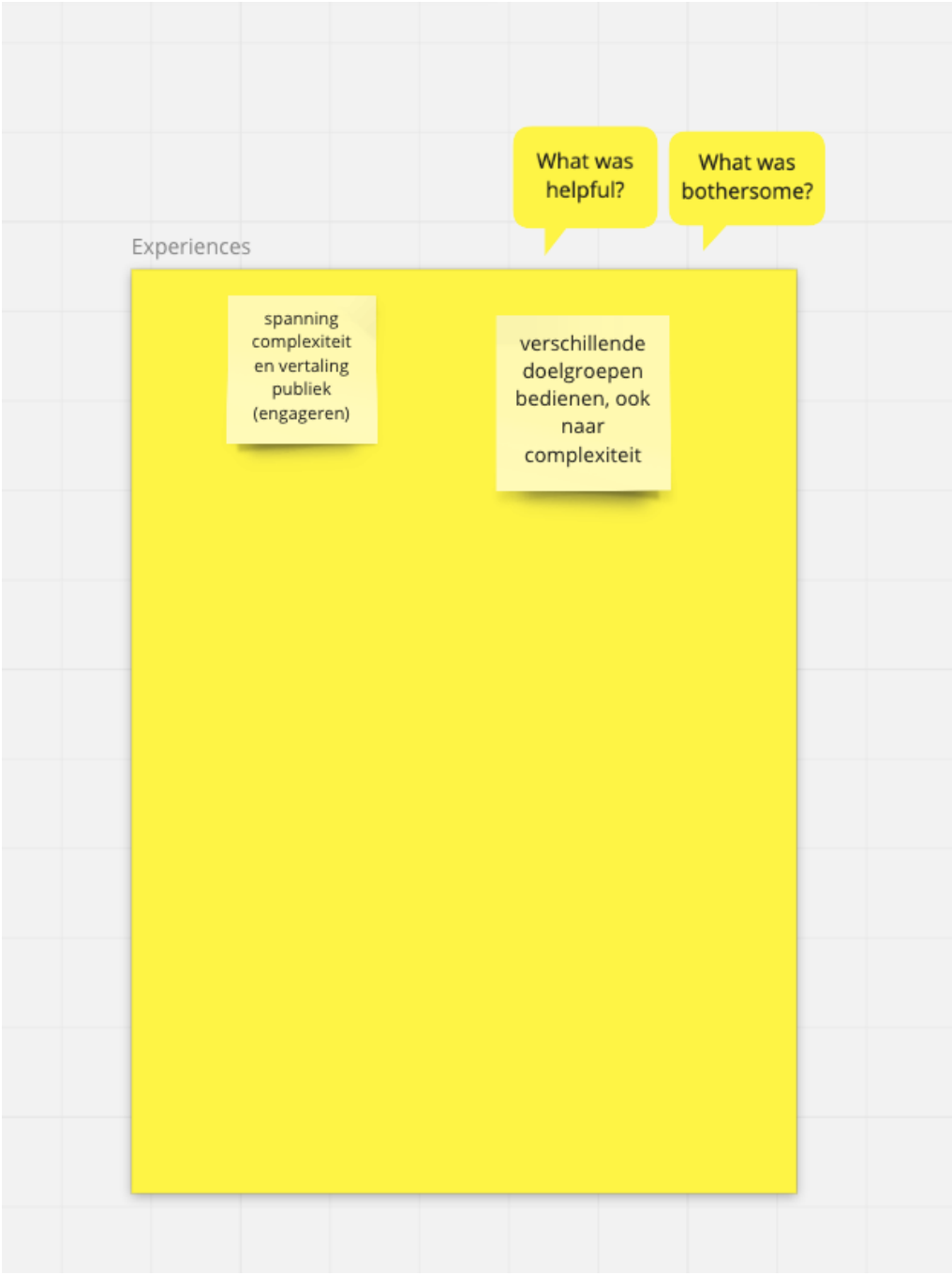
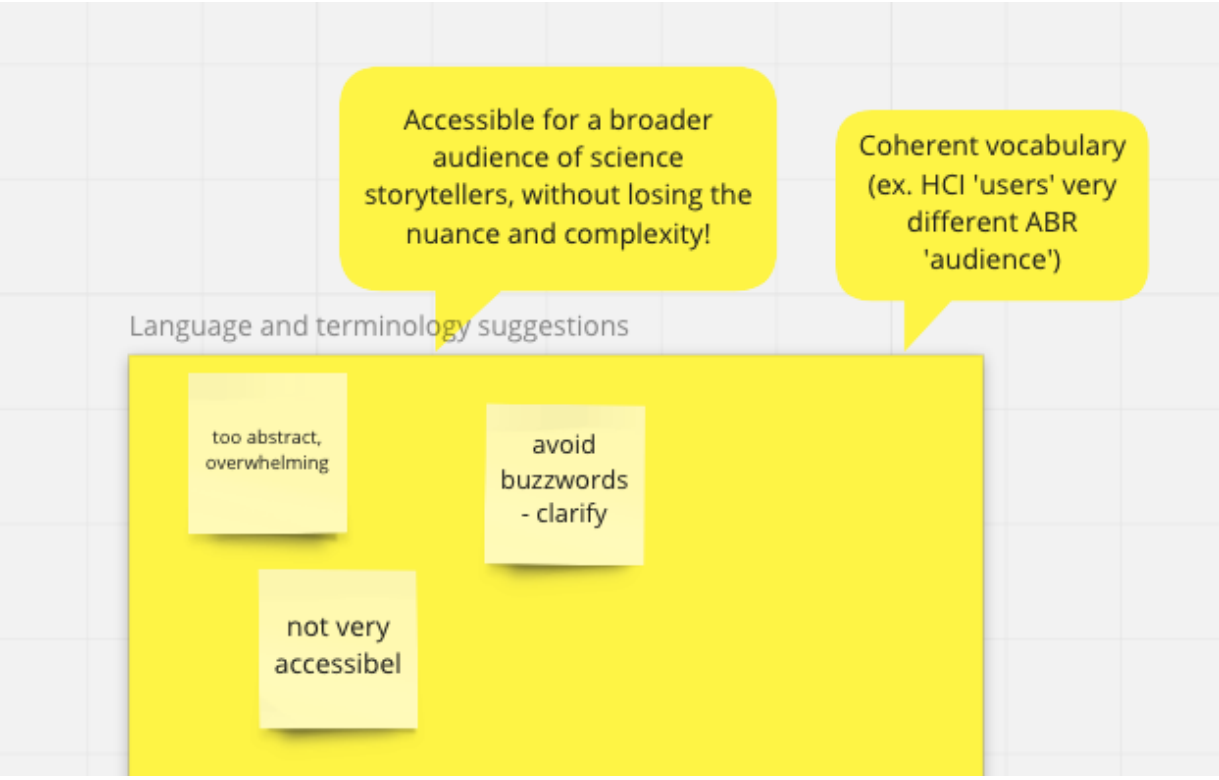

What was helpful?
What was bothersome?
Experiences
spanning complexiteit en vertaling publiek (engageren)
verschillende doelgroepen bedienen, ook naar complexiteit

Figure 13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not very accessibel

Figure 14

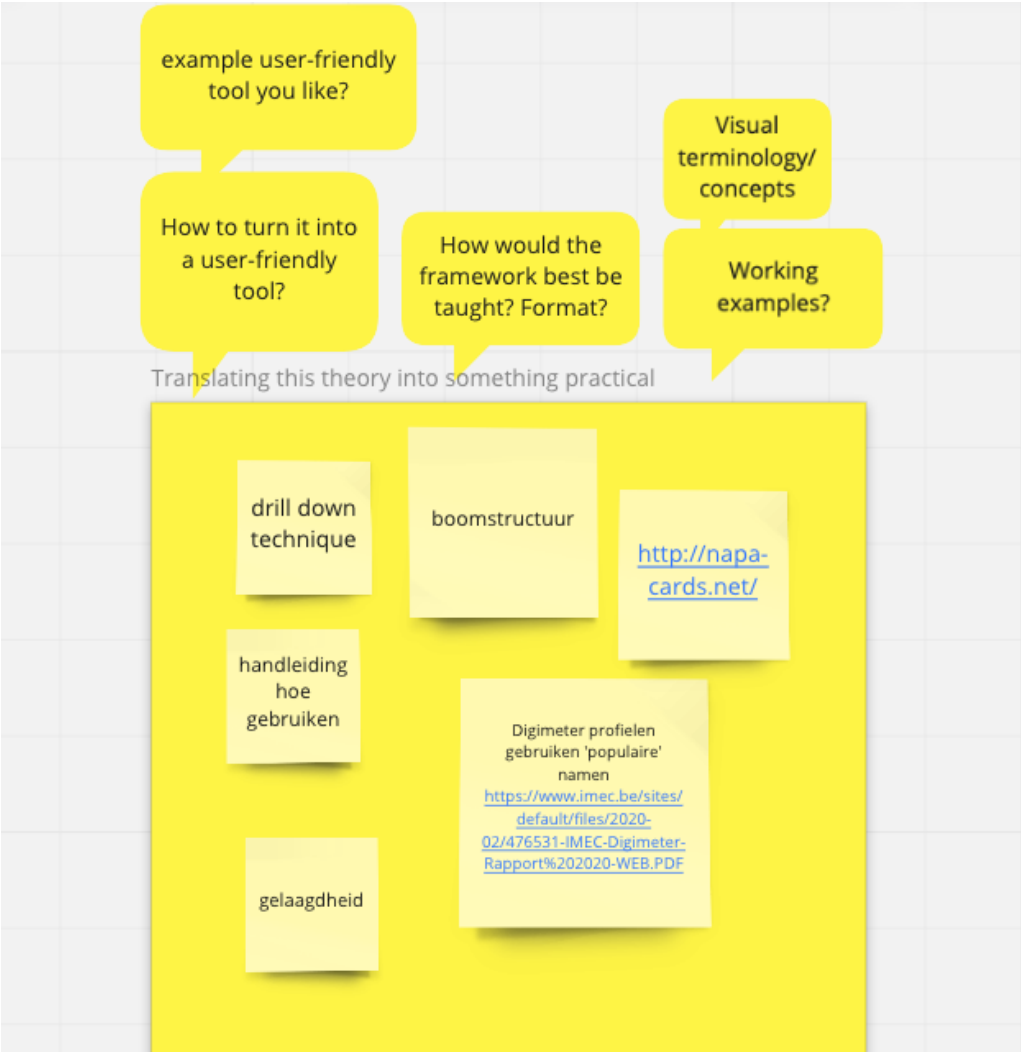
example user-friendly tool you like?
How to turn it into a user-friendly tool?
How would the framework best be taught? Format?
Visual terminology/ concepts
Working examples?
Translating this theory into something practical
drill down technique
boomstructuur
http://napa-cards.net/
handleiding hoe gebruiken
Digimeter profielen gebruiken 'populaire' namen
https://www.imec.be/sites/default/files/2020-02/476531-IMEC-Digimeter-Rapport%202020-WEB.PDF
gelaagdheid

Figure 15

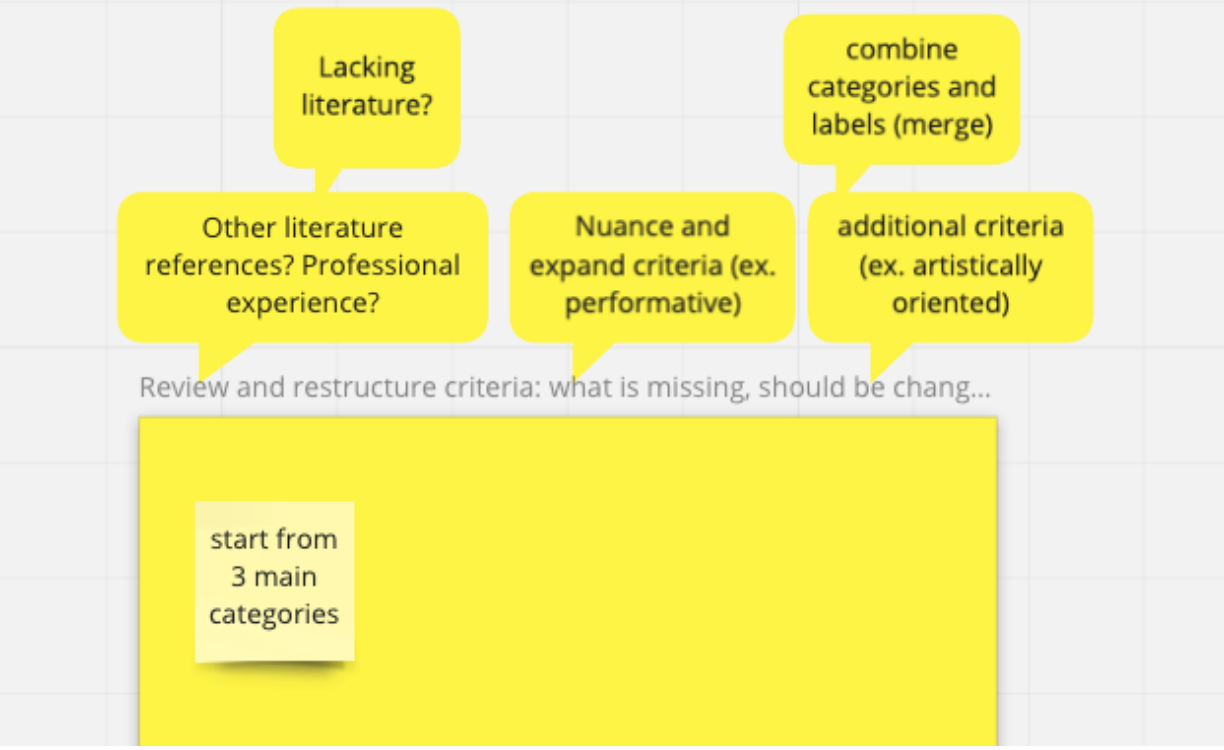

Figure 16

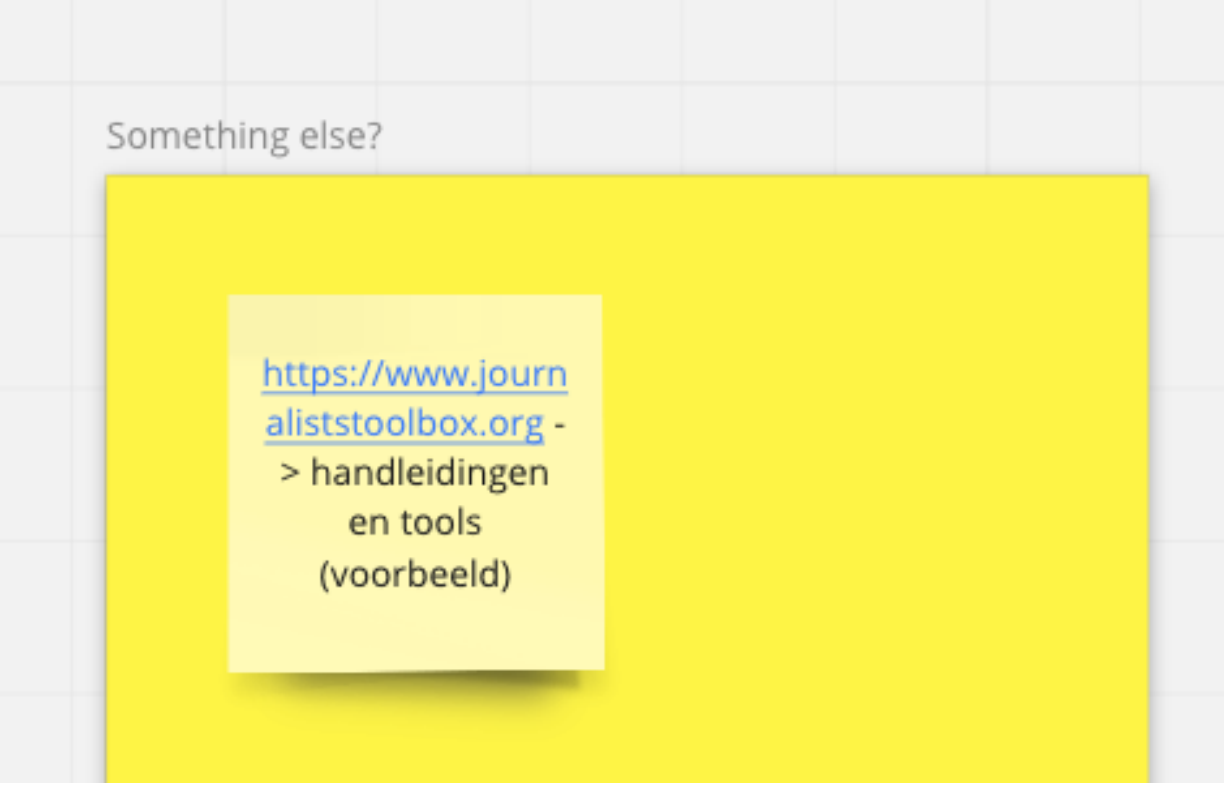

Figure 17